

# The High Cost-related Medication Non-adherence Rate among Medicare-Medicaid Dual-eligible Diabetes Patients

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## Abstract

**Context:** Access barriers to effective medication treatment have been a persistent issue for millions of older Americans despite the establishment of Medicare Part D.

**Objective:** We aimed to assess the prevalence rate of cost-related medication non-adherence (CRN) and the patterns of CRN behaviors in Medicare-Medicaid dual eligibles with diabetes.

**Design, setting, patients, interventions, and main outcome measures:** We used data from the 2011 Medicare Current Beneficiary Survey, a nationally representative sample of Medicare beneficiaries. Multivariate logistic regression analysis was performed to assess CRN rate, controlling for demographics and types of Medicare Part D plans.

**Results:** The CRN rate in dual-eligible diabetes patients was 21%, compared to 16% in non-dual-eligible diabetes patients ( $p < 0.01$ ). In 2011, the standardized prevalence rate of CRN in dual-eligible diabetes patients was 21%, of those with CRN 29% reported three or more types of CRN behaviors.

**Conclusion:** Contrary to the common belief that dual eligibles have better insurance coverage for medication due to the assistance from Medicaid to pay some of the out-of-pocket payments, the CRN rate among dual eligibles is high and patients often report multiple types of CRN behaviors. This demonstrates that cost is a significant access barrier for dual-eligible diabetes patients. More research is needed to improve the insurance benefit design and expand insurance coverage for this high-need, high-cost subpopulation.

**Keywords:** Medication adherence; Dual eligible

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## Introduction

Access barriers to effective medication treatment have been a persistent issue for millions of older Americans despite the establishment of Medicare Part D [1]. Over a third of older patients report cost-related medication non-adherence (CRN), increasing health care costs and adversely affecting patient outcomes [2-5]. Several risk factors for CRN have been identified, including lack of health insurance coverage, high out-of-pocket payment, comorbidities, and poor mental health [6-11]. "Dual eligibles" are beneficiaries who qualify for both Medicare and Medicaid, characterized by low income levels and a high disease

burden [12]. A common perception is that dual eligibles receive assistance from Medicaid to pay for some of the out-of-pocket costs of medical care, leading to low CRN rates. However, there has not been a comprehensive examination of risk of CRN among dual eligibles.

Diabetes is one of the most expensive chronic conditions in the U.S., causing high rates of mortality, morbidity, and disability [13]. There is an increasing recognition of the importance of CRN in diabetes since these patients often require many prescription drugs and incur high out-of-pocket payments (OOPs) for medications and other medical expenses [14,15]. There is an

emerging body of studies examining the cost burden and CRN for diabetes patients, with CRN ranging from 14% to 30% across studies [16-21]. However little is known about the prevalence rate of CRN in dual-eligible diabetes patients compared to that in non-dual-eligible diabetes patients with Medicare coverage or about the patterns of CRN among these dual-eligible diabetes patients.

This lack of knowledge may lead to a false belief that dual-eligible diabetes patients do not incur cost barriers to effective medication treatment. More importantly, because dual eligible have been the focus of many recent initiatives to use managed care to lower costs and improve coordination of care, these patients may be increasingly experiencing coverage limitations that could increase CRN despite assistance for OOPs from Medicaid. In this study, our aim was to assess the prevalence rate and patterns of CRN behaviors in dual-eligible diabetes patients compared to non-dual-eligible Medicare diabetes patients using a nationally representative sample of Medicare beneficiaries.

