

Colorectal Cancer Screening in the Elderly Population: Disparities by Dual Medicare–Medicaid Enrollment Status

Siran M. Koroukian, Fang Xu, Avi Dor, and Gregory S. Cooper

Objectives. To assess the disparities in colorectal cancer (CRC) screening between elderly dual Medicare–Medicaid enrollees (or duals), the most vulnerable subgroup of the Medicare population, and nonduals.

Data Sources/Study Setting. The 1999 Medicare Denominator File, the Medicare Outpatient Standard Analytic Files, and Physician Supplier Part B files. In addition, the 1998 Area Resource File was used as a source for county-level attributes.

Data Collection/Extraction Methods. CRC screening procedures for 1999—fecal occult blood test (FOBT), flexible sigmoidoscopy (FLEX), colonoscopy with FOBT and/or FLEX (COL-WFF), and colonoscopy only (COL-ONLY)—were extracted from claim records, using diagnostic and procedure codes. Duals ($n = 2.5$ million) and nonduals ($n = 20.2$ million) receiving their care through the fee-for-service system were identified from the Denominator file. Hierarchical logistic regression analysis was conducted to adjust for individual- and county-level characteristics.

Principal Findings. Compared with nonduals, duals were disproportionately represented by female, older-old, and minority individuals (respectively 74.4 versus 58.5 percent; 19.3 versus 10.8 percent; 35.7 versus 8.0 percent), and CRC screening was significantly lower in duals than in nonduals (5.1 versus 12.2 percent for FOBT adjusted odds ratio [AOR]: 0.48, 95 percent confidence interval [CI]: 0.45–0.51); 0.7 versus 1.9 percent for FLEX, (AOR: 0.55, 95 percent CI: 0.49–0.61); 0.4 versus 0.8 percent for COL-WFF (AOR: 0.60, 95 percent CI: 0.54–0.67); and 1.8 versus 2.5 percent for COL-ONLY (AOR: 0.85, 95 percent CI: 0.80–0.89); $p < .001$ for all comparisons.

Conclusions. Duals are significantly less likely than nonduals to undergo CRC screening, even after adjusting for individual- and county-level covariates. Future studies should evaluate the contribution of comorbidity and low socioeconomic status to these disparities.

Key Words. Dual eligibility, managed care, colorectal cancer screening, administrative claims data

Colorectal cancer (CRC), a highly prevalent condition and a leading cancer-related cause of death in the elderly (Jemal et al. 2005), is potentially curable

when detected early (Smith, Cokkinides, and Eyre 2005). In addition, when surgery for CRC is of an emergency and/or palliative nature, it is associated with a substantially elevated risk of mortality (McArdle and Hole 2004), especially in the frail elderly (Koperna, Kissner, and Schulz 1997). Consequently, the benefits of screening may not necessarily be limited to those who are healthy, but are likely to extend to older individuals, and to those with compromised health as well (Clark et al. 2004).

The U.S. Preventive Services Task Force (USPSTF) recommends fecal occult blood test (FOBT) to be performed on an annual basis, and flexible sigmoidoscopy (FLEX) and colonoscopy at 10-year intervals (The U.S. Preventive Services Task Force 2005). It further recommends initiating CRC screening at 50 years of age in men and women at average risk for CRC, and earlier in individuals at higher risk for the disease, although there is no consensus on the age at which CRC screening should be discontinued. Despite the higher yield of CRC screening in older individuals, its benefits may be considered limited because of competing causes of death. Given the changing demographics, however, and the increasingly greater representation of healthier individuals in the older age groups, there may be less of a tendency to set an age limit beyond which CRC screening is no longer recommended. Also, because of the greater morbidity and mortality in patients presenting with emergency CRC resection, generally resulting from screening failure, the recommendation and practice of CRC screening in the context of age and the presence of comorbid conditions are likely to be reconsidered.

