Unhealthy Drinking Patterns and Receipt of Preventive Medical Services by Older Adults

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BACKGROUND: Preventive service use among older adults is suboptimal. Unhealthy drinking may constitute a risk factor for failure to receive these services.

OBJECTIVES: To determine the relationship between unhealthy drinking and receipt of recommended preventive services among elderly Medicare beneficiaries, applying the framework of current alcohol consumption guidelines.

DESIGN/METHODS: The data source is the nationally representative 2003 Medicare Current Beneficiary Survey. The sample included community-dwelling, fee-for-service Medicare beneficiaries 65 years and older (N = 10,523). Based on self-reported drinking, respondents were categorized as nondrinkers, within-guidelines drinkers, exceeding monthly but not daily limits, or heavy episodic drinkers. Using survey and claims data, influenza vaccination, pneumonia vaccination, glaucoma screening, and mammogram receipt were determined. Bivariate and logistic regression analyses were conducted.

RESULTS: Overall, 70.3% received flu vaccination and 49% received glaucoma screening during the year, 66.8% received pneumonia vaccination, and 56.2% of women received a mammogram over 2 years. In logistic regression, heavy episodic drinking was associated with lower likelihood of service receipt compared to drinking within guidelines: flu vaccination (OR 0.75, CI 0.59–0.96), glaucoma screening (OR 0.74, CI 0.58–0.95), and pneumonia vaccination (OR 0.75, CI 0.59–0.96). Nondrinkers when compared with those reporting drinking within guidelines were less likely to receive a mammogram (OR 0.83, CI 0.69–1.00).

CONCLUSIONS: Heavy episodic drinking is associated with lower likelihood of receiving several preventive services. Practitioners should be encouraged to screen all elders regarding alcohol intake and in addition to appropriate intervention, consider elders reporting

heavy episodic drinking at higher risk for non-receipt of preventive services.

KEY WORDS: unhealthy drinking; Medicare beneficiaries; preventive services; older adults.

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INTRODUCTION

Preventive medical services for older adults can improve their health and quality of life, through preventing life-threatening disease (such as with influenza and pneumonia vaccination) and early detection (through cancer screening).¹ Despite recommendations for preventive services by organizations such as the U.S. Preventive Services Task Force (USPSTF), elders' receipt of services is suboptimal. For example, one study found that although 91% of female Medicare beneficiaries aged 65 years and older receive at least one preventive service, only 10% receive all that are appropriate.² Another found that one- to two-thirds of elderly Medicare beneficiaries did not receive most recommended preventive services.³ Underuse of preventive services among elders represents a growing public health problem, given the U.S. Census estimate that by 2030 one in five Americans will be 65 years of age or over.⁴ The problem is increasingly recognized, as evidenced by Medicare initiatives to cover more preventive services⁵ and to include preventive services in "pay-for-performance" approaches to physician payment.⁶

Numerous studies have confirmed low preventive services use among Medicare beneficiaries and identified correlates.^{3,7–12} Lower service use is associated with Medicaid coverage, lack of supplemental insurance, less than high school education, lower income, smoking, being non-married, female gender, black race, Hispanic ethnicity, and inadequate health literacy; results for health status and behavioral health factors have been mixed.

The impact of behavioral health problems, and unhealthy alcohol use in particular, on preventive service use among elders is an important research area. Unhealthy alcohol use encompasses risky use, problem drinking, and alcohol disorders, including abuse and dependence.¹³ About 9% of

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community-dwelling elderly Medicare beneficiaries report drinking that exceeds recommended guidelines.¹⁴ The National Institute on Alcohol Abuse and Alcoholism (NIAAA) and American Geriatrics Society (AGS) define risky drinking for those 65 years and older as more than seven drinks per week, or more than three drinks on any single day.^{15,16} Exceeding these limits is associated with interpersonal and functioning problems for elders,¹⁷ who have higher sensitivity and impaired ability to metabolize alcohol.¹³

Excessive alcohol use could affect preventive services use in several ways. Persons with unhealthy alcohol use could be physically or cognitively impaired in ways that reduce their ability to access appropriate services. Alternatively, excessive drinking may indicate generalized self-neglect in terms of health.^{18,19} Providers might also treat this population differently.^{20,21}

