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An Emergency Room Decision-Support Program That Increased Physician Office Visits, Decreased Emergency Room Visits, and Saved Money

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Abstract

The objective of this study was to evaluate an Emergency Room having a Decision-Support (ERDS) program designed to appropriately reduce ER use among frequent users, defined as 3 or more visits within a 12-month period. To achieve this, adults with an AARP Medicare Supplement Insurance plan insured by UnitedHealthcare Insurance Company (for New York residents, UnitedHealthcare Insurance Company of New York) were eligible to participate in the program. These included 7070 individuals who elected to enroll in the ERDS program and an equal number of matched nonparticipants who were eligible but either declined or were unreachable. Program-related benefits were estimated by comparing the difference in downstream health care utilization and expenditures between engaged and not engaged individuals after using propensity score matching to adjust for case mix differences between these groups. As a result, compared with the not engaged, engaged individuals experienced better care coordination, evidenced by a greater reduction in ER visits ($P = 0.033$) and hospital admissions ($P = 0.002$) and an increase in office visits ($P < 0.001$). The program was cost-effective, with a return on investment (ROI) of 1.24, which was calculated by dividing the total program savings ($3.41 million) by the total program costs ($2.75 million). The ROI implies that for every dollar invested in this program, $1.24 was saved, most of which was for the federal Medicare program. In conclusion, the decrease in ER visits and hospital admissions and the increase in office visits may indicate the program helped individuals to seek the appropriate levels of care. (*Population Health Management* 2014;17:257–264)

Introduction

About one third of emergency room (ER) visits are avoidable, meaning that they could have occurred in a primary care setting. These potentially unnecessary ER visits contribute to approximately $18 billion in avoidable expenditures annually.[1] As the nation struggles to fund the Medicare program, the reduction of avoidable visits to the ER is being explored as one way to improve the solvency of this program without risking access, quality, and outcomes.

A recent report by the Institute of Medicine stated that ER costs for treating minor problems are estimated to be 2 to 5 times higher than comparable treatment in a typical office visit.[2] Frequent users comprise 4.5% to 8% of all ER patients but account for 21% to 28% of all visits.[3] Although it is recognized that frequent ER use is associated with complex sociocultural and psychological factors,[4,5] several studies have identified other characteristics of Medicare insureds who are frequent ER users. Included are those who have exacerbations of chronic conditions,[6] are older and have more severe illness,[7] or whose race was black and who received care from a hospital in a predominantly minority neighborhood.[8] Conversely, having a regular primary care physician was associated with a 50% decreased risk of an ER visit compared with those without a primary care physician.[7]

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Proper coordination and quality of care have been shown to decrease ER utilization. At least 3 studies have assessed the ability of a care management program to reduce ER visits among frequent users. The first study enrolled 53 ER users, who were predominantly middle-aged men and had 5 or more ER visits in the previous 12 months, into a holistic case management program and compared preintervention and postintervention ER utilization. This study found a 40% decrease in the median number of ER visits as well as a 67% decrease in median ER costs.[9] The second study was a clinical trial that randomized 252 enrollees, again predominantly middle-aged men, into an ER care management program that used a holistic approach that was similar to the group's first study. Consistent with the first study, researchers observed a statistically significant reduction in ER visits and associated expenditures for the group in case management.[10] The third study was an observational retrospective analysis of 96 patients who were predominantly middle-aged women who had enrolled into a care management program; that study reported a 74% decrease in ER visits per member per month (PMPM).[11] Care management may be associated with improved quality of care,[12] and it is plausible that care management may reduce ER visits by improving the quality of and access to care before the need for ER services arises.

Because older adults use emergency care disproportionately,[13] it is important to understand if better care coordination among this population can reduce ER utilization and associated expenditures.

Over 3.5 million Americans, the majority of whom are aged 65 years and older, are covered by an AARP Medicare Supplement Insurance Plan insured by UnitedHealthcare Insurance Company (for New York residents, UnitedHealthcare Insurance Company of New York). These plans are offered in all 50 states, Washington DC, and various US territories. Medicare Supplement Insurance Plans are commonly referred to as Medigap plans.