Dually eligible Medicare–Medicaid beneficiaries (hereafter referred to as “duals”) represent the oldest, poorest, and frailest of the elderly population (The Henry J. Kaiser Family Foundation 2004; Murray and Shatto 1998). For example, whereas 73 percent of duals have annual incomes of \$10,000 or less, only 12 percent of nonduals may be identified with such income levels. Similarly, duals are considerably more likely than nonduals to rate their health as poor or fair (52 versus 26 percent, respectively), to present significant limitations in activities of daily living (over 30 versus 11 percent), or to reside in

Address correspondence to Siran M. Koroukian, Ph.D., Assistant Professor, Department of Epidemiology and Biostatistics, School of Medicine, Case Western Reserve University, 10900 Euclid Avenue, Cleveland, OH 44106-4945. Fang Xu, M.S., Data Coordinator, is with the Department of Epidemiology and Biostatistics, School of Medicine, Case Western Reserve University, Cleveland, OH. Avi Dor, Ph.D., Professor in Health Care Economics, is with the Department of Economics, Director of Research, Health Systems Management Center, Weatherhead School of Management, Case Western Reserve University, Cleveland OH. Gregory S. Cooper, M.D., Professor, is with the Division of Gastroenterology, University Hospitals of Cleveland, Cleveland, OH.

nursing homes (19 versus 3 percent; The Henry J. Kaiser Family Foundation 2005). On the other hand, the above statistics imply that nearly 50 percent rate their health as good, very good, or excellent; two thirds report no limitations in their activities of daily living; and 80 percent are community-dwelling—suggesting that a sizable proportion of duals may in fact benefit from preventive care. Also, while most duals have low incomes, enrollment in Medicaid is likely to give them considerable leverage to access health services that they could not afford otherwise.

The above descriptions attest to the complexity of issues in studying the health care needs of duals as a subgroup of Medicare beneficiaries at large, and illustrate the diversity in this population, especially relative to their health and functional status. In comparing the use of cancer screening between duals and nonduals, several factors need to be accounted for in formulating research hypotheses. First, considering differentials in health status between duals and nonduals, we can posit that because of competing priorities in addressing the complex health care needs in a sizable proportion of duals, management of acute and/or chronic ailments—rather than prevention—becomes the focus of care—hence the lower likelihood of undergoing cancer screening tests. Second, from the perspective of income, we postulate, based on previous studies, that lower income—and potentially lower educational attainment—is associated with underuse of preventive services (Katz and Hofer 1994; Katz, Zemencuk, and Hofer 2000), even if enrollment in Medicaid is conducive to greater access to health care. We therefore hypothesize that duals would experience a significantly lower rate of cancer screening than their nondual counterparts.

The present study examines the use of CRC screening services among Medicare beneficiaries by dual Medicare–Medicaid enrollment status, an attribute largely understudied in the disparities literature. More specifically, we compare receipt of CRC screening by duals and nonduals 65 years of age or older, after adjusting for individual-level characteristics. Given the previously documented associations between county-level socioeconomic and health systems attributes with the use of CRC screening (Koroukian et al. 2005), relevant contextual variables are also accounted for in the analysis.

METHODS

This is a cross-sectional study using Medicare enrollment and claims files. We limited our analysis to beneficiaries 65 years of age or older, residing in

the contiguous states and Hawaii, enrolled in Medicare for the entire calendar year, and receiving their care exclusively through the fee-for-service (FFS) system. We accounted for duals only if they were enrolled in the state buy-in program for Part A and Part B for all 12 months of the study year—a criterion that resulted in the exclusion of nearly 300,000 duals (or about 11 percent of beneficiaries with at least 1 month of state buy-in during the year) from the study. Nonduals were beneficiaries with no history of enrollment in the state buy-in program for Part A and Part B. To ensure robust estimates of county-level attributes, we only included beneficiaries residing in counties with more than 1,000 beneficiaries, or 10,000 FFS months of enrollment in Medicare—whichever is more. The final study population included approximately 23 million Medicare beneficiaries and 2,655 counties (85 and 86 percent of the total, respectively).

Data Sources

We used the 1999 nationwide, 100 percent population-based Medicare Denominator file, the Outpatient Standard Analytic file, the Part B Physician Supplier file, and the 1998 Area Resource File (ARF).

The Denominator file includes a record for each individual who had been enrolled in Medicare in a given year. In addition to demographic variables (age, race, sex) and the county of residence, the file also includes monthly indicators on whether an enrollee had participated in managed care programs, or in state buy-in programs.

The Outpatient Standard Analytic file and the Part B Physician Supplier file carry claims records for colorectal procedures, including for FOBT, FLEX, and colonoscopy (COL). These records include, at the procedure level, the date of service, as well as International Classification of Diseases, 9th Clinical Modification (ICD9-CM) diagnosis codes, and ICD9-CM, Current Procedural Terminology, 4th revision (CPT-4), and/or Health Care Financing Common Procedure Coding System (HCPCS) procedure codes. As detailed below, the diagnosis and procedure codes were used to identify screening procedures from the ones that may have been performed for diagnostic or surveillance purposes.

