Effects of the 2009 USPSTF Depression Screening Recommendation on Diagnosing and Treating Mental Health Conditions in Older Adults: A Difference-in-Differences Analysis

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ABSTRACT

BACKGROUND: Depression is a common mental condition in U.S. older adults. To improve rates of underdiagnosis and undertreatment for depression and other mental health conditions in primary care settings, the U.S. Preventive Services Task Force (USPSTF) updates and disseminates its depression screening guideline regularly.

OBJECTIVE: To examine the effects of the 2009 USPSTF depression screening recommendation on the 3 following outcomes: diagnoses of mental health conditions, antidepressant prescriptions (overall and potentially inappropriate), and provision of nonpharmacological psychiatric services in office-based outpatient primary care visits made by adults aged 65 or older.

METHODS: Data from the 2006-2012 National Ambulatory Medical Care Survey (NAMCS), a nationally representative sample of office-based outpatient primary care visits among older adults (n = 15,596 unweighted), were used. NAMCS represents physician practicing patterns of ambulatory medical care services utilization at the national level. Using a series of multivariate difference-in-differences analyses, we estimated effects of the USPSTF depression screening recommendation on the previously mentioned outcomes by comparing pre- (2006-2009) and post- (2010-2012) periods to describe primary care physician practice patterns.

RESULTS: Differences in any mental health diagnosis by the depression screening status were -34.7% in the pre-2009 period and -20.2% in the post-2009 period, resulting in a differential effect of -14.4% (95% CI = -28.2, -0.6; $P = 0.040$). No differential effect was found in other outcomes.

CONCLUSIONS: While there are mixed findings about efficacy and effectiveness of depression screening in the existing literature, more population-based observational research is needed to strengthen and support current USPSTF depression screening recommendation statements in the United States.

J Manag Care Spec Pharm. 2018;24(8):769-76

What is already known about this subject

- Older adults are at risk of having depression and other psychiatric disorders, yet they may be often undiagnosed and untreated.
- U.S. Preventive Services Task Force (USPSTF) regularly updates and disseminates depression screening guidelines for primary care health care providers.

What this study adds

- This study investigated USPSTF depression screening recommendations for diagnoses of mental health conditions, antidepressant prescriptions, and provision of nonpharmacological psychiatric services among older adults in outpatient care.
- Study findings show that at the national level the effects of guideline recommendations are minimal.

Aging-related depression is the leading cause of disability and the major contributor for disease burden, and depression and other related mood disorders are often underdiagnosed and undertreated among adults aged 65 and over (hereafter referred to as older adults).[1,2] While adults with depression are not likely to make psychiatry-related visits, they still seek care in primary care or other specialty visits, making "these visits particularly important opportunities to detect and initiate treatment of depression."[3] In light of providing care for depression in primary care and other specialty visits, screening for depression has become a "prominent component of the 'detect-treat-improve' paradigm for undetected depression" since the mid-1990s.[3]

In 2002, the U.S. Preventive Services Task Force (USPSTF) recommended depression screening for all eligible adults.[4] Subsequently, the 2009 USPSTF practice recommendation stated that depression screening should be provided in eligible adults to "ensure accurate diagnosis, effective treatment, and appropriate follow-up" related to depression and other mental health conditions.[5,6] The 2009 USPSTF guideline distinguished 2 different recommendations: a grade B recommendation is given when staff-assisted depression care supports are in place, and a grade C recommendation is given when staff-assisted depression care supports are not present in primary care settings.[6] Unlike the grade B recommendation, the grade C recommendation indicates that the USPSTF makes no recommendation for or against routine depression screening service, and the service may be provided based on professional judgment and/or patient preferences.[6]

While clinical and policy efforts have been made in the past decades, depression screening is still a controversial topic in the existing literature. Advocates of depression screening

suggest that it should be actively utilized since both detection and treatment rates of depression are relatively low given the fact that prevalence rates of depression and other mood disorders are high among older adults in ambulatory care settings.[7,8] However, critics argue that depression screening may not be a cost-effective approach due to its high false-positive rates.[7]

In the existing literature, some studies have assessed the policy effect of recent USPSTF guidelines (e.g., mammography use and pediatric urinalysis).[9,10] No study has yet assessed the effect of the 2009 depression screening recommendation, including among older adults aged 65 and over. Gaps remain in our understanding of whether the 2009 depression screening recommendation had effects on the following outcomes: diagnoses of depression and other psychiatric disorders, overall and potentially inappropriate antidepressant prescriptions, and provision of nonpharmacological psychiatric services among older adults.

