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Hospital utilization and expenditures among a nationally representative sample of Medicare fee-for-service beneficiaries 2 years after receipt of an Annual Wellness Visit☆

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A B S T R A C T

Medicare's Annual Wellness Visit (AWV) provides an opportunity to link beneficiaries to cancer screenings and immunizations, however, research has not examined its effectiveness. The aim of this study was to examine the effect of receiving an AWV on outcomes while accounting for the healthy user effect.

This study used 2013–2017 Medicare claims data to compare hospital utilization and total expenditures among a 5% random sample of Medicare fee-for-service (FFS) beneficiaries with and without AWV use in 2014 (228,053 AWV users were propensity-score matched to 228,053 nonusers). Linear fixed effects regression models examined differences in study outcomes 12 and 24 months after AWV use, controlling for baseline differences in sociodemographics, health status, utilization, and accountable care organization attribution.

The proportion of Medicare FFS beneficiaries that used the AWV increased from 13% in 2013 to 24% in 2017. Users of the AWV had a marginally significant reduction in Medicare spending 12 months (−$122, 95% CI −$256, $11, $p = 0.073$) and significant reductions (−$162, 95% CI, −$310, −$14, $p = 0.032$) 24 months after the visit, relative to non-users. However it remains unclear what is driving these savings as there was no change in hospital-related utilization and results may still be biased due to inherent differences between users and non-users.

The AWV provides an opportunity for providers to focus on prevention and geriatric needs not covered in typical office visits. Practices adopting AWVs have noted increased revenue, more stable patient populations, and stronger provider-patient relationships. While utilization remains low, it is steadily increasing over time.

1. Introduction

The Annual Wellness Visit (AWV), first made available to Medicare beneficiaries in 2011, focuses on preventive health. During this annual visit, the provider reviews patient's history and risk factors for diseases, ensures that the patient's medication list is up to date, and prepares a personalized prevention plan (Center for Medicare and Medicaid Services, 2017). The included screenings focus on cancer and other geriatric syndromes such as cognitive impairment, frailty, physical functioning, and risk for falls. Medicare beneficiaries who receive an AWV are more likely to receive other preventive services such as cancer and behavioral health screening, influenza and pneumococcal vaccinations, and sexually transmitted infection screening (Tao, 2018; Shen et al., 2017; Jiang et al., 2018).

While there have been studies that looked at uptake of the benefit, characteristics of individuals who receive an AWV, and the effect of AWVs on subsequent health care utilization, none to date have measured the effect of AWV on cost and hospital utilization outcomes in a nationally representative sample (Camacho et al., 2017; Mink et al., 2016; Pfoh et al., 2015; Ganguli et al., 2017; Fowler et al., 2018; Jiang et al., 2018; Chung et al., 2018).

There is inherent difficulty in examining the effect of a preventive service without accounting for underlying differences between users and nonusers so as not to miss-attribute outcomes to the service when these differences stem from aspects of the groups themselves. The objective of this study was to examine the impact of the AWV on Medicare expenditures and hospital-related utilization by harnessing a strong study design and statistical methods to minimize the potential bias between users and nonusers. Following recommendations by Shrank et al. (2011) to account for the healthy user effect in observational research, this study employed a new user study design to eliminate potential confounding from consistent use of a preventive service over time, which could overestimate the effect of the service on study outcomes. This study also follows recommendations to construct an active

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comparison group and to control for use of other preventive services in regression models to approximate the healthy user effect that would otherwise go unmeasured (Shrank et al., 2011). Lastly, we've employed statistical techniques to attenuate time-invariant factors that remain unmeasured, such as healthy behaviors, using liner fixed effects modeling.

2. Methods

The study used Medicare claims and enrollment data from the Chronic Conditions Warehouse for 2013–2017. We used a 5% random sample of Medicare fee-for-service (FFS) beneficiaries continuously enrolled (alive, enrolled in Medicare Parts A & B, and not enrolled in Medicare Advantage) throughout all study years. AWV users (identified using Medicare's Healthcare Common Procedure Coding System [HCPCS] codes G0438 and G0439) were identified in 2014 (N = 228,053) and followed for 24 months to examine subsequent hospital-related utilization and Medicare expenditures. To minimize potential selection bias, we constructed a new user study design and therefore excluded beneficiaries who had received an AWV in the preceding calendar year (2013).