One of the many services uniquely provided under these AARP branded plans includes an Emergency Room Decision-Support (ERDS) customer engagement program. This program started in June 2011 with the goal to improve the coordination of health care for AARP members with a Medigap plan insured by UnitedHealthcare Insurance Company by identifying and engaging those with high ER use. Monthly searches of health care claims data are used to find individuals who had 3 or more ER visits in a previous 12-month period. These individuals are asked to voluntarily engage in the ERDS program at no additional cost to them. Engagement involves talking with a nurse on the telephone to receive information about personal health needs and a discussion regarding treatment options. Based on this discussion, the nurse helps members find and make appointments with high-quality providers who provide treatment that is consistent with current professional knowledge. ERDS nurses also provide connections to available health resources, and referrals to Optum Management Programs, including care coordination programs, where available and applicable. Care coordination programs offer a holistic approach for managing individuals with multiple chronic conditions. The objective of this study was to evaluate the impact of the ERDS program on health care utilization and expenditures.

Methods

Study sample and time periods

The study included 91,717 AARP Medigap insureds who were referred to the ERDS program between June 1, 2011 and November 30, 2011. Engaged individuals included AARP Medigap insureds who participated in the ERDS program, while the not engaged included individuals who were eligible but either declined engagement or could not be contacted for possible engagement into the program.

Several common exclusion criteria were applied prior to analyses. Individuals were excluded from the study if key variables needed to measure case mix differences between groups were missing. The key variables are listed in Table 1. Individuals also were excluded if they had zero or very low post-engagement health care expenditures, as this was indicative that their insurance coverage lapsed.

To understand how health care expenditures changed over time for both the engaged and not engaged groups, index dates were defined for each individual to divide their observed time frames into 2 periods (before versus after index). The index date for an engaged individual was the date he or she spoke to the ERDS program nurse. The index date for each not engaged individual was based on the date he or she became eligible for the program plus a time lag adjustment.

In any program there may be a time lag between becoming eligible for and engaging in a program. This is because it takes time to contact individuals, describe the advantages of the program, obtain a decision to engage, and then to set up and apply program services. The time lag for each engaged individual (ie, the time between the first date of program qualification and the date of actual program engagement) was determined, and the distribution of these dates was applied to those who did not engage in the program via a random assignment method to ensure the time lag distribution for each group was the same. The 12 months prior to the index date was then defined as the pre period, while the 12 months after the index date was the observation period. The observation period also was labeled as the ''post period'' in this study. The time lag adjustment was a necessary step at this point in the analysis as it established the pre and post periods for which medical claims and health care utilization data could be ascertained. Therefore, it had to occur prior to matching, as will be described in a following section.

Return on investment (ROI) estimation

ERDS program savings were estimated as the difference in regression-adjusted pre and post period per member per month (PMPM) expenditures between those who engaged and those who did not. Expenditure categories included inpatient, outpatient, ER, and prescription drugs; these were totaled and divided by the number of eligible months to determine the PMPM expenditures. This difference was then multiplied by the total number of post period months among the engaged group to arrive at an estimate of total program savings. The ROI associated with engagement in the ERDS program was estimated as a ratio of ERDS program savings divided by the cost to set up and operate the program. An ROI ratio greater than 1.0 implies that for every dollar invested,