In this study, we focused on older adults only for 2 reasons. First, they have greater rates of underdiagnosis and undertreatment for depression and other psychiatric disorders, while they have a higher depression rate than any other age group.[11] Second, our conceptualization of potentially inappropriate antidepressant use was based on the Beers Criteria, which strictly apply to the older adult population only. We hypothesized that depression screening may help increase diagnosis rates of depression or other psychiatric disorders because the depression screening guideline is a tool to detect depression or other psychiatric disorders in a timely manner. Additionally, a recent study from Rhee et al. (2017) suggests that depression screening was associated with a reduced rate of potentially inappropriate antidepressant prescriptions.[11] Based on this, we hypothesized that the depression screening would be associated with a decreased rate of potentially inappropriate antidepressant prescriptions. To address these knowledge gaps, we examined the policy effects of the 2009 USPSTF depression screening recommendation on the previously mentioned outcomes between pre- (2006-2008) and post- (2010-2012) periods in office-based outpatient primary care visits made by older adults.

Methods

Data Source and Study Sample

Data used in this study originated from the 2006-2012 National Ambulatory Medical Care Survey (NAMCS), which is administrated by National Center for Health Statistics of the Centers for Disease Control and Prevention.[12] The NAMCS is an annual, cross-sectional survey of visits to office-based physicians in outpatient settings and provides reliable information about the provision and/or use of ambulatory medical care services in the United States.[12] Using a complex sampling design, selected physicians took the survey, resulting in a systematic random sample of office-based outpatient visits. Further, NAMCS utilizes an automated patient record form to collect information about the patient's demographic and clinical characteristics (e.g., clinical diagnosis and medications prescribed) in a sampled visit. The analytic sample used in this study included office-based outpatient primary care visits made by older adults aged 65 and over and had completed data for all covariates (n = 15,596 unweighted). As this study used publicly available data, the research procedure for this study was exempted by the Institutional Review Board at University of Minnesota, Twin Cities. Further details of the survey, including descriptions, questionnaires, sampling methodology, and datasets, are publicly available on the NAMCS website.[13]

Measures

Dependent Variables. The 3 main outcomes of interest were diagnosis of mental health conditions, antidepressant prescribing (overall and potentially inappropriate), and provision of nonpharmacological psychiatric services. First, we included the diagnosis of mental health conditions. The NAMCS collects up to 3 clinical diagnoses using *International Classification of Diseases, Ninth Revision, Clinical Modification* (ICD-9-CM) diagnostic codes. Based on Olfson et al.'s work (2014),[14] we constructed binary variables (yes or no) for diagnosis of mental health conditions as follow: mood disorders (ICD-9-CM diagnostic codes 293.83, 296, 298.0, 300.4, 301.1, 311, or 313.1), anxiety disorders (ICD-9-CM diagnostic codes 293.84, 300.0, 300.2, 300.3, 308.3, 309.21, or 309.81), psychoses/developmental disorders (ICD-9-CM diagnostic codes 290.0-295.9, 297.0-298.0, 298.3-299.9, 310.0-310.9, or 317-319), and other mental disorders (ICD-9-CM diagnostic codes 290-319, not included in aforementioned codes). We also constructed a comorbid mental disorder diagnosis variable indicating the presence of 2 or more diagnostic groups (mood, anxiety, psychoses/developmental, or other).

Antidepressant prescription was another outcome measure. The NAMCS collected data on up to 8 medications in 2006-2011 and up to 10 medications in 2012. Using the 2015 American Hospital Formulary Service (AHFS) Compendium, Wolters Kluwer's Drug Facts and Comparisons, and previous studies, we identified prescribed antidepressant medications using generic names (Table 1).[8,11,14-18] We constructed a binary variable (yes or no) for overall antidepressant prescriptions. For potentially inappropriate antidepressant prescriptions, we constructed a binary variable (yes or no) using the 2012/2015 Beers Criteria (Table 1 and Table 2).[19,20]

Third, we included nonpharmacological psychiatric service use as an outcome measure. The NAMCS asks 2 questions to assess whether psychotherapy and mental health counseling other than psychotherapy were provided (yes or no).[21] Due to the limited sample size, a binary variable (yes or no) was created aggregating these 2 questions.