To compare outcomes of AWV users to other Medicare FFS beneficiaries, we constructed a comparison group of individuals similar to AWV users based on a range of baseline characteristics such as demographics, health status, past service use and spending (outpatient and inpatient care), use of another preventive service (influenza vaccination) to further account for the healthy user effect, and accountable care organization (ACO) attribution. ACO attribution was included as a proxy for provider-level factors based on prior work showing a differential impact on AWV by ACO status (Ganguli et al., 2017). We estimated propensity scores for AWV use as a function of baseline variables (2014) identified as likely associated (positively or negatively) with preventive care use in general (National Commission on Prevention Priorities, 2007; Ganguli et al., 2017; Chung et al., 2018). We then performed a one-to-one matching with replacement to identify a comparison group (Parson 2004). We analyzed the balance of AWV user and nonuser (comparison) groups using standardized differences in means for the baseline variables.

Before propensity score matching, imbalances between AWV users and nonusers existed (Table 1), as indicated by standardized differences of at least 0.10 or higher (often viewed as indicative of well-balanced treatment and comparison groups) for some baseline variables (Austin, 2009). There were large differences in the prevalence of ACO attribution, influenza vaccination, office visits (evaluation and management visits), dual-eligibility, rural/urban, and some of the health conditions (heart disease, cataracts, and other chronic conditions). However, there were not large differences between users and nonusers for the remaining baseline variables. Table 1 also describes the matched study sample, where 228,053 AWV users (100% of the users identified initially) were matched to 228,053 nonusers (from the original N = 1,256,404 nonusers in the unmatched sample). After matching, all standardized differences fell below 0.05, indicating that the propensity score matching resulted in well-balanced groups across the covariates.

There is no simple way to capture the unobserved differences between users and nonusers of AWV. The results of regression models are likely biased if these unobserved and unmeasured traits are related to the observed explanatory variables and the outcome being measured (endogeneity). The healthy user effect is one example of this sort of bias. It states that patients who receive one preventive therapy are also likely to seek other preventive services or partake in other healthy behaviors (Shrank et al., 2011). Although the new user design and propensity score matching attempted to overcome this endogeneity problem, we further used linear fixed effects modeling, which eliminates unmeasured confounding factors, such as proclivity to participate in healthy behaviors, if these factors did not change over time. The liner fixed effects (within estimator) was conducted using the xtreg fe command with robust standard errors from Stata version 15.

We conducted linear fixed effects models to examine differences in outcomes 12 and 24 months after AWV use, including inpatient hospital covered days, emergency department (ED) visits, and total parts A and B Medicare spending (based on Medicare allowed charge amounts). Full regression output for these three study outcomes are provided in Microsoft Word format in supplemental files 1–3. Regression models controlled for the same observed characteristics used to construct the comparison group, which produced doubly robust standard errors. Specifically, regression models controlled for all baseline variables listed in Table 1 as well as time dummy variables at 12 and 24 months after AWV use. To examine differential effects of AWV use, we added interactions of AWV and time dummy variables.

3. Results

3.1. Use of Annual Wellness Visits

Use of the AWV steadily increased among Medicare FFS beneficiaries from 13% in 2013; 15% in 2014; 19% in 2015; 22% in 2016; to 24% in 2017. In general, Medicare beneficiaries that had an AWV in 2014 tended to be slightly older, not dually eligible for Medicare and Medicaid, somewhat healthier (less likely to have specific conditions such as Alzheimer or cataracts), more likely to receive an influenza vaccination and an office visit, more likely to be attributed to an ACO, and had lower baseline Medicare spending (Table 1).