There is limited empirical work on the impact of alcohol use on older adults' preventive service use. A study of the elderly Medicare population found that very heavy drinkers – those drinking at least four drinks per night on eight or more nights per month – used fewer preventive services overall, though results for specific services were not reported.³ Another study of adults 55 and older found that harmful drinkers were less likely than social drinkers to receive a pneumococcal vaccination.¹⁰ A study of women aged 50 and older found that those who consumed alcoholic beverages had higher mammography rates than non-drinkers, but did not examine effects of heavier drinking specifically.²² Research including, but not limited to the elderly has found a negative relationship between preventive service receipt and substance use.^{23,24} The current study fills this gap in the literature by applying the framework of current alcohol consumption guidelines to the use of widely recommended preventive services, using nationally representative data.

METHODS

Data and Sample

The primary data source is the 2003 Access to Care file of the Medicare Current Beneficiary Survey (MCBS), conducted continuously from 1991.²⁵ The sample is selected using a stratified, multistage probability sample design to represent the Medicare population nationally. MCBS sample weights are provided to achieve nationally representative estimates. The survey is based on in-person interviews administered three times per year. Content includes sociodemographics, health and functional status, and health-care utilization. The 2003 MCBS included items regarding alcohol consumption and preventive care services.²⁶ Subjects' Medicare claims are also provided and were linked to survey data for this analysis. The 2003 MCBS Access to Care sample consisted of 16,003 beneficiaries. This study included community-dwelling persons 65 years of age or older. Health maintenance organization (HMO) enrollees were excluded because their claims were not available. After excluding 3,520 subjects under 65 years of age or institutionalized, another 1,890 subjects enrolled in HMOs, and 59 subjects missing alcohol data, this study included 10,523 persons representing a weighted N of 26,617,034. Sample sizes varied by sub-analysis due to item-missing data (<2.5 to 8%) or selecting women for the mammogram analysis

who were also in the 2002 MCBS so utilization could be observed over 2 years.

Measures

Alcohol Consumption Variables. The 2003 MCBS included three alcohol consumption items. Quantity and frequency were ascertained by asking, "Please think about a typical month in the past year. On how many days did you drink any type of alcoholic beverage? On those days that you drank alcohol, how many drinks did you have?" Heavy episodic drinking was assessed by asking, "Please think about a typical month in the past year. On how many days did you have 4 or more drinks in a single day?" Alcoholic beverages were described as including "liquor such as whiskey or gin, mixed drinks, wine, beer, and any other type of alcoholic beverage."

To assess unhealthy drinking in terms of consuming risky amounts of alcohol (regardless of whether alcohol problems or disorders were present), we defined alcohol measures reflecting two parameters of the NIAAA¹⁶ and AGS guidelines.¹⁵ First, to be consistent with the weekly guideline, we defined "exceeding monthly limits" as more than 30 drinks per typical month. Twenty-six respondents reporting 31 drinks per month whose responses were clearly based on a 31-day month were also coded as negative, since the items did not specify standardized number of days per month. Second, we constructed a "heavy episodic drinking" variable, indicating whether an individual reported four or more drinks in any single day during a typical month in the past year, according to either drinking quantity item.

We categorized respondents into four mutually exclusive categories: non-drinkers; within-guidelines drinkers (not exceeding the monthly limit or the three-drink single-day limit); drinkers who exceeded the monthly limit, but not the single-day limit; and heavy episodic drinkers who exceeded the single-day drinking limit, with or without exceeding the monthly limit. For descriptive purposes, we also calculated continuous measures of drinking quantity and frequency.

Covariates. Covariates were selected that were identified previously to affect health-care utilization. Sociodemographic variables included gender, race, Hispanic ethnicity, annual household income, age, education, marital status, and residence in a metropolitan area. Living arrangement was not included due to high correlation with marital status.