The ARF, which is compiled by the U.S. Census Bureau, was used as a source for county-level attributes. The variables from the ARF include, among others, the distribution of the population by demographic and socioeconomic characteristics. Additional variables provide a detailed account of the availability of physician and other health care resources for each county in the United States.

Variables of Interest

Dependent Variables. The following procedure codes were used to identify the relevant CRC screening tests:

- *FOBT*: CPT-4 82270, 82273; HCPCS G0107
- *FLEX*: CPT-4 45330, 45331, 45333, 45338, 45339; HCPCS G0104; ICD-9-CM 45.24, 48.22, 48.24
- Colonoscopy (*COL*): CPT-4 44388, 44389, 45378, 45380, 45382, 45383, 45384, 45385; HCPCS G0105; ICD-9-CM 45.22, 45.23, 45.25, 45.41, 45.42, 45.43, 48.36

As described elsewhere (Cooper and Koroukian 2004), we identified *screening* procedures after excluding claims that carried—at the *procedure level*—diagnosis codes indicating (a) symptoms—in which case the procedure may have been performed for diagnostic purposes (e.g., gastrointestinal bleeding) or (b) the presence of previous chronic conditions of the lower gastrointestinal tract. In the latter scenario, the procedure was assumed to have been performed for surveillance purposes (e.g., history of polyps).

A number of individuals had claims for more than one procedure type in the study year. Colonoscopy was categorized as colonoscopy-only (COL-ONLY) when the individual did not have a history of use of FOBT and/or FLEX during the study period, and colonoscopy with FOBT and/or FLEX (COL-WFF) to account for colonoscopy procedures that may have been performed following inconclusive findings from FOBT or FLEX. Each of these variables (FOBT, FLEX, COL-ONLY, and COL-WFF), was created at the individual level, and coded as 0/1 (no/yes). The value of 1 indicated that the individual underwent a given procedure at least once during the study year.

Independent Variables

Individual-Level Variables. The main independent individual-level variable was dual beneficiary status, or enrolled in both the Medicare and Medicaid programs. An individual was identified as “dual,” if s/he had participated in the state buy-in program for Part A and Part B during the entire study year, as documented in the monthly indicators in the Denominator file. While this variable does not distinguish between “full” Medicaid beneficiaries, Qualified Medicare Beneficiaries (QMBs), and Specified Low-Income Medicare Beneficiaries (SLMBs), it reflects on the individual’s low income status.

Other individual-level variables included age, race, and sex, which were also retrieved from the Denominator file. We characterized individuals in age groups (65–69, 70–74, 75–79, 80–84, and 85+), racial categories (Caucasian, African American, and Other), and by gender.

County-Level Variables. County-level variables that were previously shown or hypothesized to be associated with the use of CRC screening were accounted for in the analysis. They included:

- (1) *Managed care activity (MCA)*: Described as *spillover effect* (Baker 1997, 1999; Glied and Zivin 2002; Baker 2003), higher MCA in a given county is associated with a small, but positive and significant increase in the use of CRC screening among FFS beneficiaries residing in that county. Medicare MCA, representing the proportion of Medicare beneficiaries months of enrollment in managed care programs to total months of enrollment in Medicare at the county level, was derived from monthly indicators in the Denominator file. Consistent with our previous study (Koroukian et al. 2005), MCA was categorized as low (< 10 percent), moderate (10–29.99 percent), and high (\geq 30 percent).
- (2) Availability of physician resources, as retrieved from the ARF, including the total number of physicians, those in primary care fields (PCPs) and gastroenterologists (GIs), as well as their respective number per 100,000 county residents. We also calculated the ratio of PCPs to the total number of physicians as a means to account for the balance of PCPs and specialists (Roetzheim et al. 2001).
- (3) The proportion, at the county level, of each of the following: (a) elderly individuals with incomes less than 100 percent FPL; (b) elderly residing in nursing homes; and (c) adults with high school diploma.