Table 1. Descriptive Statistics, Emergency Room Decision Support Program

Variable	*Unmatched*			*Propensity Score Matched*		
	Engaged n = *7138*	*Not Engaged* n = *67,875*	*Standardized Difference*[a]	*Engaged* n = *7070*	*Not Engaged* n = *7070*	*Standardized Difference*[a]
Age (%)						
65–74 years	59.4	36.5	0.471	59.2	59.4	0.003
≥75 years	34.9	60.6	0.533	35.3	35.4	0.000
Sex (% female)	58.9	59.8	0.017	59.0	59.0	0.001
Living in metropolitan statistical area (%)	72.7	76.8	0.094	74.0	74.1	0.002
ER index date lag	178.6	189.1	0.093	179.4	178.8	0.005
Prior 12 mo. MD visit count	18.0	16.1	0.177	17.7	17.7	0.004
Prior 12 mo. inpatient count	0.6	0.6	0.029	0.6	0.6	0.001
Prospective 3 mo. cost score	12.0	11.3	0.059	11.9	12.1	0.013
Hospital beds (per 1000)	2.4	2.4	0.013	2.4	2.4	0.001
Primary care physicians (per 100,000)	65.1	65.0	0.006	65.1	64.9	0.009
Specialists (per 100,000)	119.9	122.1	0.047	120.0	120.4	0.009
Prescription expense (%)	67.3	64.9	0.051	67.1	66.8	0.006
Income (%)						
High	39.8	45.2	0.109	40.1	40.0	0.002
Upper medium	27.7	25.1	0.060	27.5	26.8	0.016
Lower medium	21.6	19.5	0.053	21.5	21.8	0.006
Low	10.8	10.2	0.020	10.9	11.4	0.017
Minority status (%)						
Low	64.5	63.7	0.016	62.6	61.2	0.028
Medium/high	35.5	36.3	0.016	37.4	38.8	0.028
Region (%)						
Northeast	26.3	27.9	0.037	26.2	25.3	0.020
Midwest	19.7	18.3	0.037	19.6	19.6	0.001
South	35.9	37.7	0.038	36.2	37.4	0.025
West	18.1	16.1	0.053	18.0	17.8	0.007
Mental health episode (%)	6.2	5.9	0.011	6.1	5.6	0.021
Program name (%)						
ER3	37.3	47.4	0.204	37.7	37.2	0.009
ER4–5	39.6	31.5	0.171	39.2	39.6	0.008
ER 6+	23.1	21.2	0.046	23.1	23.1	0.001

[a]Standardized difference is the difference in means, or proportions, divided by the pooled standard deviation, where notable case mix differences are defined as values greater than 0.10.

ER, emergency room; MD, doctor of medicine.

more than a dollar was saved in medical and pharmaceutical expenditures because of program engagement.

Statistical analyses

Before savings were estimated, the study team determined if case mix differences existed between engaged and not engaged individuals. Descriptive statistics were used to answer this question. Because that turned out to be the case, propensity score analyses were used to account for measurable case mix differences observed in the descriptive analyses. These analyses were performed in a number of ways to understand how the choice of analytic methods impacted results. Lastly, the relationships between ERDS engagement and health care utilization rates were investigated.

The savings estimates were generated using data for each insured individual. Two sets of descriptive tables were produced before estimating savings. The first set showed unadjusted values of case mix measures for those who engaged in the ERDS program and those who did not. The second set was similar to the first, but showed case mix measures after a propensity score matching process was used to adjust for those case mix differences between these 2 groups.[14] Standardized differences in means or percentages of the case mix measures also were calculated.[15] As suggested in the literature,[16] standardized differences that were less than 0.10 were assumed to provide evidence that the propensity score analysis adequately adjusted for case mix differences.

The propensity score matching process first involved logistic regression analysis to estimate a propensity score for each individual. The variables used in the logistic regression are those listed in Table 1. Then subsequent matching of engaged and not engaged individuals was conducted based on their propensity scores. The propensity score is the predicted probability of engaging in ERDS, as estimated from the logistic regression.

An iterative, within caliper, nearest neighbor matching technique was used to match engaged and not engaged

individuals based on their propensity scores. The matching process started with a 6-digit caliper. In the first pass of matching, 28.7% of engaged and not engaged individuals were matched using the first 6 digits after the decimal point in their propensity scores. The remaining unmatched individuals were then run through the matching process again using a 5-digit caliper, after which an additional 56.5% were matched based on the first 5 digits after the decimal point. Finally, one more pass using the first 4 digits was performed after which an additional 13.9% were matched. In total and after 3 passes, 99% of the engaged and not engaged individuals were matched. This matching process yields more accurate estimates of ERDS program impact when expenditures are compared for the engaged and not engaged groups. The literature has shown that propensity score matching is a convenient and acceptable way to remove case mix differences when evaluating health and wellness programs.[17]

Predictor variables included in the propensity score logistic regression

Several types of variables were used to predict the probability of engaging in ERDS. These included demographic and socioeconomic measures, correlates of health status, and measures of the local supply of health care professionals and facilities.