We controlled for health status by utilizing DxCG (diagnostic cost group) risk-adjustment software²⁷ that uses sex, age, and diagnosis codes from claims to construct a continuous measure of relative risk of health-care resource use. Compared to other illness burden indices or scales, the DxCG score contains higher specificity related to the individual's clinical profile in projecting future health-care costs and estimating an individual's care management needs.^{28,29} Thus, it may be used as a proxy for health status in that higher DxCG risk scores denote higher health-care resource use risk and presumably poorer health.³⁰ A value of 1 indicates the individual's predicted cost equals the population average for all persons with Medicare claims; higher values indicate higher-than-average predicted costs. For bivariate analyses, we created categories: no claims or claims not indicative of significant health risk (DxCG score

<0.1); claims indicative of lower-than-average health risk ($0.1 \leq \text{DxCG score} \leq 1$); claims indicative of higher-than-average health risk ($\text{DxCG score} > 1$). For logistic regression models, we used the continuous measure; increasing scores indicate higher risk of health-care resource use (poorer health status).

We controlled for functional status utilizing a modified Katz Index of Independence in Activities of Daily Living (ADL)³¹ variable constructed from survey data. Respondents were asked whether they had trouble or needed assistance with six ADLs: bathing, dressing, transferring, toileting, continence, or feeding. If no difficulty was indicated, that activity received a score of 1. The resulting variable reflects a 7-position scale (0–6) of the number of independent ADLs.

Two mental health variables were used. First, a self-reported depression variable was created. Respondents were asked, “In the past 12 months, how much of the time did you feel sad, blue, or depressed?” (all, most, some, little, or none of the time), and “In the past 12 months, have you had 2 weeks or more when you lost interest or pleasure in things that you usually cared about or enjoyed?” (yes, no). Respondents who answered “all” or “most of the time” to the first question and/or “yes” to the second question were categorized as having self-reported depression. This covariate was constructed to approximate the modified PHQ-2 validated for older adults.³² Second, a dichotomous variable indicating mental health diagnosis was constructed based on a single ICD-9 coded claim with a mental health diagnosis in the inpatient setting or two such claims in the outpatient setting during the year.

Other dichotomous variables included current smoking, having a usual source of care, private supplemental insurance, and Medicaid coverage (all survey-based).

PREVENTIVE SERVICE MEASURES

Dichotomous variables were created for four preventive services that are widely recommended for elders with no definitive age cut-off and were feasible to measure with this dataset.

Influenza vaccination. The USPSTF³³ and Centers for Disease Control (CDC)³⁴ recommend annual vaccination for adults 50 years of age and older. A positive response was based on the question, “Did you get a flu shot any time during the period from September (previous year) through December (previous year)?”

Glaucoma screening. While the USPSTF found insufficient evidence to recommend routine glaucoma screening for persons over 65 years of age,³³ it was recommended by other national experts [The American Academy of Ophthalmologists,³⁵ National Committee for Quality Assurance (NCQA),³⁶ and the Veterans Administration³⁵]. We include it as an example of a widely, but not universally recommended preventive care measure for a major health problem in this population. We constructed a claims-based measure to determine glaucoma screening receipt during the year, following NCQA’s Healthcare Effectiveness Data and Information Set (HEDIS) specifications.³⁶ HEDIS measures are widely endorsed performance measures accompanied by technical specifications for calculating from administrative data.

Pneumonia vaccination. The USPSTF and CDC recommend that all adults 65 years of age and older receive a one-time pneumonia vaccination.^{33,34} A positive response was based on the question, “Have you ever had a shot for pneumonia?”

Mammogram. The USPSTF recommends that women over 40 years of age receive a mammogram every 1–2 years.³³ There is no definitive age cut-off, but rather decision-making for those over age 70 should be guided by a woman’s life expectancy given her health status. Prior research found that survey data tend to overestimate mammogram receipt compared to claims data.³⁷ Therefore, we used a claims-based measure to determine mammogram receipt during a 2-year period according to HEDIS specifications, without an age ceiling.³⁶ The variable was positive if a mammogram claim was identified in either 2002 or 2003 among women present in both years of the MCBS.

Statistical Analysis

Results presented here are weighted estimates that represent the continuously enrolled, community-dwelling, non-HMO, elderly Medicare population. Chi-square tests were used to assess bivariate differences by drinking category; chi-square statistics were corrected for the survey design and converted to F-statistics. We conducted logistic regression analyses to model receipt of each service as a function of alcohol consumption and covariates.