Analysis. Descriptive analyses were conducted to compare the demographic profile between duals and nonduals. We used χ^2 statistics to test for statistical significance in bivariate associations. We conducted stratified analyses and compared the proportions of duals and nonduals undergoing various screening modalities within age, race, and sex strata as a means to ensure that observed differences by dual eligibility status were not due to dissimilar demographic profiles between the two study populations. We also calculated the age–race–sex-adjusted rates of screening for duals and nonduals, using the

direct adjustment method (Kahn and Sempos 1989). Given the multilevel nature of the data and the potential clustering of screening activities within counties, we employed hierarchical logistic regression models. The adjusted odds ratios (AORs) were then used to assess the likelihood of undergoing CRC screening procedure, after controlling for individual- and county-level characteristics. The software programs used in the analysis included *Statistical Analysis Systems (SAS)* version 8.0, Cary, NC and *HLM* version 5.04, SSI Central, Chicago, IL.

RESULTS

The study population included 2.5 million duals, and 20.2 million nonduals. The two groups differed markedly in their demographic profile (Table 1). In particular, we note the greater representation of older-old individuals among duals than among nonduals (19.3 versus 10.8 percent); women (74.4 versus 58.5 percent); and minority individuals (21.1 versus 5.3 percent for African Americans, and 15.7 versus 2.6 percent for individuals of “Other” race). All comparisons were significant at $p < .001$.

Duals were significantly less likely to undergo CRC screening procedures (Table 2). We note, for example, that 12.2 percent of nonduals, but only

Table 1: Distribution of Duals and Nonduals by Demographic Attributes

	<i>N (% of Total)</i>	
	<i>Duals</i>	<i>Nonduals***</i>
Age groups		
65–69	545,479 (22.06)	5,293,887 (26.22)
70–74	575,499 (23.27)	5,393,459 (26.71)
75–79	500,869 (20.26)	4,428,797 (21.93)
80–84	373,498 (15.10)	2,906,374 (14.39)
85+	477,381 (19.31)	2,170,869 (10.75)
Gender		
Male	633,964 (25.64)	8,374,109 (41.47)
Female	1,838,762 (74.36)	11,819,277 (58.53)
Race		
Caucasian	1,563,203 (63.22)	18,587,113 (92.05)
African American	521,368 (21.08)	1,074,781 (5.32)
Other race/ethnicity	388,155 (15.70)	531,492 (2.63)
Total	2,472,726 (100.00)	20,193,386 (100.00)

*** $p < .001$.

Table 2: Proportion (%) of Duals and Nonduals Undergoing Colorectal Cancer Screening Procedures

	<i>Fecal Occult Blood Test</i>		<i>Flexible Sigmoidoscopy</i>		<i>Colonoscopy with Either FLEX or COL</i>		<i>Colonoscopy Only</i>	
	<i>Duals</i>	<i>Nonduals</i>	<i>Duals</i>	<i>Nonduals</i>	<i>Duals</i>	<i>Nonduals</i>	<i>Duals</i>	<i>Nonduals</i>
By age (years)								
65–69	6.00	13.56	0.98	2.32	0.50	0.95	2.14	2.66
70–74	6.01	13.74	0.87	2.17	0.50	0.95	0.48	0.97
75–79	5.53	12.65	0.78	1.82	0.44	0.87	2.04	2.74
80–84	4.62	10.36	0.58	1.29	0.32	0.65	1.65	2.31
85+	3.09	6.62	0.35	0.70	0.17	0.34	1.01	1.43
By race								
White	5.10	12.53	0.70	1.89	0.39	0.85	1.76	2.57
African American	4.64	7.42	0.78	1.32	0.37	0.59	1.92	2.27
All other	5.96	10.48	0.80	1.58	0.45	0.73	1.90	2.23
By sex								
Male	4.41	10.78	0.73	2.10	0.40	0.90	1.85	2.88
Female	5.39	13.21	0.73	1.67	0.39	0.78	1.80	2.31
Total unadjusted	5.14	12.20	0.73	1.85	0.39	0.83	1.82	2.54
Total adjusted*	5.17	12.30	0.75	1.81	0.42	0.82	1.88	2.52

*Age–race–sex-adjusted rates of screening, using direct risk adjustment method.

All statistics significant at $p < .001$.

5.1 percent of nonduals underwent FOBT ($p < .001$). The proportion of screening was significantly lower among duals than among nonduals, consistently across all age, race, and sex strata, and across all procedural modalities. The difference between the two subgroups was smaller for COL-ONLY, possibly because this procedure may have been performed for diagnostic, rather than screening purposes.