## Research Design and Methods

### Study population

We utilized the 2011 data from the Medicare Current Beneficiary Survey (MCBS). The MCBS is an ongoing longitudinal, cross-sectional study that surveys a nationally representative sample of Americans with Medicare coverage about their socio-economic status, insurance coverage, physical health, cognitive functioning, and Medicare resource utilization [22]. Data for the survey are collected primarily by interview every year. The analysis in this study was restricted to survey respondents who reported previous diagnosis of Type II diabetes, excluding those with Type I diabetes, borderline, pre-diabetes, gestational, or other type of diabetes (except Type II). Among the 14,120 respondents in the 2011 MCBS Access to Care files, 3,637 (26%) reported that they had been previously diagnosed with diabetes. Among those 3,637 diabetes patients, 442 (12%) reported having Type I diabetes, 576 (16%) borderline diabetes, 153 (4%) pre-diabetes, 27 (1%) gestational diabetes, and 58 (2%) reported "other type of diabetes" or "don't know." These patients were subsequently excluded from further analysis, resulting in a final size of 3,281 diabetes patients.

### Cost-related medication non-adherence

CRN was measured by asking participants specifically if taking less medication was due to a cost barrier: "Please tell me how often during (current year) (you have/survey participant) done any of the following things (often, sometimes, or never): A) taken smaller doses of a medicine to make the medicine last longer; B) skipped doses to make the medicine last longer; C) delayed getting a prescription filled because the medicine cost too much; or D) decided not to fill a prescription because it cost too much. Participants who answered "often" or "sometimes" to any of these four types of behaviors were indicated as exhibiting CRN [10,23].

### Demographic and socio-economic characteristics

The MCBS includes demographics and socioeconomic

characteristics, including age, gender, ethnicity, and supplemental information from the Medicare enrollment file for dual eligibility. In Medicare, all dual-eligible patients were automatically assigned to a Part D outpatient prescription drug plan, with the option to change the plan. We hypothesized that patients and plan characteristics in stand-alone prescription drug plans (PDPs) may be different from that of Medicare Advantage plans with prescription drug coverage (MA-PDs), resulting in a differential impact on the CRN rate for patients enrolled in these two types of Part D plans. Hence, we included a variable indicating the type of plan the dual-eligible diabetes patients enrolled in based on information from the MCBS files to derive the population-standardized CRN rate. We also indicated if the patients changed their plan type during the year.

### Statistical analysis

We first performed bivariate analyses of the differences in socio-demographic characteristics between dual-eligible and non-dual-eligible diabetes patients using Chi-square tests and t-tests. To obtain the population-standardized CRN rate for diabetes patients, we performed a multivariate regression analysis using self-reported CRN as the dependent variable and age, gender, race, ethnicity and types of Part D plans as independent variables in dual-eligible diabetes patients. The population-standardized CRN rate was calculated by finding the mean of the predicted probability of CRN.

We then compared the prevalence rates of four individual types of CRN behavior by dual-eligible and non-dual-eligible diabetes patients. We further investigated the four types of CRN behaviors by examining all combinations of them among the dual-eligible diabetes patients. Finally, we ran a multivariate logistic regression using the indicator variable of three or more CRN behaviors as the dependent variable and age, gender, race, ethnicity, and dual eligibility as independent variables for those who reported CRN. All analyses were conducted using Stata MP 13 [24].

## Results

Among those 3,281 diabetes patients, 524 (22%) had dual eligibility. The prevalence rates of CRN were 21% and 16% for dual-eligible non-dual-eligible diabetes patients, respectively ( $p < 0.01$ ). **Table 1** shows the comparison of demographic variables and CRN rates by these two groups.

**Table 2** shows the results from multivariate logistic regression analysis for CRN rate for the dual-eligible diabetes patients. The standardized prevalence rate of CRN in dual-eligible diabetes patients was 0.21 based upon the predicted probability of CRN, adjusting for age, gender, race, ethnicity, and types of Part D plans.