TABLE 1 Antidepressant Medications by Class

Tricyclic antidepressants	Monoamine oxidase inhibitors
Amitriptyline[a,b,c]	Isocarboxazid
Amoxapine[b]	Phenelzine
Clomipramine[a,b,c]	Tranylcypromine
Desipramine[b]	Rasagiline[e]
Doxepin[a,b,c]	Selegiline[e]
Imipramine[a,b,c]	**Serotonin and norepinephrine reuptake inhibitors**
Maprotiline	Desvenlafaxine
Nortriptyline[b]	Duloxetine
Protriptyline[b]	Levomilnacipran[d]
Trimipramine[a,b,c]	Venlafaxine
Serotonin modulators	Milnacipran[f]
Nefazodone	**Miscellaneous**
Trazodone	Bupropion
Vilazodone[d]	Mirtazapine
Vortioxetine[d]	
Selective serotonin reuptake inhibitors	
Citalopram	
Escitalopram	
Fluoxetine	
Fluvoxamine	
Paroxetine[b]	
Sertraline	

[a]*Denotes tertiary tricyclic antidepressants.*
[b]*Denotes drugs with strong anticholinergic properties.*
[c]*Indicates that it should be avoided, regardless of diagnosis, according to 2012 or 2015 Beers Criteria.*
[d]*Indicates that it is not available in National Ambulatory Medical Care Survey.*
[e]*Denotes a monoamine oxidase B and is primarily classified as anti-Parkinsonian agents.*
[f]*Is primarily classified as fibromyalgia agents.*

Independent Variables. The key exposure of interest was the depression screening status (yes or no). More specifically, the NAMCS asks, "Was the depression screening exam ordered or provided at the visit?" The time indicator variable was also included to identify before and after the 2009 USPSTF depression screening guideline (0 = 2006-2008 [reference category] and 1 = 2009-2012).

Control Variables. Based on previous studies, we identified the following covariates. We included demographic variables: age (65-74, 75-84, or 85+), gender, race/ethnicity, region (Northeast, Midwest, South, or West), primary source of payment (Medicare, Medicaid, private, or others), reason for visit (acute problem, routine chronic problem, preventive care, or pre- or post-surgery care), and repeat of visits within the past 12 months (none, 1-2, 3-5, or 6+).[8,11,17,18,22-24] In addition, we included the following clinical characteristics: type of medical practice (solo or others), metropolitan statistical area (MSA) status (yes or no), time spent with doctor (< 15, 15-20, 21-30, or > 30 minutes), number of chronic conditions (none, 1, 2-3, or 4+), and number of medications (0-2, 3-5, or 6+). The number of chronic conditions was based on 14 chronic conditions (yes or no) collected by the NAMCS (e.g., arthritis, congestive heart failure, and diabetes).[21] The repeat of visits variable had the largest missing proportion (14.8%) and was imputed based on age, gender, and the number of medications using the Hotdeck imputation technique.[25] Other variables that had missing values included primary source of payment (3.9%), reason for visit (1.7%), and the number of chronic conditions (1.2%). Observations with all of these missing values (6.5%) were systematically excluded, leaving the final sample size of 15,596 visits (unweighted).

Data Analysis

To answer our research questions, we conducted bivariate and multivariable analyses. First, we examined the extent to which demographic and clinical characteristics differed in visits by the time period before (2006-2008) and after (2010-2012) the implementation of 2009 USPSTF depression screening recommendation. We used cross-tabulations and design-based F-tests to investigate differences by depression screening status. Second, we employed a series of difference-in-differences (DID) approaches using multivariate logistic models to investigate if the 2009 USPSTF depression screening recommendation had differential effects on 3 aforementioned outcomes. We chose the DID method because it allows us to compare treatment and comparison groups (i.e., visits with depression screening and visits without depression screening) in terms of selected outcome changes over time relative to the outcomes observed in the pre-2009 time period.[26] The strength of the DID approach is that it can minimize bias from unmeasured confounders and control for secular trends that might have affected depression screening rates.[26] This was done by regressing each outcome on the indicator variable of depression screening status (yes or no), a time indicator variable (before 2009 [i.e., 2006-2008] or after 2009 [i.e., 2010-2012]), and the interaction of these 2 variables, while adjusting for all other covariates. The DID approach compares the changes in proportions of selected outcomes by pre-2009 and post-2009 time periods (i.e., first difference) and comparing the first differences by the depression screening status (i.e., second difference). We used Stata version 13.1 (StataCorp, College Station, TX) for all analyses, and the svy commands in Stata were employed to account for the complex sample design of the NAMCS (i.e., unequal probability of selection, clustering, and stratification).