Due to the complex sampling design, using procedures that assumed equal probability of selection would likely lead to underestimating standard errors.^{38,39} The SVY:LOGIT procedure of the statistical package STATA version 9.0 was used to more accurately determine the statistical significance of the observed differences (STATA Corporation, College Station, TX).

RESULTS

The weighted sample reflected a predominantly white (87.7%), non-Hispanic (93.7%) population living in a metropolitan area (73.7%) (Table 1). Most (56.5%) were female. Almost one-third (30.6%) were aged 65–70, 45.9% were 71–80, and 23.5% were 81 years or older.

Two-thirds (65.5%) of the sample reported drinking no alcohol during a typical month in the past year (Table 1). One-quarter (25.4%) reported drinking within guidelines, 3.8% exceeded the monthly limit only, and 5.4% reported heavy episodic drinking (exceeding the three-drink daily limit, with or without exceeding the monthly limit). Among persons exceeding the monthly limit only, drinks per month ranged from 32 to 93 with a mean of 60.4 (SD 12.1) and median of 60. Among heavy episodic drinkers, the range was 0.5 to 625 (a value of 0.5 was assigned to the response of “less than one drink” and based on the frequency-quantity series, not the separate binge item); the mean was 63.1 (SD 69.3) and the median was 50. The mean number of heavy drinking days was 7.6 (SD 9.5, median 3.0).

In bivariate analyses, heavy episodic drinkers were significantly less likely ($p < .001$) to receive flu vaccination, glaucoma screening, or pneumonia vaccination than all other drinking categories (Table 2). Mammogram receipt showed a different

Table 1. Sample Description

Weighted percent	Total	Non-drinker	Drinks within guidelines	Drinks over monthly limit	Heavy episodic drinking	P value*
Unweighted n	10,523	7,114	2,539	379	491	
Weighted N	26,617,034	17,422,361	6,760,633	1,004,758	1,429,282	
Total		65.5	25.4	3.8	5.4	
Female	56.5	63.3	50.5	31.3	20.5	<.001
Age						<.001
65 to 70 years	30.6	27.7	33.7	34.4	48.7	
71 to 80 years	45.9	45.4	47.7	47.5	41.8	
≥81 years	23.5	26.9	18.6	18.1	9.5	
Hispanic	6.3	7.5	3.6	†	7.9	<.001
Race						<.001
White	87.7	84.6	93.4	97.7	90.5	
Black	8.2	10.3	4.0	†	7.4	
Asian	1.8	2.2	1.2	†	†	
Other	2.3	2.9	1.4	†	†	
Education						<.001
< H.S. diploma	29.1	35.9	15.3	14.4	29.1	
H.S. graduate	29.9	31.4	27.7	25.5	26.5	
Some college/voc/tech	23.9	21.5	29.6	22.9	27.5	
College degree	17.1	11.3	27.5	37.2	24.1	
Annual income						<.001
<\$25,000	57.3	66.8	39.5	27.4	44.4	
\$25,000 to \$40,000	22.2	20.1	27.2	23.7	24.7	
>\$40,000	20.5	13.2	33.3	48.9	31.0	
Marital status						<.001
Married	55.8	50.8	65.1	68.2	64.3	
Widowed	32.5	37.5	25.2	21.4	14.5	
Divorced, separated, single	11.7	11.7	9.7	10.4	21.2	
Metropolitan area	73.7	69.4	82.4	79.8	79.3	<.001
Region						<.001
Northeast	18.9	17.9	21.7	21.4	16.3	
South	37.8	41.4	30.7	31.0	32.0	
Midwest	25.9	25.2	27.9	23.3	26.6	
West	15.9	13.5	19.3	24.2	22.1	
Other	1.5	1.9	0.4	†	3.0	
Relative health risk						<.001
No risk indication	31.0	28.6	33.6	36.0	44.6	
< Average risk	42.7	41.7	46.5	43.4	37.6	
> Average risk	26.3	29.8	20.0	20.7	17.7	
Self-reported depression	13.2	16.0	7.6	6.3	10.9	<.001
Mental health dx	13.9	16.1	9.3	8.5	11.6	<.001
Current smoker	11.2	10.4	10.1	11.6	25.7	<.001
Functional status						<.001
Independence in 6 ADLs	60.6	56.8	66.4	74.1	69.8	
Independence in 5 ADLs	23.8	24.0	24.3	20.1	21.0	
Independence in 0 to 4 ADLs	15.7	19.2	9.3	5.8	9.2	
Usual source of care	95.3	95.5	95.7	94.9	90.1	<.001
Private insurance	73.6	69.6	82.8	84.6	70.4	<.001
Medicaid coverage	12.2	16.2	4.5	2.0	7.6	<.001

