

# Medicare Recipient Characteristics and Utilization of Emergency Departments

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**ABSTRACT:** The Affordable Care Act (ACA) was enacted to enhance access to care, primarily among non-elderly and low-income populations. The ACA has three primary goals, first, to provide affordable health insurance available to more people; second, to expand the medical program to cover all adults with income below 138% of the federal poverty level; and third, to support innovative medical care methods designed to lower the cost of healthcare. Accountable Care Organizations (ACOs) were created as part of the Quality Payment Program to appropriately incentivize physicians based on high-quality and cost-efficient care of Medicare beneficiaries and lower healthcare costs. Despite the significant reduction in Medicare spending from ACOs, a great proportion of Emergency Department (ED) visits by the Medicare population is considered preventable. This study analyzed a sample of Medicare claims of all ED visits between 2015 and 2020 of a cohort of Medicare patients that enrolled in an ACO in 2017. The aim of the study was to evaluate the changes in ED visits, mortality rates, and institutional paid amount before and after ACO policy intervention, while identifying whether there were differences in ED utilization by gender and insurance plan.

**KEYWORDS:** Affordable Care Act, Quality Payment Program, Medicare, Emergency Department (ED), Accountable Care Organizations (ACOs), Claims, Gender, Age, ED spent

## Introduction

Medicare is a federal health insurance program under the Centers for Medicare and Medicaid Services (CMS) for individuals 65 years or older or with a disability or end-stage renal disease (ESRD). As of October 2021, the total Medicare enrollment was 63,964,675 (CMS, n.d.). Older adults, who are part of this program, use emergency departments (EDs) more than any other age group and are more prone to subsequent adverse events (Gruneir et al. 2011).

The Innovation Center was created by the Affordable Care Act to test new healthcare delivery and payment models, offer technical support to providers to improve care coordination, and diffuse lessons learned and best practices throughout the healthcare system (CMS 2011). The new payment models evolved into different initiatives that include accountable care organizations (ACOs), which focus on transforming the quality of healthcare for programs like Medicare, and ACOs which are groups of doctors, hospitals, and other healthcare providers, who come together voluntarily to give coordinated, high-quality care to their Medicare patients (CMS 2022.).

Despite ongoing interest in improving health outcomes among Medicare beneficiaries, a growing body of evidence suggests that various factors influence emergency department (ED) utilization. Many contributing factors of avoidable ED utilization include social determinants of health (SDOH), which are defined by the CDC (2022) as the nonmedical factors that influence health outcomes. While not all ED utilization can be averted, the focus is shifting to what utilization could be avoided, the contributing factors, and how to address those issues and concerns (Majewski & Lobick 2022). While often dismissed as a mere inconvenience for patients, the impact of ED crowding on avoidable patient morbidity and mortality is well-documented but remains largely underappreciated (Kelen et al. 2021).

## ACO Participation

Since its implementation in 2012, ACOs have saved Medicare \$13.3 billion in gross savings and \$4.7 billion in net savings (NAACOS n.d.). Shared savings are generated from decreasing overutilization of preventable services, including ED visits that could have been treated at a physician's office, and focusing on preventative care to slow or stop the likelihood of emergency care and high-cost admissions.

Although ACOs independently work towards improving key factors impacting social determinants of health, supporting evidence remains limited, suggesting the implementation of quality metrics and performance benchmarks under the Medicare Shared Savings Program (MSSP) to solve social needs. The standardization of metrics and domains of quality lack flexibility and consideration for vulnerable groups. Kovach et al. (2019) found that while payment reforms could provide the funding mechanisms to support social determinants of health in primary care, there is currently insufficient evidence to support the use of the practices.

D'Aunno et al. (2018) assessed high-performing ACOs and found a fundamental and distinctive insight from the analysis. Evidence from the study indicated that high-performing ACOs were distinguished from low-performing ACOs in that they had relatively large, well-established physician groups that provided cost-effective care before their involvement in an ACO (D'Aunno et al. 2018). Similarly, Quayogode et al. (2017) found that organizations with prior experience with risk-bearing contracts positively correlated with savings and significantly increased the likelihood of receiving shared savings payments. Evidence from these studies suggests that experienced ACOs are more likely to achieve positive outcomes than ACOs without experience or resources. Therefore, Quayogode et al. (2017) suggest that CMS should encourage diversity in organizational structures for ACO participants and provide alternative funding and risk-bearing mechanisms to allow a diverse group of organizations to participate.

## Demographics

A report published by the Assistant Secretary for Planning and Evaluation (2021) reported that emergency department (ED) visits continue to be the highest for patients in communities with lower median income and greater social vulnerability. Minority Medicare patient populations are more likely to utilize ED resources, potentially demonstrating decreased access to continuing care and adequate disease management (Hanchate et al. 2019).