Results

Study Sample Characteristics

Table 3 presents demographic and clinical characteristics of office-based outpatient primary care visits made by older adults by the time period before (2006-2008) and after (2010-2012) the implementation of the 2009 USPSTF depression screening recommendation. The depression screening rates were nearly the same (1.9%) in the 2 different time periods. Further, all outcomes of interest were not significantly different between

TABLE 2 2012/2015 Beers Criteria for Potentially Inappropriate Antidepressant Use in Older Adults Due to Drug-Disease or Drug-Syndrome Interactions That May Exacerbate the Disease or Syndrome[19,20]

Disease or Syndrome (ICD-9-CM Code)	Antidepressant[a]	Rationale	Recommendation	Quality of Evidence	Strength of Recommendation
Cardiovascular					
Syncope (780.2, 992.1)	Tertiary TCAs	Increase risk of orthostatic hypotension or bradycardia	Avoid	Moderate	Strong
Central nervous system					
Chronic seizures or epilepsy (345, 780.33)	Bupropion, maprotiline	Lowers seizure threshold; may be acceptable in patients with well-controlled seizures in whom alternative agents have not been effective	Avoid	Moderate	Strong
Delirium (290.11, 290.3, 290.41, 291.0, 292.81, 293.0, 293.1)	TCAs, anticholinergics	Induce or worsen delirium in older adults; if discontinuing drugs used chronically, taper to avoid withdrawal symptoms	Avoid	Moderate	Strong
Dementia and cognitive impairment (290, 291.2, 292.82, 294.10, 294.11, 294.20, 294.21, 331.0, 331.19, 331.82, 331.83)	Anticholinergics	Avoid because of adverse CNS effects	Avoid	High	Strong
History of falls or fractures (E880-E888)	TCAs, SSRIs	Ability to produce ataxia, impaired psychomotor function, syncope, and additional falls	Avoid unless safer alternatives are not available	High	Strong
Gastrointestinal					
Chronic constipation (564)	Tertiary TCAs, anticholinergics	Can worsen constipation	Avoid unless no other alternatives	Moderate to low	Weak
Lower urinary tract symptoms, benign prostatic hyperplasia (600)	Anticholinergics	May decrease urinary flow and cause urinary retention	Avoid in men	Moderate	Inhaled agents: strong; others: weak

[a]*Refer to Table 1 for full description.*

CNS = central nervous system; ICD-9-CM = International Classification of Diseases, Ninth Revision, Clinical Modification; TCA = tricyclic antidepressant; SSRI = selective serotonin reuptake inhibitor.

time periods. For demographic characteristics, age, race/ethnicity, and region did not differ significantly between time periods. Gender and the source of payment did differ significantly, such that more visits were made by male older adults ($P = 0.001$) and covered by Medicare ($P < 0.001$) in the post-2009 time period. Clinical characteristics, reason for visit, type of medical practice, and MSA status did not differ across time periods. Between 2006 and 2008, 74.4% of patients had 3 or more visits in the past 12 months, and this rate was significantly higher than that of the post-2009 period (68.9%; $P < 0.001$). The distribution of time spent with a doctor differed significantly across the time periods ($P < 0.001$). For example, 34.1% of visits had 21 or more minutes spent with a doctor in the post-2009 period, which is significantly higher than that of the pre-2009 period (23.3%). We also observed that the number of multiple chronic conditions and the number of medications prescribed varied by the time period ($P = 0.006$ and $P = 0.001$, respectively). For instance, 71.3% of older adults had 2 or more chronic conditions in the post-2009 period, which was higher than that of the pre-2009 period (67.1%). Similarly, 67.7% of older adults who had visits had 3 or more concomitant medications prescribed in the post-2009 period, which was higher than that of the pre-2009 period (63.1%).