*Chi-square tests, corrected for survey design; weighted sample used

†Not shown due to unweighted cell n<11

pattern, being significantly lower for nondrinkers (52.8%) than for within-guidelines drinkers (66.3%) ($p < .001$).

In the logistic regression model predicting flu vaccination, heavy episodic drinking (as compared to within-guideline drinking) was significantly associated with lower odds of vaccination (OR 0.75, CI 0.59–0.96, $p=0.02$) and glaucoma screening (OR 0.74, CI 0.58–0.95, $p=0.02$) (Table 3). Heavy episodic drinking was also associated with lower odds of pneumonia vaccination (OR 0.75, CI 0.59–0.96, $p=0.02$) (Table 4). Nondrinkers were less likely to receive a mammogram (OR 0.83, CI 0.69–1.00, $p=0.05$) compared to within-

guideline drinkers; heavy episodic drinking and drinking over the monthly limit were not significant (Table 4).

Sensitivity analyses using survey data, or survey plus claims data, failed to find an association between nondrinkers and mammogram receipt (data not shown). Analyses employing interaction terms for gender by drinking category into the models for the other three services were not significant in the flu vaccination and glaucoma screening models. For pneumonia vaccination, only the interaction variable for “female by exceeding monthly guidelines” was significant and was positively associated with vaccination receipt ($p<.01$). The heavy

Table 2. Utilization of Preventive Services By Drinking Pattern

	Flu vaccination	Glaucoma screening	Pneumonia vaccination	Mammogram
Weighted percent*				
Unweighted n	10,469	10,523	10,387	4,051
Weighted N	26,484,972	26,617,034	26,235,718	9,809,367
Overall percent	70.3	49.0	66.8	56.2
Drinking category	†	†	†	†
Non-drinker	69.5	49.0	66.0	52.8
Drinks within guidelines	73.7	51.8	70.2	66.3
Drinks over monthly limit	75.1	52.0	71.8	65.9
Heavy episodic	60.1	34.3	57.7	63.2
Gender		†		N/A
Female	70.4	53.6	67.0	56.2
Male	70.1	43.0	66.6	N/A
Age	†	†	†	†
65 to 70 years	61.4	35.8	55.1	66.3
71 to 80 years	73.1	53.0	71.2	59.6
≥81 years	76.2	58.4	73.4	41.5
Ethnicity	†	†	†	†
Hispanic	52.6	37.8	49.5	42.9
Non-Hispanic	71.4	49.8	68.0	57.2
Race	†	†	†	†
White	72.0	50.4	69.1	58.0
Black	55.2	37.2	52.1	42.9
Other	62.8	42.6	49.1	46.9
Education	†	†	†	†
< H.S. diploma	62.5	42.9	60.0	44.6
H.S. graduate	72.0	50.2	67.1	57.8
Some college/voc/tech	72.8	50.6	72.5	62.2
College degree	76.9	55.2	70.3	68.2
Annual income	†	†	†	†
<\$25,000	66.9	47.7	63.6	49.9
\$25,000 to \$40,000	71.6	50.1	71.0	65.0
>\$40,000	78.7	52.3	72.4	71.5
Marital status	†	†	†	†
Married	72.3	48.4	68.2	66.9
Widowed	70.4	53.8	67.6	49.9
Divorced, separated, single	60.2	38.8	58.1	45.1
Metropolitan area				
In metropolitan area	70.1	49.4	68.0	56.9
Not in metro area	70.6	47.9	66.4	53.9
Region	†	‡	†	‡
Northeast	72.0	52.0	64.7	53.7
South	69.3	50.0	67.6	56.3
Midwest	72.5	47.9	68.0	59.9
West	70.9	46.6	68.0	54.9
Other	27.8	30.3	43.3	37.2
Relative health risk	†	†	†	†
No risk indication	59.5	33.5	56.5	48.5
< Average risk	74.0	56.2	70.7	62.2
> Average risk	76.8	55.6	72.8	54.1
Self-reported depression				†
Depression	68.4	47.2	66.7	48.7
No depression	70.5	49.3	67.3	57.5
Mental health dx	†		‡	‡
MH diagnosis	75.2	51.0	70.0	52.1
No MH diagnosis	69.5	48.7	66.3	57.0
Current smoker	†	†	†	†
Current smoker	59.3	34.7	59.7	39.4
Not current smoker	71.6	50.8	67.7	57.8
Functional status	‡		†	†
Independence in 6 ADLs	69.0	49.6	64.6	58.5
Independence in 5 ADLs	72.3	51.2	69.9	60.9
Independence in 0 to 4 ADLs	71.9	49.6	71.0	43.0
Usual source of care	†	†	†	†
Had usual source	72.1	50.1	68.4	57.5
No usual source	34.6	26.2	34.3	26.9
Private insurance	†	†	†	†
Private insurance	74.0	53.3	70.4	61.5
No private insurance	59.6	37.1	56.8	41.1
Medicaid coverage	†	†	†	†
Medicaid	61.8	44.8	53.5	41.6
No Medicaid	71.4	49.6	68.7	58.8