Most recently, COVID-19 hospitalizations by race and ethnicity persisted during the pandemic. A study by Chang et al.'s (2021) on the association of chronic conditions among Medicare beneficiaries on hospitalizations showed that substantial variation exists between hospitalized and non-hospitalized Medicare beneficiaries with COVID-19 by demographic attributes, including age, gender, race/ ethnicity, geographic region, urbanization, Medicare entitlement, Medicare and Medicaid dual-eligibility status, and comorbidity.

Wang et al. (2021) examined the differences between ED visits of patients with end stage renal disease (ESRD) versus ED patients without ESRD. The investigation aimed to identify the geographical characteristics of ED visits of patients with ESRD. This study's results showed a prevalence of ED visits among ESRD patients with Medicare in the South. These findings are particularly relevant for southern states such as Texas, the second largest state in the United States. According to data released by the Texas Comptroller (2020), almost 84 percent of the South Texas region's total population was Hispanic, more than double the state's Hispanic share. Risk factors for non-communicable diseases (NCDs) and decreased healthcare access make Hispanics disproportionately vulnerable to illness and death (Velasco-Mondragon et al. 2016).

## **Social Determinants of Health**

While substantial research on social determinants of health and health equity exists, limited research is available on the effectiveness of accountable care organizations (ACOs) and population health management in reducing preventable ED visits. The CDC (2022) defines social determinants of health (SDOH) as the conditions in which people are born, grow, work, live, and age and the broader set of forces and systems shaping the conditions of daily life. Healthy People (2030) identified obstacles of SDOH to include lack of health insurance, language-related barriers, disabilities, inability to take time off work to attend appointments, geographic and transportation-related barriers, and a shortage of primary care providers.

Lack of provider access has various implications on individuals and the utilization of health services. Nyweide and Bynum (2017) performed a study to assess the relationship between continuity of ambulatory care and risk of emergency department episodes among older adults. Findings from the study suggest that in comparison to individuals without a primary care physician, higher continuity of care by a primary care provider resulted in more appropriate referrals to the ED (Nyweide & Bynum 2017). Haber et al. (2017) also found a correlation between the percentage of months with a PCP visit and whether the patient maintained the same usual source of care after nursing home admission and having fewer inpatient admissions and ED visits.

Disparities due to a shortage of clinicians continue to have a detrimental effect on the quality of health of rural populations. Various studies have documented the lower quality of ambulatory care for people with chronic conditions and lower preventative screening rates in rural areas compared to urban areas (Johnston et al. 2019). In a nationally representative study of older adult Medicare beneficiaries, Johnston et al. (2019) found that rural beneficiaries with complex chronic conditions had higher preventable hospitalization and mortality rates than their urban peers. Shoff et al. (2019) also evaluated geographic variations as predictors of ED use and found that the association between healthcare market concentration, healthcare delivery, and socioeconomic/sociodemographic factors with ED admissions differed across communities.

## **Research**

This quantitative study aims to determine whether the ACO intervention in 2017 resulted in changes in the volume of ED visits, mortality rates, and institutional paid amount, while identifying any significant differences in ED utilization by gender and insurance plan. The following research questions will be assessed:

- RQ1.** How does ACO intervention impact volume of ED visits over time?
- RQ2.** How does ACO intervention impact mortality rates?
- RQ3.** How does ACO intervention impact institutional paid amount?
- RQ4.** How does gender impact ED visits?
- RQ5.** How does insurance plan impact ED visits?

## **Methodology**

The data source used for the study includes Medicare claims data from 2015 to 2020. The data includes all outpatient claims for Emergency Department (ED) visits of Medicare beneficiaries that participated in an Accountable Care Organization (ACO) in South Texas in 2017. Information such as age, gender, insurance plan, dates of service, diagnosis, institutional charges/paid amount, and date of death, if present, were available for review.

The use of claims data for this study was subject to review to ensure patient health information (PHI) remained confidential. All patient identifiers were modified or removed as necessary to comply with HIPAA regulations. The Health Insurance Portability and Accountability Act of 1996 (HIPAA) is a federal law requiring national standards to protect sensitive patient health information from being disclosed without the patient's consent or knowledge (CDC 2022). Only the minimal required data was used to conduct this study.

### Statistical Analysis

A series of statistical tests using Stata software were completed. A total of 48,861 ED visits were reviewed. Figure 1 includes total ED visits between 2015-2020 by year. The results of a line graph show that although ACO policy intervention in 2017 resulted in a sharp increase in ED visits during the first two years of enrollment (2017-2018), a significant reduction in ED visits in the years after (2019-2020) occurred. Forty-Eight percent of the total ED visits between 2015-2020 occurred between 2017 and 2018 alone.