Findings from the hierarchical logistic analysis were consistent with that of the bivariate analysis, showing that dual Medicare–Medicaid status was inversely and significantly associated the use of screening. The AOR and 95 percent confidence interval (CI) was 0.48 (0.45, 0.51) for FOBT, 0.55 (0.49, 0.61) for FLEX, 0.60 (0.54, 0.67) for COL-WFF; and 0.85 (0.80, 0.89) for COL-ONLY. Similarly, and consistently for all screening modalities, both older age and African American race were associated with lower likelihood of undergoing screening. Finally, while men were less likely to undergo FOBT, they were more likely to undergo FLEX, COL-WFF, or COL-ONLY (Table 3).

Relative to county-level attributes, we note that higher level of managed care activity in the beneficiaries’ county of residence was associated with

Table 3: Results from the Multilevel, Multivariable Model Predicting the Use of Colorectal Cancer Screening Services by Dually and Nondually Eligible Medicare–Medicaid Beneficiaries

	<i>Fecal Occult Blood Test (FOBT)</i> (N = 2,590,582)	<i>Flexible Sigmoidoscopy (FLEX)</i> (N = 391,329)	<i>Colonoscopy with either FLEX or COL (COL_WFF)</i> (N = 177,147)	<i>Colonoscopy Only (COL_ONLY)</i> (N = 558,755)
<i>County characteristics</i>				
Managed care activity level	–	–	–	–
Low (ref)	1.03 (0.89, 1.19)	1.02 (0.90, 1.16)	1.08 (0.96, 1.23)	1.10 (1.00, 1.22)
Moderate	1.29 (1.06, 1.57) ^a	1.49 (1.24, 1.78) ^c	1.11 (0.95, 1.30)	0.91 (0.79, 1.04)
High	–	–	–	–
Physician resources	1.15 (0.98, 1.35)	1.13 (0.94, 1.35)	1.06 (0.92, 1.21)	1.09 (0.96, 1.24)
Number of gastroenterologists*	0.85 (0.75, 0.97) ^a	0.96 (0.85, 1.10)	0.96 (0.86, 1.06)	0.97 (0.87, 1.09)
Number of primary care providers [†]	0.52 (0.40, 0.69) ^c	0.81 (0.58, 1.12)	0.57 (0.44, 0.73) ^c	0.83 (0.63, 1.09)
Proportion of primary care providers to all physicians	–	–	–	–
Other county attributes	0.97 (0.91, 1.04)	1.01 (0.95, 1.08)	0.98 (0.93, 1.02)	1.02 (0.98, 1.07)
Proportion of individuals ≥ 65 years' age below the federal poverty level*	–	–	–	–
Proportion of individuals with high school diploma*	1.06 (1.00, 1.12) ^a	1.14 (1.08, 1.20) ^c	1.03 (0.99, 1.07)	1.02 (0.98, 1.06)
Proportion of elderly residing in nursing homes	1.02 (0.14, 7.28)	0.12 (0.02, 0.72) ^a	0.28 (0.06, 1.40)	1.57 (0.36, 6.75)
<i>Characteristics of Medicare beneficiaries</i>				
Dual enrollment in Medicare–Medicaid	0.48 (0.45, 0.51) ^c	0.55 (0.49, 0.61) ^c	0.60 (0.54, 0.67) ^c	0.85 (0.80, 0.89) ^c
Gender	–	–	–	–
Female (Ref)	0.72 (0.68, 0.76) ^c	1.17 (1.12, 1.22) ^c	1.09 (1.04, 1.14) ^c	1.19 (1.15, 1.23) ^c
Male	–	–	–	–
Race	–	–	–	–
Caucasian (Ref)	0.63 (0.57, 0.70) ^c	0.70 (0.63, 0.79) ^c	0.72 (0.65, 0.78) ^c	0.76 (0.70, 0.82) ^c
African American	0.97 (0.78, 1.20)	0.85 (0.74, 0.97) ^a	1.03 (0.78, 1.36)	0.92 (0.79, 1.07)
Other race/ethnicity	–	–	–	–