**Table 3** shows the patterns of CRN behavior in dual-eligible diabetes patients. Among 110 dual-eligible patients reporting CRN, 19 (17%) were engaged with all four types of CRN behaviors, while 29 (27%) had engaged in three or more types of CRN behaviors. The multivariate logistic regression suggests that among those who reported CRN, dual eligibles had a higher tendency to report having three or more CRN behaviors (odds ratio 1.13 compared to non-dual eligibles), but this difference

**Table 1** Characteristics of diabetes patients by eligibility status.

|                                       | Dual Eligible<br>N (%) | Non-Dual-Eligible<br>N (%) | P-value |
|---------------------------------------|------------------------|----------------------------|---------|
| Full sample: N (%)                    | 524 (100)              | 1,847 (100)                |         |
| Age                                   |                        |                            | <0.01   |
| Mean (s.d.)                           | 46 (16)                | 54 (9)                     |         |
| Gender                                |                        |                            | <0.01   |
| Male                                  | 184 (35)               | 1,028 (55)                 |         |
| Female                                | 340 (65)               | 829 (45)                   |         |
| Race                                  |                        |                            | <0.01   |
| White                                 | 307 (59)               | 1,484 (80)                 |         |
| African-American                      | 140 (27)               | 225 (12)                   |         |
| Other                                 | 77 (15)                | 148 (8)                    |         |
| Ethnicity                             |                        |                            | <0.01   |
| Hispanic                              | 105 (20)               | 198 (11)                   |         |
| Non-Hispanic                          | 417 (80)               | 1,659 (89)                 |         |
| Cost-related Medication Non-adherence |                        |                            | <0.01   |
| Yes                                   | 110 (21)               | 295 (16)                   |         |
| No                                    | 414 (79)               | 1,562 (84)                 |         |

Note: P-values by Chi-squared tests, except for age, where t-test was performed.

**Table 2** Results of multivariate logistic regression analysis of CRN for dual-eligible diabetes patients.

|                         | Odds Ratio | P>z   | 95% Conf. Interval |
|-------------------------|------------|-------|--------------------|
| Socio-demographics      |            |       |                    |
| Age                     | 0.95       | <0.01 | 0.94, 0.97         |
| Male                    | 0.86       | 0.54  | 0.54, 1.38         |
| African American        | 1.08       | 0.78  | 0.64, 1.82         |
| Other Race              | 1.18       | 0.65  | 0.59, 2.37         |
| Hispanic ethnicity      | 0.53       | 0.07  | 0.26, 1.05         |
| Type of Part D plans    | Reference  | -     | -                  |
| MAPD                    |            |       |                    |
| PDP                     | 1.89       | 0.04  | 1.04, 3.44         |
| Change in types of plan | 0.36       | 0.19  | 0.08, 1.68         |

**Note:** Results from multivariate logistic regression analysis.

was not statistically significantly ( $p = 0.66$ ) (data not shown). Compared to those who were not dually eligible, dual-eligible diabetes patients were more likely to delay filling, not fill, or split doses ( $p < 0.01$ , respectively). Not filling prescriptions was the most prevalent CRN behavior for both groups (data not shown).

## Discussion

We found that contrary to the common belief that dual eligibles had better insurance coverage for medication due to the assistance from Medicaid to pay some of the out-of-pocket payments, the CRN rate in dual eligible in this study was actually higher than that in non-dual-eligible diabetes patients. This is indicative of the inadequacy of insurance coverage for the very sick and poor subpopulation who needs the insurance protection the most. It is also concerning because dual eligibles consume a disproportionate share of medical resources and non-adherence to medication may drive these patients further down the vicious

**Table 3** Patterns of CRN behaviors in dual eligible diabetes patients reporting CRN.

| No fill or refill | Delay filling | Skip doses | Split doses | N (%)     |
|-------------------|---------------|------------|-------------|-----------|
|                   |               |            | +           | 5 (5)     |
|                   |               | +          |             | 3 (3)     |
|                   |               | +          | +           | 6 (5)     |
|                   | +             |            |             | 12 (11)   |
|                   | +             | +          |             | 1 (1)     |
|                   | +             | +          | +           | 4 (4)     |
| +                 |               |            | +           | 3 (2)     |
| +                 |               |            |             | 22 (20)   |
| +                 |               |            | +           | 2 (2)     |
| +                 |               | +          | +           | 3 (3)     |
| +                 | +             |            |             | 16 (15)   |
|                   | +             |            |             | 21 (15)   |
| +                 | +             |            | +           | 12 (11)   |
| +                 | +             | +          |             | 3 (3)     |
| +                 | +             | +          | +           | 19 (17)   |
| 77                | 69            | 39         | 53          | 110 (100) |