Clarke et al. (2019) suggest that the impact of any intervention is likely to be shaped as much by the context (e.g., communities, workplaces, homes, schools, or hospitals) in which it is delivered, as the details of the intervention itself. Therefore, a simple before and after study is not sufficient to evaluate the impact of ACO intervention on ED visits. The following number of ED visits occurred by year: 2015 (1)- 5,683, 2016 (2)- 8,163, 2017 (3)- 9,598, 2018 (4)- 13,530, 2019 (5)- 7,322, and 2020 (6)- 4,185.

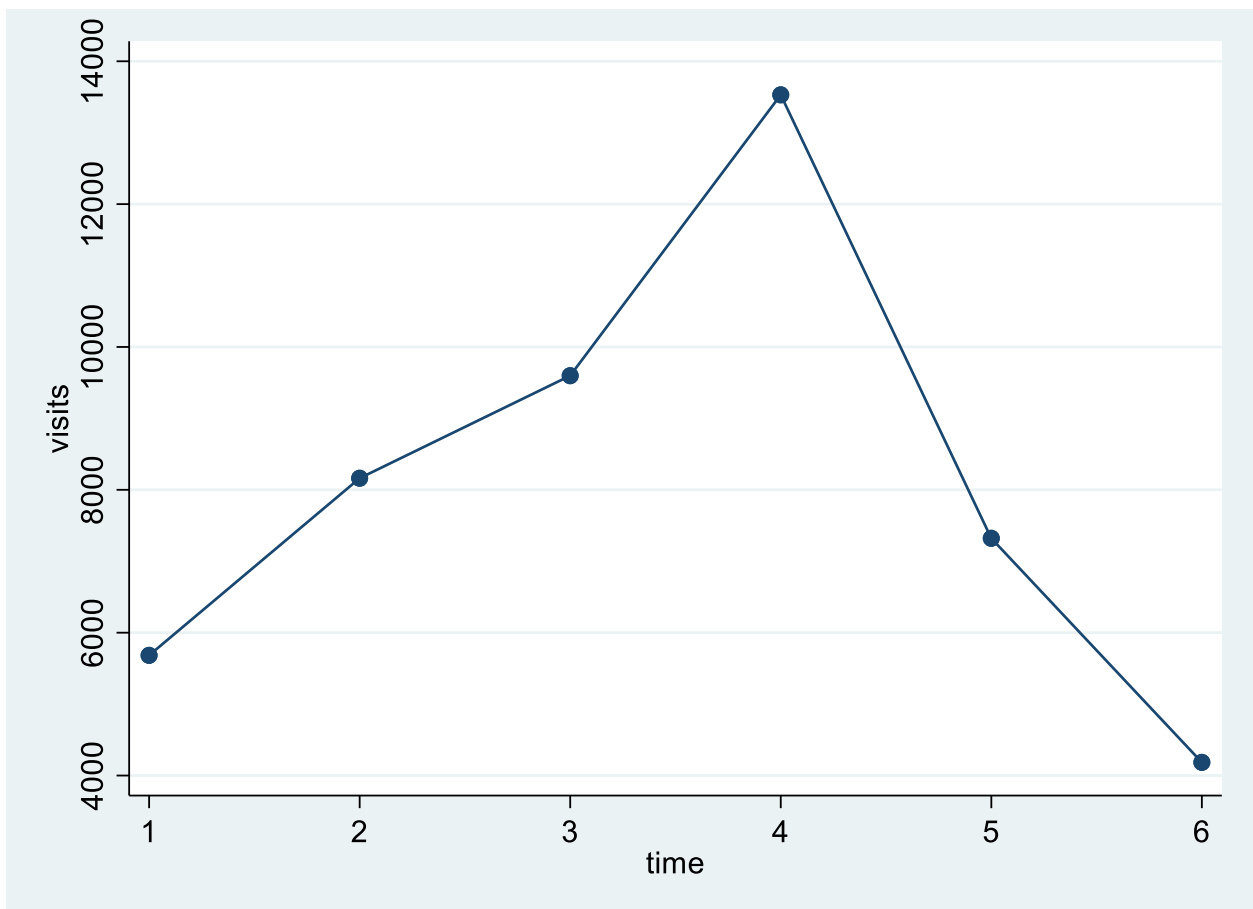


Figure 1. ED Visits of Medicare Beneficiaries Enrolled to an ACO between 2015-2020

Additionally, table 1 below represents the regression of the data with time and time squared (sqtime) as dependent variables. The negative coefficient seen on time squared (sqtime) represents an inverse relationship between ED visits over time, partially due to the temporary

increase in ED visits during the first two years of ACO intervention (2017-2018). As shown in table 1, the analysis results represent significant findings below the level of statistical significance.