Demographic measures included the individual's age, sex, and 2 variables measuring location. The first indicated if the individual resided in a rural versus an urban location. The second indicated the census region of the country in which the individual resided (Northeast, Midwest, South, and West).

Socioeconomic variables included geocoded imputations of each individual's race and income based on where they resided. Although not as accurate as self-reported measures, geocoded measures have proven to be useful at explaining health care utilization differences likely attributable to socioeconomic status.[18] Geocoded race was categorized as high, medium, or low, depending on the percent of minority residents in the individual's zip code. Geocoded income was imputed as high, medium-high, medium, or low based on whether the median income in the individual's zip code area was in the highest, second-highest, third-highest, or lowest quartile in 2010, according to US Census records.

Pharmaceutical claims data were available for approximately half of those included in these analyses (ie, only those who had a Medicare Part D Plan provided by UnitedHealthcare Insurance Company or one of its affiliates, a Medicare-approved Part D sponsor). A binary variable was created to account for the impact of having pharmacy spend in the 12 months prior to the index date; this variable served as a proxy for having and using Medicare Part D coverage from UnitedHealthcare.

Several health status measures also were included in the analyses and were used to assess case mix differences between the engaged and not engaged groups. First among these was the Optum ImpactPro prospective risk score, which used information about diagnoses observed in the claims data to generate a score, centered around 1.0, to estimate whether Medicare-allowed charges would be higher or lower than average in the following year. The ImpactPro risk score can be viewed as an expenditure-based proxy for predicted health status in the coming year. Also, a variable was created to identify the percentage of engaged and not engaged individuals who had a mental health episode. This was accomplished by creating a binary indicator for individuals having an ER visit or 2 physician office visit claims for a mental disorder in the 12 months prior to program identification. The remaining health status variables included health care utilization metrics to denote whether the sample member used inpatient, ER, or physician office visits in the 12 months prior to the index date.

The analyses also accounted for differences in the supply of health care services in the areas where individuals lived, because these are well known to influence health care utilization and expenditures and therefore might influence the decision to engage in ERDS.[18] Supply measures were included based on the number of primary care physicians, specialists, and hospital beds in the individual's zip code of residence. Physician office visits were calculated per 100,000 residents, while hospital beds were calculated per 1000 residents.[19]

Outcome measures used to assess the impact of ERDS

After the propensity matching was completed to remove case mix differences, initial comparisons of health care expenditures were made for those who engaged in ERDS versus those who did not. Expenditures were measured in PMPM terms and included Medicare, Medigap, and member out-of-pocket contributions. In addition to studying total expenditures PMPM, expenditures were subdivided into inpatient, outpatient, ER, and prescription drug expenditures. Next, 3 utilization metrics were assessed to determine if ERDS was associated with different care patterns. These metrics included rates per thousand for ER utilization, inpatient admissions, and physician office visits.

Sensitivity analyses

A number of sensitivity analyses also were performed to assess whether the impact of ERDS engagement varied according to issues of interest. First, many analyses are sensitive to the inclusion of a few individuals (outliers) with extremely high or low expenditures in the pre-index and follow-up periods. Many analyses simply remove outliers, leaving the reader without any knowledge of their impact. This study includes estimates with and without outliers, which provides the reader insight into the impact of excluding a few members with very high or low expenditures that are unlikely to be related to the program. The study team feels excluding outliers produces a cleaner measure of the overall program impact for the majority of the participants. The initial analyses were conducted after excluding outliers. In the sensitivity analysis, outliers were added back into the sample.

Outliers were identified using a method first described by Heckman et al.[20] The intent of the outlier identification method was to ensure that the ranges of health care expenditures were similar for ERDS engaged and not engaged members. Expenditures outside the common range in each group were labeled as outliers and removed from the main analyses, but included in the sensitivity analyses.