*Weighted sample used; significance based on chi-square tests, corrected for survey design

† <.01

‡ <.05

Table 3. Logistic Regression Results*: Flu Vaccination and Glaucoma Screening

	Odds ratio (95% confidence interval)	
	Flu vaccination	Glaucoma screening
Drinking category		
Drinks within guidelines	Reference	Reference
Non-drinker	0.99 (0.87 – 1.13)	0.95 (0.85 – 1.07)
Drinks over monthly limit only	0.99 (0.75 – 1.31)	1.12 (0.87 – 1.45)
Heavy episodic drinking	0.75 (0.59 – 0.96) ‡	0.74 (0.58 – 0.95) ‡
Female	0.98 (0.88 – 1.09)	1.50 (1.37 – 1.66) †
Age		
65 to 70 years	Reference	Reference
71 to 80 years	1.64 (1.46 – 1.86) †	1.91 (1.71 – 2.14) †
≥81	1.87 (1.61 – 2.18) †	2.31 (2.03 – 2.63) †
Hispanic	0.78 (0.60 – 1.00)	0.88 (0.70 – 1.10)
Race		
White	Reference	Reference
Black	0.62 (0.51 – 0.75) †	0.69 (0.57 – 0.84) †
Other	0.87 (0.65 – 1.16)	1.01 (0.78 – 1.30)
Education		
< HS diploma	Reference	Reference
High school graduate	1.32 (1.15 – 1.51) †	1.22 (1.10 – 1.36) †
Some college/voc/tech	1.40 (1.23 – 1.59) †	1.29 (1.13 – 1.47) †
College degree	1.58 (1.33 – 1.87) †	1.53 (1.31 – 1.80) †
Annual income		
<\$25,000	Reference	Reference
Income \$25,000 to \$40,000	1.04 (0.90 – 1.20)	1.34 (0.92 – 1.15)
Income >\$40,000	1.40 (1.19 – 1.65) †	1.06 (0.92 – 1.22)
Marital status		
Married	Reference	Reference
Divorced, separated, or single	0.75 (0.64 – 0.86) †	0.81 (0.69 – 0.95) †
Widowed	0.90 (0.79 – 1.04)	0.99 (0.89 – 1.10)
Metropolitan area	0.92 (0.81 – 1.05)	1.01 (0.89 – 1.14)
Region		
South	Reference	Reference
Northeast	1.16 (0.98 – 1.36)	1.01 (0.88 – 1.16)
Midwest	1.10 (0.96 – 1.27)	0.86 (0.76 – 0.98) ‡
West	1.10 (0.91 – 1.34)	0.85 (0.76 – 0.95) †
Other	0.27 (0.18 – 0.41) †	0.58 (0.23 – 1.46)
Relative health risk	1.10 (1.05 – 1.15) †	1.07 (1.03 – 1.11) †
Self-reported depression	0.95 (0.81 – 1.12)	0.96 (0.84 – 1.10)
Current smoker	0.78 (0.67 – 0.91) †	0.68 (0.58 – 0.80) †
Functional status		
Independence in 6 ADLs	Reference	Reference
Independence in 5 ADLs	1.10 (0.96 – 1.26)	1.02 (0.90 – 1.15)
Independence in 0 to 4 ADLs	1.08 (0.93 – 1.25)	0.88 (0.77 – 1.00)
Usual source of care	3.97 (3.11 – 5.07) †	2.29 (1.78 – 2.96) †
Mental health diagnosis	1.23 (1.07 – 1.42) †	0.99 (0.86 – 1.16)
Private supplemental insurance	1.51 (1.31 – 1.73) †	1.86 (1.64 – 2.11) †
Medicaid coverage	1.28 (1.05 – 1.56) ‡	1.62 (1.41 – 1.92) †