**Table 1: Regression of ED Visits Over Time**

	DV TIME Total
time	7158.382* (2342.253)
Sqtime	-1047.446** (327.5532)
_cons	-1,087.900 (3580.183)
N	6
r2	0.7754
ar2	0.6257
Prob>F	0.1064

Standard errors in parentheses

\*p<0.10, \*\*p<0.05, \*\*\*p<0.01

#### *Mortality Rate*

To assess mortality rate, two categorical variables were created to measure mortality before and after ACO intervention. A categorical value assigned as 1 represents the time frame after ACO policy intervention (2017-2020), while 0 represents pre-ACO intervention (2015-2016). As shown in table 2, the proportion of patients who expired post-intervention equaled 0.1676 compared to 0.2035 prior to ACO intervention. These findings demonstrate an improvement in mortality rates after ACO intervention that could be due to an increase in quality metrics, improvement in access to care, and preventative screenings as part of the expectations to improve the quality of care for Medicare patients participating in ACOs. The results were statistically significant at below the 1% level of statistical significance.

**Table 2: Two-Sample Test of Proportions for Deceased Patients**

	Observations	Mean	Std. Error
0	13,846	0.20345	0.00342
1	34,634	0.16755	0.002

#### *Gender*

In relation to gender, a difference in proportions test presented in table 3 demonstrates a substantial difference between the percentage of ED visits between males and females in the sample. A categorical value of X was assigned to male participants, while Y was assigned to the female counterparts. Sixty-Four percent of ED visits between 2015-2020 were from females, while 36% were from males. The result from the two-sample t-test is statistically significant at below the 1% significance level.

**Table 3: Difference in Proportions Test by Gender**

	Observations	Mean	Std. Error
X	17,458	0.3601	0.00363
Y	31,023	0.6399	0.00273

*Institutional Paid Amount*

Institutional billing claims are generated by hospitals and other facilities to bill payors/ individuals for the services provided. The test shown in table 4 consisted of a two-sample t-test to examine the degree to which institutional paid amount varied between two categories, before and after ACO intervention. A categorical value assigned as Inter=1 represents the time frame after ACO policy intervention (2017-2020), while Inter = 0 represents pre-ACO intervention (2015-2016). The results from the data in table 6 are statistically significant at below the 1% level of statistical significance. There was a total of 13,486 observations before the ACO intervention (366.25 mean paid) and 34,635 (352.97 mean paid) observations after ACO intervention. While ED visits temporarily increased between the 2017-2018 ACO intervention, the average paid amount to institutions for ED encounters relatively decreased after ACO intervention by 4%.

**Table 4: Institutional Paid Amount (Mean) by Intervention Period**

	Observations	Mean	Std. Dev.
0	13,846	366.2498	592.964
1	34,635	352.9685	637.2251

*Insurance Plan*

A difference in proportions test of the following two Medicare eligibility criteria groups was performed to determine whether there is a difference in proportion of ED visits between aged only population (65 years and older) and their aged-dual counterparts, which are Medicare beneficiaries who are also enrolled to Medicaid, a low-income government assistance program. Table 8 shows that the majority of the ED visits between 2015-2020 were from Medicare-Medicaid (aged-dual) beneficiaries. Results are statistically significant at below the 1% level of statistical significance.

**Table 5: Difference in Proportions by Insurance Plan**

	Freq.	Percent	Cum.
0	6,436	40.24	40.24
1	9,559	59.76	100
Total	15,995	100	

**Policy Implications and Discussion**

As shown in figure 1, there was an improvement in the total volume of ED visits year over year, likely due to ACO policy intervention in 2017. Improvement in the average paid amount to institutions for ED visits was also reduced following ACO intervention (2017-2020). We also assessed mortality among Medicare beneficiaries and found a significant improvement in mortality rates after ACO intervention.

In a gender comparison of the proportion of ED visits between 2015-2020, 64% were ED visits by females. Lastly, differences in proportion of ED visits from Medicare aged-non dual beneficiaries were significantly lower between 2015-2020 as opposed to the Medicare

aged-dual beneficiaries who receive additional financial support under the dual-eligibility program with Medicaid, a low-income benefit program.

Coordinated care within ACOs aims to ensure that patients get the proper care at the right time while avoiding unnecessary duplication of services and preventing medical errors (CMS n.d.). Several noted improvements following ACO intervention were achieved among this South Texas cohort of Medicare beneficiaries. To our knowledge, this is the first study to address changes in outcomes of a single ACO group in South Texas.

Alternative payment models and value-based care were designed to improve care quality and patient outcomes. Findings from this study suggest that ACO interventions led to a reduction in ED visits. As we noted from the results of multiple analyses throughout the study, we also measured key improvements in Medicare spending and mortality rates following ACO intervention. This study enables a better understanding of the impact of ACO intervention among Medicare beneficiaries and their utilization of the emergency department (ED) in relation to key factors related to SDOH. This study also raises awareness of key characteristics that are more prevalent among Medicare beneficiaries who make ED visits, such as the role of gender and access to insurance coverage by Medicaid.

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