Difference-in-Differences

Table 4 presents the adjusted prevalence of selected outcomes in office-based outpatient primary care visits made by older adults by depression screening status and the time period. Overall, the prevalence of diagnosis with any mental disorder significantly decreased from 40.2% in pre-2009 to 26.6% in post-2009 in visits with depression screening. On the other hand, the prevalence of diagnosis with any mental disorders increased from 5.5% in pre-2009 to 6.4% in post-2009 in visits without depression screening. Differences by the depression screening status were -34.7% in the pre-2009 period and -20.2% in the post-2009 period, resulting in a differential effect of -14.4% (95% confidence interval [CI] = -28.2, -0.6; $P = 0.040$). In subgroup analyses, no differential effect was found in mood disorders, anxiety disorders, or psychosis/developmental disorders. In the case of other disorders that are not mood disorders, anxiety disorders, or psychosis/developmental disorders, the differential magnitude was large (-8.5%), even though it was not statistically significant (95% CI = -17.0, 0.1; $P = 0.053$). No differential effect due to the 2009 USPSTF depression screening recommendation was found in the cases of antidepressant prescription patterns ($P = 0.680$) and the utilization of psychiatric services ($P = 0.679$).

TABLE 3 Selected Baseline Characteristics (Weighted Percent) of Older Adults in Office-Based Outpatient Primary Care Settings by Time Periods, 2006-2012 NAMCS

	Pre-2009 (2006-2008)	Post-2009 (2010-2012)	Total	*P* Value
Depression screening				
No	98.1	98.1	98.1	0.963
Yes	1.9	1.9	1.9	
Mental disorder diagnosis				
No	93.7	93.1	93.4	0.330
Yes	6.3	6.9	6.6	
Antidepressant prescribed				
No	88.1	87.2	87.7	0.470
Yes, appropriate	10.4	11.4	10.9	
Yes, potentially inappropriate	1.5	1.4	1.5	
Psychotherapy or other mental health counseling provided				
No	99.4	99.3	99.3	0.669
Yes	0.6	0.7	0.7	
Age, years				
65-74	49.7	50.5	50.1	0.227
75-84	36.8	35.0	35.9	
85+	13.6	14.5	14.0	
Gender				
Female	59.9	56.7	58.3	0.012
Male	40.1	43.3	41.7	
Race/ethnicity				
Non-Hispanic white	77.9	78.2	78.0	0.935
Non-Hispanic black	9.4	8.6	9.0	
Hispanic	8.3	8.4	8.3	
Other[a]	4.5	4.9	4.7	
Region				
Northeast	17.0	18.6	17.8	0.096
Midwest	19.7	21.7	20.7	
South	43.4	35.7	39.6	
West	19.8	24.0	21.9	
Source of payment				
Private	17.2	14.7	15.9	<0.001
Medicare	75.9	82.4	79.1	
Medicaid	4.9	1.6	3.3	
Other[b]	2.1	1.3	1.7	

	Pre-2009 (2006-2008)	Post-2009 (2010-2012)	Total	*P* Value
Reason for visit				
Acute problem	32.5	31.3	31.9	0.265
Routine chronic problem	50.9	49.3	50.1	
Preventive care	14.3	16.6	15.4	
Pre- or postsurgery	2.3	2.9	2.6	
Repeat of visits				
0 visits	2.6	4.5	3.3	<0.001
1-2 visits	23.0	26.6	24.4	
3-5 visits	39.3	39.3	39.3	
6+ visits	35.1	29.6	33.0	
Type of medical practice				
Solo	89.0	89.5	89.3	0.832
Other[c]	11.0	10.5	10.7	
MSA status				
MSA	80.6	79.7	80.1	0.780
Non-MSA	19.4	20.3	19.9	
Time spent with doctor				
<15 min.	14.8	14.0	14.4	<0.001
15-20 min.	61.8	52.0	56.9	
21-30 min.	16.2	22.0	19.1	
>30 min.	7.1	12.1	9.6	
Multiple chronic conditions				
None	11.1	8.8	10.0	0.008
1	21.8	19.9	20.9	
2-3	47.4	47.2	47.3	
4+	19.7	24.1	21.9	
Number of medications				
0	11.8	11.1	11.5	0.001
1-2	25.1	21.2	23.2	
3-5	29.4	25.8	27.6	
6+	33.7	41.9	37.7	
Sample size				
Unweighted sample	6,283	9,313	15,596	
Weighted visits	47,087,308	46,502,737	93,590,045	