*Weighted sample used

†<.01

‡<.05

episodic drinking variable retained its main effect at $p < .05$ in all three models.

DISCUSSION

Heavy episodic drinking, as defined by current guidelines, was associated with lower likelihood of receiving a preventive service in three out of four types of preventive care services we examined. Exceeding monthly, but not single-day limits

was not associated with less preventive service receipt. There are several possible explanations. Persons with heavy episodic drinking are more likely to have diagnosable alcohol use disorders.⁴⁰ Their lower likelihood of preventive services may be part of a constellation of behaviors reflecting self-neglect and/or impaired judgment. They may be difficult to engage, or their drinking may present competing demands that result in less clinical time for encouraging preventive care. Previous research found that heavier drinking was associated with fewer physician visits, offering less opportunity for preventive

Table 4. Logistic Regression Results*: Pneumonia Vaccination and Mammogram

	Odds ratio (95% confidence interval)	
	Pneumonia vaccination	Mammogram
Drinking category		
Drinks within guidelines	Reference	Reference
Non-drinker	0.94 (0.83 – 1.07)	0.83 (0.69 – 1.00) ‡
Drinks over monthly limit only	1.05 (0.80 – 1.38)	1.03 (0.59 – 1.79)
Heavy episodic drinking	0.75 (0.59 – 0.96) ‡	0.86 (0.50 – 1.47)
Female	1.00 (0.91 – 1.09)	
Age		
65 to 70 years	Reference	Reference
71 to 80 years	1.97 (1.76 – 2.22) †	0.75 (0.63 – 0.91)
≥81	2.16 (1.88 – 2.47) †	0.39 (0.32 – 0.47) †
Hispanic	0.72 (0.55 – 0.94) ‡	0.94 (0.67 – 1.31) †
Race		
White	Reference	Reference
Black	0.62 (0.51 – 0.74) †	0.80 (0.63 – 1.03)
Other	0.63 (0.48 – 0.82) †	0.73 (0.48 – 1.10)
Education		
< HS diploma	Reference	Reference
High school graduate	1.17 (1.02 – 1.34) ‡	1.21 (1.00 – 1.47) ‡
Some college/voc/tech	1.51 (1.32 – 1.72) †	1.40 (1.12 – 1.74) †
College degree	1.23 (1.04 – 1.46) ‡	1.62 (1.22 – 2.16) †
Annual household income		
<\$25,000	Reference	Reference
Income \$25,000 to \$40,000	1.22 (1.05 – 1.41) †	1.10 (0.90 – 1.34)
Income >\$40,000	1.28 (1.11 – 1.48) †	1.31 (0.98 – 1.74)
Marital status		
Married	Reference	Reference
Divorced, separated, or single	0.88 (0.75 – 1.03)	0.49 (0.38 – 0.64) †
Widowed	0.95 (0.84 – 1.08)	0.72 (0.61 – 0.85) †
Metropolitan area	0.91 (0.77 – 1.07)	1.14 (0.95 – 1.36)
Region		
South	Reference	Reference
Northeast	0.88 (0.74 – 1.04)	0.97 (0.77 – 1.23)
Midwest	0.95 (0.81 – 1.11)	1.11 (0.91 – 1.35)
West	1.06 (0.88 – 1.27)	0.92 (0.74 – 1.13)
Other	0.68 (0.40 – 1.16)	0.69 (0.35 – 1.33)
Relative health risk	1.10 (1.05 – 1.14) †	1.01 (0.96 – 1.06)
Self-reported depression	1.05 (0.89 – 1.24)	0.90 (0.73 – 1.11)
Current smoker	0.94 (0.79 – 1.12)	0.42 (0.31 – 0.57) †
Functional status		
Independence in 6 ADLs	Reference	Reference
Independence in 5 ADLs	1.22 (1.09 – 1.37) †	1.11 (0.93 – 1.32)
Independence in 0 to 4 ADLs	1.28 (1.10 – 1.48) †	0.68 (0.56 – 0.83) †
Usual source of care	3.53 (2.86 – 4.35) †	3.95 (2.73 – 5.71) †
Mental health diagnosis	1.05 (0.90 – 1.22)	1.00 (0.80 – 1.24)
Private supplemental insurance	1.25 (1.09 – 1.44) †	1.83 (1.45 – 2.31) †
Medicaid coverage	0.85 (0.71 – 1.02)	1.34 (1.03 – 1.74) ‡