circle of high usage of medical resources and deteriorating health. This may also further strain the resources available to other Medicare patients due to increased spending on outpatient and inpatient care by the dual eligible, hence the medical resource is further concentrated and unevenly distributed in Medicare.

We also demonstrated the gravity of CRN in dual-eligible diabetes patients by showing that close to one third of patients reporting CRN had engaged in three or more types of CRN behaviors. Unlike those patients with Medicaid-only or Medicare-only coverage, dual eligibles are, by definition, in poverty and with high disease burden at the same time. Therefore, even a small amount of nominal co-payments could accumulate to a significant financial burden as patients have concurrent treatment for multiple conditions. Value-based pricing is a potential mechanism to reduce access barrier and improve outcome. Other policy actions such as closing the donut hole in the Medicare Part D program or improving generic prescribing might also be valuable tools. Further research is imperative to advance understanding of how to improve insurance benefit design and expanding insurance coverage to reduce CRN in the very sick and poor subgroups of populations.

Internationally, the research in CRN outside the US is relatively scarce. Regardless, research has shown that CRN is likely a factor influencing medical treatment and health equality even in an environment with universal health insurance coverage. For example, research showed that a significant proportion of patients reported CRN in Canada, and disparity in access to new, recommended medication in Germany was in part due to the variation in insurance coverage [25-27]. Protection of the very sick, poor patients from access barriers to medical treatments and from falling into poverty is a universal theme in health policy globally. It is imperative to advance the understanding of the adequacy of health insurance protection for those at the high end of resource utilization and low end of economic resources. It is possible that those who encounter access barriers to medication may have to trade their basic needs of daily life in order to afford medication. Hence it may also require a change in social policy

to ensure the very poor, and sick to have the means to access necessary medications.

This study is limited in that while we have shown the prevalence and patterns of CRN in dual eligibles, the options to reduce CRN among these patients is less clear. Formulary restrictions, low rates of generic drug prescriptions, poor patient-physician communication on OOPs for medication can all be contributing factors of CRNs. Further research in these areas will likely shed light on how and what policy instruments can be developed to improve the benefit design of insurance coverage to reduce CRN among dual eligibles. The MCBS survey also does not give us any indication of whether the patients understand the adverse consequences of CRN, so it is not clear if the CRN was confounded by health literacy or perception of medicine effectiveness. In addition, researches have suggested that there was a dramatic increase in the use and OOPs of insulin analogs among privately insured patients with type 2 diabetes mellitus [28,29]. This can be a driving force for CRN in dual-eligible diabetes patients as well which requires further investigation.

Diabetes is a costly medical condition that progresses to multiple complications requiring extensive treatments. While effective medications are available and dual eligibles are covered by both Medicare and Medicaid, the fact that dual-eligible patients have higher CRN shows the challenges in improving medication adherence and patient outcomes in high-need, high-cost patient populations. Together, these results suggest the need to

re-evaluate the cost-cutting management tools in managed care plan that restrict formularies, so as to decrease CRN and improve outcomes. In addition, interventions that aim to reduce cost-cutting behaviors in these patients, such as generic medication substitution, have the potential of improving the effectiveness of treatment and reducing overall medical costs. Improving patient-physician communication on CRN may also be instrumental in this process.

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### Conflict of interest

No conflict of interest, financial or other, exists.

### Author's contributions

We have listed everyone who contributed significantly to the work and has obtained written consent from all contributors who are not authors and are named in the Acknowledgment section.

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