Next, a second stage regression is sometimes warranted if the propensity score matching does not remove all measured case mix differences, or if the distribution of the dependent variable is skewed, which is common in analyses of health care data. Therefore, the savings also were estimated using a second stage generalized linear model (GLM) that controlled for all the same predictor variables already described, but which adjusted for skew in the expenditure measures and

further accounted for case mix differences. The individual, either engaged or not engaged, was the unit of analysis in these models. The second stage regression included a variable for engagement and the predictor variables that were included in the propensity score matching model. The dependent variable was the PMPM difference (total medical and pharmacy expenditures) between the pre-index and post-index health care expenditures for engaged and not engaged individuals.

Lastly, a sensitivity analysis was performed using propensity matching and a repeated measures design. This analysis accounted for each month from index and the interaction of month from index and program effect. The benefit of using repeated measures is an increase in power related to each person contributing 12 observations versus only 1 observation per person in the descriptive model. Because roughly 10% of the monthly observations showed zero dollar costs, a zero-inflated regression model was used to account for the high number of zeros before looking at outcomes.

Results

Prior to exclusions, there were 91,717 individuals who met the ER frequent use criteria. In 2011, there were 3.3 million supplemental health insurance plan members, suggesting that the unadjusted incidence rate for frequent ER use in the study population was about 28 per 1000.

After exclusions, 89.6% of the engaged individuals were maintained in the sample, resulting in a study sample that included 7138 ERDS engaged individuals and 67,875 not engaged individuals. The matching process was successful at both removing case mix differences and retaining most (99%) of the engaged members. Table 1 shows values of the case mix measures for both groups before and after matching. Generally, prior to propensity score matching, there were several large differences in means or percentages of the case mix measures between engaged and not engaged individuals. After propensity score matching, all measured case mix differences were removed (standardized difference < 0.10). This allowed program impact to be estimated more accurately as case mix differences no longer influenced the results. Further, because 99% of the engaged members were retained after matching, the results were generalizable to the entire sample of engaged members.

Next, health care utilization differences were assessed for engaged and not engaged individuals (Table 2). After propensity score matching to remove case mix differences and after the removal of outliers, ERDS engaged individuals' reduced their ER visits by 1,299 visits per 1,000 members, compared with a reduction of 1,121 visits per 1,000 members for the not engaged individuals ($P = 0.033$). Engaged and not engaged individuals decreased the number of office visits in the post period. However, engaged individuals had about 1 more visit per person compared with the not engaged. When assessing hospital admissions, engaged individuals had greater pre to post reductions than did the not engaged. These findings might indicate that the ERDS program helped individuals to seek care in a more appropriate setting.

ROI

Average pre period and post period PMPM inpatient, ER, outpatient, and prescription expenditures were calculated for engaged and not engaged sample members (Table 3). When comparing pre period minus post period differences between these groups, engaged individuals had larger decreases in expenditures for ER visits and inpatient admissions categories, but smaller decreases for expenditures on outpatient visits and prescription drugs. These findings are consistent with expectations; engaged members likely had fewer inappropriate ER and hospital admissions, and likely had more appropriate outpatient visits and prescriptions. However, all of these differences were relatively small in magnitude and not statistically significant.

Total ERDS program savings were estimated by multiplying the estimated PMPM savings associated with program engagement ($40) by the number of post period months for the engaged group, an average of 12 months. This value ($480) was multiplied by the number of engaged individuals (7070) producing an estimated total savings of $3.41 million. The total cost of the ERDS program was $2.75 million over this time period. Thus, the ROI was estimated to be $3.41/$2.75 million, or $1.24. This implies that for every dollar invested in this program, $1.24 was saved.