3.2. Outcomes associated with AWV use

Among Medicare FFS beneficiaries who received an AWV in 2014, we found significant improvements in total expenditures relative to similar beneficiaries who did not receive an AWV. Total A & B Medicare expenditures were significantly lower for AWV users, by $122 (95% confidence interval (CI): −$256, $11, $p = 0.073$) and $162 (95% CI: −$310, −$14, $p = 0.032$), in the 12 and 24 months after AWV use, respectively (Table 2). With baseline total Medicare expenditures of $8952 for AWV users and $10,459 among non-users, this translates into relatively small reductions in total expenditures (less than 2%). Annual ED visits were fractionally lower among AWV users, by 0.007 (95% CI: −0.015, 0.002, $p = 0.12$) and 0.002 (95% CI: −0.011, 0.007, $p = 0.64$), in the 12 and 24 months following AWV use, respectively, but these changes were not statistically significant. AWV use was associated with slightly fewer inpatient hospital covered days (0.003 fewer days, 95% CI: −0.03, 0.02, $p = 0.84$) in the 12 months after AWV use but not in the 24 months after AWV use (0.004 more days, 95% CI: −0.02, 0.03, $p = 0.77$), however neither of these results were statistically significant.

4. Discussion

Use of the AWV among a nationally representative group of Medicare FFS beneficiaries was associated with lower Medicare spending that came close to covering the cost of the service ($175 first visit; $119 subsequent visits) itself (Hollmann, 2019). Although the current study did not find significant changes in hospital-related utilization, prior studies have demonstrated that use of the AWV was associated with improvements in subsequent use of preventive services such as mammography, pap smear tests, bone mass measurement, prostate cancer screening, colon cancer screening, influenza vaccination, and screenings for depression and alcohol misuse (Jiang et al., 2018). It is possible that increased use of these preventive services could improve the overall health and well-being of Medicare beneficiaries. However, it may be unrealistic to expect the subsequent preventive screenings and/or vaccinations to have lowered expenditures within the short follow-up period examined in this study when many of these services typically increase spending initially with cost-savings

Table 1
Baseline characteristics of the Medicare FFS study population and annual wellness visit use in 2014: before and after propensity score matching.

Baseline variables	Before matching			After matching		
	AWV users in 2014	Non-users	SD	AWV users in 2014	Non-users	SD
	N = 228,053	N = 1,256,404		N = 228,053	N = 228,053	
Age (mean, Std Dev)	73.3 (10.0)	71.0 (12.9)	0.05	73.3 (10.0)	73.3 (10.2)	0.00
Male (%)	41.5	45.6	0.05	41.5	41.5	0.00
Race/Ethnicity (%)			−0.08			0.00
White	86.0	80.0		86.0	87.0	
Black	6.7	10.3		6.7	6.5	
Hispanic	4.0	6.0		4.0	3.6	
Other	3.4	3.7		3.4	2.9	
Medicare-Medicaid dual eligible (%)	13.3	21.8	−0.22	13.3	12.6	0.02
Region (%)			0.00			0.00
West	17.7	18.9		17.7	18.1	
Northwest	22.8	18.3		22.8	22.3	
Midwest	20.7	23.1		20.7	20.9	
South	38.8	39.8		38.8	38.7	
Rural	19.9	16.9	−0.24	19.9	20.2	0.00
Comorbidities (%)						
Atrial fibrillation	12.6	12.5	0.00	12.6	12.4	0.01
Alzheimer	9.2	11.8	−0.09	9.2	8.7	0.02
Anemia	50.6	47.3	0.07	50.6	50.3	0.01
Asthma	13.4	13.3	0.01	13.4	13.4	0.00
Cancer	15.4	13.0	0.07	15.4	15.6	0.00
Heart disease	80.2	74.1	0.15	80.2	80.5	−0.01
Cataract	67.2	54.2	0.27	67.2	67.3	0.00
CKC	21.6	22.9	−0.03	21.6	21.3	0.01
COPD	21.4	23.8	−0.06	21.4	21.3	0.00
Diabetes	33.4	34.3	−0.02	33.4	35.6	−0.05
Other chronic conditions	95.4	85.8	0.33	95.4	95.7	−0.02
ACO attribution (%)	24.9	14.3	0.27	24.9	23.1	0.04
Utilization/Costs						
Influenza vaccination (%)	66.4	46.0	0.42	66.4	65.7	0.01
Office visits (%)	96.9	84.5	0.44	96.9	97.4	−0.03
Acute covered days (mean, Std Dev)	0.75 (3.24)	1.16 (4.57)	−0.03	0.75 (3.24)	1.02 (4.00)	−0.02
Any ED visits (mean, Std Dev)	0.47 (1.26)	0.67 (1.82)	−0.03	0.47 (1.26)	0.57 (3.24)	−0.02
Total Medicare expenditures (mean, Std Dev)	$8952 (17,909)	$10,726 (23,763)	−0.02	$8952 (17,909)	$10,459 (21,320)	−0.02