Age groups (years)					
65-69 (ref)	—	—	—	—	—
70-74	0.98 (0.96, 1.00)	0.93 (0.90, 0.95) ^c	1.01 (0.97, 1.06)	1.05 (1.02, 1.08) ^c	
75-79	0.88 (0.85, 0.91) ^c	0.75 (0.73, 0.78) ^c	0.88 (0.84, 0.93) ^c	1.01 (0.99, 1.04)	
80-84	0.68 (0.65, 0.71) ^c	0.53 (0.50, 0.56) ^c	0.65 (0.61, 0.70) ^c	0.85 (0.81, 0.89) ^c	
85+	0.39 (0.37, 0.42) ^c	0.26 (0.23, 0.29) ^c	0.35 (0.30, 0.40) ^c	0.52 (0.49, 0.55) ^c	
Cross-level interactions					
Dual × managed care Activity:	—	—	—	—	
Low (ref)	1.01 (0.84, 1.22)	0.88 (0.74, 1.06)	0.97 (0.79, 1.18)	0.91 (0.78, 1.05)	
High	0.82 (0.70, 0.96) ^a	0.61 (0.51, 0.73) ^c	0.69 (0.52, 0.93) ^a	0.77 (0.69, 0.85) ^c	

^a0.01 < $p \leq .05$;

^b0.001 < $p \leq .01$;

^c $p \leq .001$.

All other statistics not significant at $p > 0.05$.

*Odds ratios to be interpreted relative to a .5-point increase.

[†]Odds ratios to be interpreted relative to a .50-point increase.

higher use of screening by FOBT or FLEX, but not with COL-ONLY or COL-WFF. Also, the coefficient for the interaction term of MCA and dual status was negative and statistically significant, implying that the association between MCA and screening would differ by individuals' dual status, with duals benefiting from the presence of managed care to a lesser extent than nonduals.

The availability of gastroenterologists at the county level was positively, but not significantly, associated with screenings. However, a greater availability of primary care physicians and a higher representation of primary care physicians in the physician workforce were negatively associated with screenings—although these statistics were not consistently significant across the procedure types. Finally, we note that the proportion of elderly with incomes below the federal poverty level and the proportion of elderly residing in nursing homes were not associated with CRC screening (with the exception of FLEX with the proportion of elderly residing in nursing homes). The proportion of adults with high school diploma was positively and significantly associated with the use of FOBT and FLEX, but not with COL-WFF or COL-ONLY.

DISCUSSION

This study documented the presence of substantial and significant differences in the use of CRC screening between duals and nonduals. The findings indicated that duals were 15 to 52 percent less likely to undergo CRC screening procedures—a gap that persisted in age-, race-, and sex-stratified analyses, and after controlling for individual- and county-level characteristics. These statistics are particularly troubling, given the already low levels of use of CRC screening (Cooper and Koroukian 2004; Seff et al. 2004), even in nonduals. Of note is that despite the statistical significance in the differences observed for most procedural modalities, the widest and most meaningful disparity by dual status was observed for FOBT. Given the very low rates of screening through FLEX and colonoscopy for nonduals (less than 3 percent), even small differences between duals and nonduals in absolute terms would translate in substantial differences in relative terms (1.82 percent for duals and 2.54 percent for nonduals, for COL-ONLY, as an example). Such differences are unlikely to bear important implications from a public health perspective, however.

Disparities in the use of CRC screening have been documented previously. Data from the 2000 National Health Interview Survey indicated lower use of FOBT and FLEX among minority respondents, compared with whites

65 years of age or older (Swan et al. 2003). Similarly, disparities were observed by income and educational attainment, as well as with usual source of care. A more recent study analyzing differences in the use of colorectal procedures by indication showed that racial differences were smaller for diagnostic procedures than for ones performed for screening or surveillance purposes (Cooper and Koroukian 2004)—a finding suggesting that disparities in the use of such procedures are less pronounced when the patient actually presents with signs and symptoms. The detection and removal of precancerous colorectal polyps through screening is key to reducing deaths from CRC, and the identification of subgroups of the population that experience disparities in CRC screening is central to the long-term efforts to reduce CRC-related death rates. The 2010 target for CRC-related death rate is 13.9, down from the 1998 rate of 21.2 per 100,000 (Centers for Disease Control and Prevention, and National Institutes of Health, Healthy People 2010).

The status of dual eligibility for Medicare and Medicaid is strongly associated with old age and frailty. Perhaps because of perceived diminished benefits of cancer screening in the older old and sicker individuals, preventive care has not been studied in this population. It is important to keep in mind, however, that while all duals are by definition of low-income status, the characteristics of old age and frailty may or may not present together in a given individual. That is to say, for example, that an older *and healthy* individual may well qualify for and enroll in the dual program because of his/her income level. This implies a level of diversity in the dual population relative to health status, and that of gradients in frailty/disability/comorbid status, which are important to be recognized, especially in the context of monitoring the use of preventive care and relevant outcomes in this population subgroup.