Sensitivity analyses

The results of this evaluation were sensitive to some of the analytic methods chosen. The main analysis reported excluded outlier observations. The outlier analyses identified 2.8% (n = 226) of engaged and 3.3% (n = 2788) of not engaged individuals for removal. Of the engaged individuals, those with monthly pre period expenditures ranging from $30,320 to $109,044 or monthly post period expenditures ranging from $21,464 to $84,090 were removed. Not engaged individuals who were removed had monthly pre period expenditures ranging from $30,048 to $951,432 or monthly post period

Table 2. Health Care Utilization for Engaged and Not Engaged Individuals

	Engaged			*Not Engaged*				
Health Care Measure	*Pre Period*	*Post Period*	*Difference*	*Pre Period*	*Post Period*	*Difference*	*Incremental Difference*[a]	P *value*
ER utilization/1000	3501	2202	−1299	3630	2508	−1121	−178	0.033
Physician office visit/1000	17,889	16,775	−1114	17,777	15,766	−2011	897	< 0.001
Hospital admissions/1000	589	355	−234	584	403	−181	−53	0.002

[a]Calculated as engaged difference minus not engaged difference. Negative differences between engaged and not engaged individuals pre-post utilization indicates the engaged experienced a greater reduction in utilization than the not engaged. A positive difference indicates engaged individuals had a lower reduction in utilization compared to not engaged individuals.

ER, emergency room.

Table 3. Average Health Care Expenditure for Engaged and Not Engaged

	Engaged in ERDS (n = 7070)			*Not Engaged (n = 7070)*			*Difference*	
Outcome[a]	*Pre Period*	*Post Period*	*Difference*[b]	*Pre Period*	*Post Period*	*Difference*[b]	*Difference in Difference*[c]	P *value*[d]
Total	$3341	$2664	−$677	$3349	$2711	−$637	−$40	0.502
Inpatient	$769	$423	−$346	$776	$490	−$287	−$59	0.080
Outpatient	$2350	$1990	−$360	$2362	$1991	−$370	$10	0.828
Emergency room[e]	$466	$276	−$190	$497	$329	−$168	−$21	0.140
Prescription	$222	$251	$28	$210	$230	$20	$9	0.201

[a]Outcomes are average per member per month (PMPM) following propensity score matching and exclusion of outliers.
[b]Defined as pre period minus post period expenditures.
[c]Defined as difference among those engaged in ERDS minus difference for those not engaged.
[d]*P* value for tests of statistical significance of difference in difference, $\alpha = 0.05$.
[e]Emergency room expenditures are a subset of the outpatient spend. The 3 cost components of inpatient, outpatient, and prescription add up to the total expenditures. Differences in total expenditures compared with the sum of the 3 components are because of rounding.
Note: Negative differences indicate that those engaged in ERDS experienced a greater reduction in spend than did those who were not engaged. A positive difference indicates that those who were engaged had a lower reduction in spend compared to those who were not engaged.
ERDS, emergency room decision support.

expenditures ranging from $21,453 to $233,717. Additionally, engaged and not engaged individuals with less than $14 in monthly pre period or $11 in monthly post period expenditures were removed. When these outliers were included in the sensitivity analysis, the ROI estimate fell from $1.24 to $0.63, indicating the strong influence these outliers possess with respect to study findings. Although this highlights the fact that the not engaged group had proportionally more individuals with very high health care expenditures, it should not be construed that the program only saves money when outliers are excluded. The sensitivity analysis only confirms that outliers need to be excluded to obtain a fair estimate of program impact.

Next, the results based on the GLM analysis were very similar to the main model that used propensity score matching. The ROI estimated from the GLM approach was a savings of $1.30 per dollar spent on the program when outliers were excluded, and a savings of $0.75 per dollar spent when outliers were included.

The results for the repeated measures sensitivity analysis showed that engaged individuals had lower costs on average over the course of the 12 months, with the exception of 1 and 6 months after index. The biggest cost differential between the 2 groups occurred in the later months of 8 and 11. These estimates also were converted into quarterly measures, showing that engaged individuals had lower costs over each 3 month increment, with the last 3 months having the biggest cost differential ($67 PMPM) for engaged individuals compared with not engaged individuals. Using repeated measures, the average cost difference across all months observed is $46 per member, which was slightly larger than the descriptive result of $40. This repeated measures methodology resulted in an ROI of $1.42 when outliers were excluded.