ACO = accountable care organization; AWV = Annual Wellness Visit; CKC = Chronic Kidney Disease; Chronic Obstructive Pulmonary Disease; ED = emergency department; FFS = fee for service; Std Dev = standard deviation; SD = standardized difference.

realized over longer time windows (Maciosek et al., 2010).

AWVs are generally considered beneficial by most family physicians, are relatively well reimbursed compared to established office visits, and are essentially free to Medicare beneficiaries (Bluestein et al., 2017). Assessments geared toward geriatric needs that screen for cognitive issues, physical function, and discussion about advanced directives are not a focus during routine primary care visits (Colburn and Nothelle, 2018; Hollmann, 2019). Patients are more likely to schedule and receive this service if it is recommended by their provider. Therefore, patient characteristics may be less relevant to uptake and provider characteristics should also be considered. Although uptake of AWVs has increased over time, it remains relatively low (Ganguli et al., 2017; Chung et al., 2015). Uptake is lower among practices serving more vulnerable Medicare populations (racial minorities, dually eligible for Medicaid and Medicare beneficiaries, and those living in rural settings), groups likely the most in need of these services (Ganguli et al., 2018).

While some providers view the service as overly complex and time consuming to administer, others appreciate its ability to “escape the tyranny of the urgent” with its focus on prevention (Colburn and Nothelle, 2018). The ability for non-physician providers to administer the visit, including nurses, dieticians, pharmacists, health educators (under supervision by a physician), facilitates greater uptake of the visit (Colburn and Nothelle, 2018; Ganguli et al., 2018; Hollmann, 2019). Practices adopting AWVs have noted increased revenue, more stable patient populations, and stronger provider-patient relationships (Colburn and Nothelle, 2018; Hollmann, 2019).

Although our methods addressed many potential biases, results should be viewed in light of several study limitations. Even though the study attempted to account for the healthy user effect, study results may still be biased. Inherent differences between users and nonusers may still be driving the observed impact on expenditures. This study did not account for many factors that cannot be observed through claims data, such changes in individual's functional status, mental health, and cognitive impairment. While an indicator for beneficiaries' attribution to an ACO provides a proxy for physician practice patterns, other provider characteristics such as quality of care remain unmeasured. Additionally, this study did not examine the underlying mechanisms that may be driving study outcomes (such as primary care referrals to

Table 2
Relative changes on study outcomes 12 and 24 months after use of Annual Wellness Visit in 2014.

	12 months after AWV use in 2014	24 months after AWV use in 2014
Total Part A & B Medicare expenditures	−$122.29 [−255.89, 11.30]	−$162.31 [−310.30, −14.33]
Acute covered days	−0.003 [−0.030, 0.024]	0.004 [−0.024, 0.033]
Any emergency department visits	−0.007 [−0.015, 0.002]	−0.002 [−0.012, 0.007]

other preventive services, including cancer screenings). We did not account for AWV use in the post-period years, potentially confounding study results. Longer follow-up periods may be needed to determine the cumulative impact of this and subsequent preventive visits over time on downstream utilization and expenditures. Study results are only applicable to the Medicare FFS beneficiaries that remain continuously enrolled as beneficiaries who died or enrolled in Medicare Advantage (MA) at any point over the study window were excluded from the sample due to a lack of claims data on health care spending and utilization.

5. Conclusions

Use of Medicare's Annual Wellness Visit (AWV) was associated with reductions in Medicare spending 24 months after the visit. However it remains unclear what is driving these savings as there was no changes in hospital-related utilization.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.ypmed.2019.105850.

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