[a]*Includes Asians, American Indian/Alaska Natives, Native Hawaiian or Other Pacific Islanders, and multiple races.*
[b]*Includes worker's compensation, self-pay, no charge, and others.*
[c]*Includes federally qualified health center, non-federal government clinic, family planning clinic, health maintenance organization or other prepaid practice plan, and faculty practice plan.*
MSA = metropolitan statistical area; NAMCS = National Ambulatory Medical Care Survey.

Discussion

This is the first population-based observational study to examine the effects of the 2009 USPSTF depression screening recommendation in office-based outpatient visits made by older adults. Overall, the diagnosis of any mental disorder had a differential effect (-14.4%; 95% CI = -28.2, -0.6). While there is no clear explanation from this population-based observational data, there are 2 plausible reasons for this phenomenon. One would be that primary care physicians have different medical practice patterns compared to psychiatrists, who are specialized in mental health diagnoses and psychopharmacological interventions. The other possibility may be patient perceptions. Older patients, unlike their younger counterparts, may still be sensitive to stigma related to mental health issues. Besides these, there might be unobserved confounders that can explain this finding. Future research, however, is needed to better understand such medical practice patterns and how they may affect mental health outcomes of older patients.

TABLE 4 Adjusted Proportion of Selected Outcomes Among Older Adults in Office-Based Outpatient Primary Care Settings by Depression Screening, NAMCS 2006-2012

	With Depression Screening, %		Without Depression Screening, %		Difference, %		Difference-in-Differences, %		
	Pre-2009 (2006-2008)	Post-2009 (2010-2012)	Pre-2009 (2006-2008)	Post-2009 (2010-2012)	Pre-2009 (2006-2008)	Post-2009 (2010-2012)	Coefficient	95% CI	*P* Value
Mental disorder diagnosis									
Any mental disorder	40.2	26.6	5.5	6.4	-34.7	-20.2	-14.4	-28.2 -0.6	0.040
Mood disorder	26.9	20.1	2.0	2.0	-24.9	-18.0	-6.9	-20.9 7.1	0.334
Anxiety disorder	8.2	4.7	1.7	1.9	-6.5	-2.8	-3.7	-10.9 3.5	0.313
Psychosis/developmental disorder	6.0	1.2	1.2	1.8	-4.8	0.6	-5.4	-12.2 1.4	0.121
Other	12.5	4.6	2.9	3.5	-9.6	-1.1	-8.5	-17.0 0.1	0.053
Comorbid mental disorders									
2 or more	0.9	1.7	0.1	0.2	-0.8	-1.5	0.7	-18.7 3.3	0.592
Antidepressant prescription									
Any antidepressant	28.2	25.8	10.9	10.8	-17.3	-15.0	-2.3	-13.1 8.5	0.680
Potentially inappropriate antidepressant	0.5	-0.1	1.6	1.4	1.1	1.6	-0.5	-1.8 0.8	0.463
Psychiatric service use									
Psychotherapy and mental health counseling	9.1	10.9	0.4	0.4	-8.7	-10.4	1.8	-6.6 10.1	0.679
Sample size									
Unweighted sample	323		15,273		–	–	–	15,596	
Weighted visits	1,748,058		91,841,986		–	–	–	93,590,045	

Note: Controlled for all other covariates.
CI = confidence interval; NAMCS = National Ambulatory Medical Care Survey.

No differential effect was found in terms of overall and potentially inappropriate antidepressant prescribing patterns and provision of nonpharmacological psychiatric services. First, these findings are consistent with previous studies, which show no or uncertain improvement of depression-related outcomes due to depression screening.[27,28] This may be due to a broadly defined guideline in the USPSTF depression screening recommendation statements, which did not specify which depression screening instruments should be used in primary care practices. Other possible reasons include acceptability or credibility issues regarding depression screening among patients and health care providers (e.g., uncertainty with respect to the evidence).