*Weighted sample used

†<.01

‡<.05

services.⁴¹ Alternatively, heavy episodic drinkers may have providers who focus less on preventive care.⁴²

The lack of association between heavy episodic drinking and mammogram receipt is unique among the four services. Only nondrinkers were significantly less likely to receive the service than within-guidelines drinkers. The finding is somewhat puzzling, though consistent with some prior research.²² Although moderate (and heavy) drinking is a known risk factor for breast cancer, it seems unlikely that drinkers sought mammography because of this risk as it is not well publicized.⁴³ Most analyses employing interaction terms did not indicate gender differences in the relationship between alcohol consumption and preventive service receipt. Certainly fewer women report heavy drinking than men.^{44,45} Further research is needed to confirm the role of older women's drinking in preventive services use, and if confirmed, to understand why this might vary by service.

The effect of heavy episodic drinking was similar for services that are consistently recommended and that Medicare covers universally (influenza and pneumonia vaccinations), as well as for glaucoma screening, for which recommendations are mixed and Medicare covers only for high-risk groups. Thus, factors other than professional consensus and extent of coverage may drive the relationship between heavy episodic drinking and preventive service receipt. The relatively low preventive service use overall suggests that implementing multiple strategies to improve service delivery, as Medicare initiatives are aiming to do, is warranted.

The lack of significance found between over-monthly-limit drinking and receipt of preventive services may reflect a population at risk for chronic problems, but without current impairment affecting preventive services use. In contrast, heavy episodic drinking is more likely associated with at least acute cognitive impairment, which can lead to social disorganization and general self-neglect. This would be a fruitful area for further research.

This study has several limitations. The study's cross-sectional design does not permit determination of causality. MCBS data are not ideally suited to precise dose-response analyses, which we therefore did not conduct. Other measures also carry some imprecision, including mental health variables: claims underestimate prevalence of mental health disorders, and self-reported depression is not synonymous with clinical disorder. The DxCG risk score is only a proxy for health status, but sensitivity analyses using self-reported health status did not change key findings (data not shown). Our analyses included glaucoma screening, a service not universally recommended. However, a similar pattern was observed across several measures. Finally, it is worth noting that study findings neither validate nor cast doubt on the alcohol guidelines, which were developed with a range of outcomes in mind, not health-care utilization.

The study goal was to examine the relationship between alcohol guideline adherence and preventive services receipt. Results suggest that elders with heavy episodic drinking are at risk for failure to receive certain recommended preventive services. Health-care providers and others working with older adults should be alert to the broad range of problems associated with unhealthy drinking and be encouraged to screen proactively all elders regarding alcohol consumption. Investigation of underlying causal mechanisms is needed. Nonetheless, currently recommended screening for unhealthy alcohol use could also identify those at risk for not receiving indicated

preventive services, and interventions directed at lowering consumption might also improve preventive service use.

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