Comorbid status has been associated with use of cancer screening, although studies have yielded inconsistent findings to this effect. A number of studies have identified comorbidity as a factor hindering the recommendation of cancer screening, as the focus in a given health care encounter with sicker individuals might shift to needs that must be addressed imminently. On the other hand, as documented elsewhere (Heflin et al. 2002), patients with comorbid conditions may be presented a greater opportunity to be counseled on the use of cancer screening, given their more frequent contacts with the health care system.

Biases among practitioners vis-à-vis their perception and assessment of the benefits of cancer screening in the older old and frail likely dictate their practice relative to recommending such services. The relevance of cancer screening and its benefits in older/sicker patients are being re-examined, however, particularly in the context of screening for CRC (Koperna, Kisser,

and Schulz 1997). Relative to breast and prostate cancer, two of the most common cancers in the elderly that are amenable to screening, CRC screening has the greatest potential to present circumstances in which a complex surgical intervention may be warranted on an emergency or nonelective basis—in the event of occlusion, for example. Such procedures carry significantly greater risks of morbidity and mortality than when they are performed on an elective basis, in which case the patient's pre-operative condition likely yields improved chances of more favorable outcomes.

Comparable with findings from other studies (Cunningham et al. 1999; Cunningham and Trude 2001), and as evidenced through the interaction term of Medicaid status and MCA, the effect of managed care relative to screening usage differed significantly among the duals and nonduals. The negative sign of the coefficient indicated that duals benefited from the presence of managed care to a lesser extent than nonduals. Future studies should further explore this finding to elucidate the relationship between community-level factors and health systems characteristics and the use of preventive services by vulnerable subgroups of the population.

In contrast to studies by Roetzheim et al. (2001) reporting decreased incidence and mortality of CRC, and lower odds of late-stage CRC diagnosis in Florida counties with increased supply of general internists (Roetzheim et al. 1999), results from our nationwide study indicated that a greater representation of primary care physicians in the physician workforce was inversely related with the usage of CRC screening. This finding was consistent across the models predicting the use of FOBT, FLEX, and COL-WFF. The lack of consistency between this and previous studies in the results relative to the availability of PCPs and usage of CRC could be due, in part, to differences in the outcomes studied (CRC cancer incidence, mortality, and late stage diagnosis versus CRC screening) and geographic scope of the studies (67 counties in Florida in the studies by Roetzheim et al., compared with over 2,500 counties nationwide in the present study). Future analyses are warranted to better understand the contribution of balance of PCP's and GIs to CRC control.

To the author's knowledge, this study is the first to assess the use of cancer screening by dual Medicare–Medicaid enrollment status, an attribute that has remained largely unexplored in the disparities literature. Findings from this study should be interpreted in light of the following limitations, however:

First, the process of identifying duals from the Medicare Denominator file is simplistic, and does not account for the differences in cost sharing arrangements relative to each of the dual-eligibility categories (Rosenbach and

Lamphere 1999; The Henry J. Kaiser Family Foundation 2005; Center for Medicare and Medicaid Services 2005) that could potentially influence individuals' health-seeking behavior. The analyses also ignore the timing of enrollment in Medicaid relative to the usage of CRC screening services. Out-of-pocket expenses are likely to greatly affect a patient's decision to seek and/or undergo a screening procedure, especially in low-income elderly individuals, in whom such expenses may amount to up to one third of their monthly income (Yee and Capitman 1996), and enrollment in Medicaid is likely to at least partially reduce financial barriers to access these services and present an impetus to use screening services. Previous studies have shown that cancer patients enrolled in Medicaid before cancer diagnosis are less likely than those enrolling upon cancer diagnosis to present with advanced stages of breast (Perkins et al. 2001; Koroukian 2003) and CRC (Bradley, Given, and Caralee 2003). On the other hand, and as noted above, improved access to care through enrollment in Medicaid does not guarantee greater use of preventive services. Katz and colleagues have shown that low income and educational attainment are predictive of lower use of cancer screening, even in the absence of financial barriers in the use of such services (Katz and Hofer 1994; Katz, Zemencuk, and Hofer 2000).

Second, while the algorithm used in this study correctly identifies duals, it is likely to have missed a sizable proportion of low-income older individuals. Given the low rate of participation in the dual Medicare–Medicaid program (Pezzin and Kasper 2002), many Medicare-only beneficiaries—or nonduals—could well be eligible, but not enrolled in Medicaid. It is therefore erroneous to assume that the findings presented in this study would be generalizable to low-income Medicare beneficiaries at large.