One of the important clinical implications is the quality of current depression screening tools in primary care practice. For example, false-positive rates of existing screening tools are relatively high,[29] such that primary care physicians do not order follow-up tests for mental health diagnoses other than depression. Alternatively, primary care physicians may not be well informed about procedures when several screening tools are available with little evidence of such tools.[29] According to the American Geriatrics Society, the Patient Health Questionnaire-2 is recommended as an initial depression screening tool and a 15-item Geriatric Depression Scale as a follow-up test for older adults.[30] In other words, screening tools are meant as a way to alert primary care physicians to the possible presence of a mental health condition and should be followed by more assessments. However, using nationally representative secondary data, our study is limited to investigating the details of primary care physician practice patterns for utilizing depression screening. Future research is needed to better understand the adherence of primary care physicians to the depression screening guideline and its related outcomes.

A recent study found that depression screening was associated with a decreased rate of potentially inappropriate antidepressant prescriptions in older adults using the same data source.[11] Based on our findings and their rationale, it seems that depression screening is still useful, as the provision of depression screening was associated with a decreased rate of potentially inappropriate antidepressant prescriptions in visits made by older adults[11]; this phenomenon, however, was not likely due to recent USPSTF guideline implementation. Future research is still needed to characterize causal pathways for depression screening, diagnoses, and treatments of depression and other psychiatric disorders to further guide the utility of depression screening guidelines for health care providers in primary care settings.

Limitations

Our study has several limitations. First, the 2009 USPSTF depression screening recommendation distinguishes that the screening service use is recommended if and only if staff-assisted depression care supports are in place (i.e., grade B

recommendation). Otherwise, the screening service may be provided depending on individual circumstances (i.e., grade C recommendation).[5] Because the NAMCS does not collect information regarding staff-assisted depression care supports, careful interpretations of the study findings are needed. Currently, no publicly available national data allow us to collect such information. In addition, detailed depression screening strategies are not known in the NAMCS. Future research should address such issues (e.g., types and intensity of depression screening) when examining the roles of depression screening on diagnosing and treating depression and other mental health conditions.

Second, due to the nature of the survey design, the NAMCS only captures up to 3 diagnoses in a sampled visit, and diagnoses from any previous visit are not known. In addition, problems with transferring clinical information across different health care providers or sites may have contributed to missing psychiatric diagnoses in the NAMCS data, as documented elsewhere.[31] Thus, the NAMCS may have underreported the rates of depression screening, mental health diagnosis, and/or treatment. These limitations should be carefully considered when interpreting our findings.

Strengths of the study include the use of a quasi-experimental DID method to evaluate the effect of the 2009 depression screening recommendation at the national level.[25] This study adds value to existing literature because no population-based observational study was conducted to support previous studies, as they solely used a randomized controlled trial (RCT) approach.[28,32,33] While RCT studies focus on efficacy of depression screening in ideal settings, population-based observational studies, such as our study, can evaluate the effectiveness of depression screening with greater validity in real-world settings. For this reason, our study can inform clinical implications of practicing depression screening in primary care settings at the national level.

Conclusions

This study provides evidence that the 2009 USPSTF depression screening recommendation was associated with a decreased rate of diagnosing any mental disorder but had no effect on antidepressant prescribing patterns and provision of nonpharmacological psychiatric services in office-based outpatient visits made by older adults. In 2016, the USPSTF disseminated its updated recommendation, which remains unchanged that a grade B recommendation is given regardless of staff-assisted depression care supports status.[34,35] Such a recommendation is notably different from the Canadian Task Force on Preventive Health Care, which recently recommended against depression screening in 2013 because of the evidence that no RCT study supports the effectiveness of depression screening on depression outcomes in primary care settings.[33] Since evidence of efficacy and effectiveness of depression screening remains mixed, additional population-based observational research with rigorous designs is needed in the near future to strengthen and support current USPSTF depression screening recommendation statements in the United States.

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DISCLOSURES

Funding for this study was provided by the National Institute on Aging of the National Institutes of Health (#T32AG019134). The authors declare that they do not have any conflicts of interest. Publicly available data were obtained from the National Center for Health Statistics (NCHS) of the Centers for Disease Control and Prevention (CDC). Analyses, interpretation, and conclusions are solely those of the authors and do not necessarily reflect the views of the Division of Health Interview Statistics or NCHS of the CDC.

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