Discussion

The study team believes this is the first study to report on an ERDS program designed for adults who have Medicare supplemental (ie, Medigap) insurance. Engaged individuals experienced a greater reduction in ER visits and inpatient admissions and a smaller reduction in office visits and prescription drugs over time than did not engaged individuals. This suggests that the program may be helping individuals to seek care in a more appropriate care setting. The ERDS program was associated with savings, with participants experiencing a $40 greater reduction in average PMPM costs over time compared with those who did not use the ERDS program.

In this study it was found that those who were engaged in ERDS had a greater reduction in post period inpatient costs than those who were not engaged. Because ER use is positively correlated with hospital readmissions,[21] there may be important secondary benefits to be gained by decreasing ER use. In 2007, the Medicare Payment Advisory Commission reported to Congress that 75% of Medicare readmissions were potentially preventable, costing Medicare an additional $15 billion per year.[22] Also, beginning in 2009, the Centers for Medicare & Medicaid Services started publicly reporting hospital readmission rates as part of the Hospital Compare Web site. Beginning in 2013, hospitals experienced reduced payments if their readmission rates were higher than expected.[23] Decreasing ER utilization may be an important means to reduce hospital readmissions.

Programs that improve quality of care and are cost-effective may serve as benchmarks and should be considered for implementation on a larger scale. This program was associated with total program savings of $3.41 million, or about $1.24 per dollar spent on it. These findings are comparable to results reported by Okin et al who reported an approximate 50% decrease in ER costs, 67% decrease in inpatient costs, and program savings of $1.44 per dollar spent for frequent ER users enrolled into a hospital-based case management program.[9]

Currently, Medicare spending is growing faster than the US economy, causing an increasing burden on the federal budget.[24] Increasing the availability of ERDS programs to all Medicare insureds may provide an appreciable cost savings.[25] Based on this evaluation, the ERDS program was associated with significant cost savings that can be attributed to Medicare, the Medigap insurance provider, and the ERDS callers themselves, proportional to the costs incurred by each. We estimate that about 89% of the ERDS program savings can be attributed to Medicare, 11% to Medigap, and

less than 1% to individuals. The Medicare share amounted to about $3 million, while the amounts for Medigap and the individual were $373,400 and $11,400, respectively.

These findings should be interpreted within the context of the study's limitations and strengths. The limitations include the following. First, this study used medical claims data that were collected for insurance purposes rather than for research purposes, but these data have been used successfully in the past for similar research exercises.[26] Second, the study was limited to AARP insureds with Medigap coverage and may not be generalizable to other segments of the Medicare population. However, similar programs that utilized a holistic case management approach and enrolled predominantly younger populations had similar success.[9–11] This study had several strengths. First, the study had a relatively large sample consisting of over 14,000 individuals who were equally divided between those who were engaged and not engaged in the ERDS program. Additionally, the pre versus post design ensured comparability when determining the effect of program participation, and propensity score matching adjusted for measurable case mix differences that existed between engaged and not engaged groups.

In conclusion, the study team evaluated an ERDS program that was designed for AARP insureds who were considered to be frequent ER users. Those who engaged in the program were offered advice about treatment options, assistance with finding quality providers, and referrals to other health resources. Those who engaged in the ERDS program were less likely to visit an ER and were less likely to have an inpatient admission, perhaps improving the appropriateness of care. The program also was associated with savings in medical expenditures. Programs that improve quality of care and reduce costs for the fee-for-service Medicare program should be considered for broader implementation. Further research to predict those who likely will be frequent users of ER services and then engage them in an ER program such as this one may generate additional savings and improve quality of care even further.

Author Disclosure Statement

Drs. Hawkins, Wells, Ozminkowski, Migliori, and Yeh, Ms. Navratil-Strawn, and Mr. Hartley declared the following conflicts of interest with respect to the research, authorship, and/or publication of this article: All authors are paid employees of their respective organizations. In addition, Dr. Hawkins, Mr. Hartley, and Dr. Ozminkowski have stock options with UnitedHealth Group. The other authors have no other conflicts of interest to report. This work was funded by Optum. The investigators retained full independence in the conduct of this research.

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