Third, the comparison of duals and nonduals based on demographic characteristics alone does not account for the important differences in health/comorbid status between the two subgroups of the elderly. As noted above, comorbid status is likely to influence practitioners' decision to recommend cancer screening. In particular, it was not possible to distinguish between community-dwelling beneficiaries and those residing in nursing homes—an indicator that may well serve as a litmus test for recommending preventive care. Although we accounted for the proportion of elderly individuals residing in nursing homes at the county level, this approach presents important limitations, mainly because it lacks specificity relative to this measure at the individual level. Our inability to incorporate comorbidity measures in the analysis was due to the fact that our database was solely comprised of claims carrying the relevant procedure codes. Therefore, we could derive measures of comorbidity for

beneficiaries utilizing colorectal procedures, but not for those *not* utilizing such procedures. Absent comorbid measures for both users and nonusers of CRC screening tests, we could not adjust for comorbid status in our analyses.

Fourth, despite the algorithm we used to distinguish between screening and diagnostic/surveillance tests, it is possible that some of the tests were misclassified in one category versus another. Such misclassifications are unlikely to have occurred disproportionately in duals versus nonduals, however, and therefore unlikely to affect the picture of disparities between the two subgroups of the elderly population.

Fifth, we note marked differences between survey- and claims-based CRC screening rates. These differences can be explained by several factors: (1) Survey data rely on respondents' accurate identification of the procedure(s) in question, whereas claims-based studies rely on the presence of specific procedure codes in the claim record. Thus, while survey data can be subject to recall bias, claims data are free of that error. We note, however, that claims-based FOBT rates may be underestimated, as providers might choose not to bill it to Medicare because of low payment rates for that procedure (U.S. General Accounting Office 2000). (2) Whereas survey questionnaires do not distinguish between screening, diagnostic, or surveillance tests, many of the claims-based studies employ elaborate algorithms to specifically measure CRC *screening* rates. (3) Given the interval at which it is recommended to undergo CRC screening, survey questions ask about the use of FOBT in the previous year, and the use of FLEX or COL in the past 5 years, or ever. Hence, survey-based rates may reflect usage of these procedures for up to 5 years. Conversely, most claims-based studies are cross-sectional, generally using 1 year's data, thus yielding rates that reflect usage of these procedures on an annual basis. It is therefore expected that CRC screening rates derived from cross-sectional claims data be lower than those obtained from survey data. For example, according to the 2000 National Health Interview Survey, which accounted for use of home blood stool test within the last year, or colorectal endoscopy (FLEX, COL, or proctoscopy) within the last 5 years, CRC cancer tests were used by over 40 percent of individuals 65 years of age or older (Swan et al. 2003). Similarly, results from the 2001 California Health Interview Survey indicated that nearly 62 percent of respondents age 65 or older underwent CRC cancer testing (Etzioni et al. 2004). In contrast, cross-sectional claims-derived studies for Medicare FFS beneficiaries consistently reported FOBT rates slightly above or below 10 percent, and usage of endoscopy (FLEX and COL) of approximately 5 percent (U.S. General Accounting Office 2000; Cooper and Koroukian 2004; Ko, Kreuter, and Baldwin 2005). On the other

hand, one study using Medicare managed care claims data reported CRC screening rates of approximately 30 percent for calendar year 2000 (Morales et al. 2004). Screening tests in that study encompassed FOBT, FLEX, COL, and double contrast barium enema (DCBE). Similarly, using 2003 Veterans' Administration claims data, the screening rates were over 80 percent for FOBT, 11 percent for COL, 5 percent for FLEX, and 3 percent for DCBE (El-Serag, Hample, and Cooper 2005). To our knowledge, however, no study has formally assessed the degree to which survey and claims-based data may respectively over- or underestimate the use of CRC screening by older adults. As a result, it is difficult to accurately characterize the extent of cancer screening underuse in the elderly population.

In closing, the findings of this study show very low usage of CRC screening in the dual Medicare–Medicaid population, and the significant disparities in the relevant measures by Medicaid status. Rather than the important dissimilarities in the demographic profile between duals and nonduals, we believe that the disproportionate representation of the frail and the poor may explain these disparities, for reasons outlined above. To develop successful intervention strategies, additional analyses should focus on further elucidating the factors contributing to the inadequate rates of CRC screening by Medicare beneficiaries in general, and by duals in particular.

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