U.S. Department of Health and Human Services
Centers for Medicare & Medicaid Services

Value in Opioid Use Disorder Treatment (VIT-OUD) Demonstration Evaluation

Intermediate Report to Congress

April 2024

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List of Acronyms

ASMD	absolute standardized mean difference
CCBHC	Certified Community Behavioral Health Clinic
CCN	CMS Certification Number
CMF	care management fee
CMHC	Community Mental Health Center
CMMI	Centers for Medicare and Medicaid Innovation
CMS	Centers for Medicare & Medicaid Services
ED	emergency department
FDA	Food and Drug Administration
FFS	fee-for-service
FQHC	Federally Qualified Health Center
HCPCS	Healthcare Common Procedure Coding System
HCC	Hierarchical Condition Category
HEDIS	Healthcare Effectiveness Data and Information Set
HOP	hospital outpatient department
LIS	Low-Income Subsidy
MA-PD	Medicare Advantage Part D drug plan
MOUD	medication to treat opioid use disorder
NPI	National Provider Identifier
OTP	opioid treatment program
OUD	opioid use disorder
PBIP	performance-based incentive payment
PBPM	per beneficiary per month
POS	place of service
SUD	substance use disorder
SUPPORT Act	Substance Use-Disorder Prevention That Promotes Opioid Recovery and Treatment for Patients and Communities Act
TIN	Tax Identification Number
VIT-OUD	Value in Opioid Use Disorder Treatment

Executive Summary

As required by Section 6042 of the Substance Use-Disorder Prevention that Promotes Opioid Recovery and Treatment for Patients and Communities Act (SUPPORT Act), the Centers for Medicare & Medicaid Services (CMS) is conducting a demonstration to improve treatment for Medicare fee-for-service (FFS) beneficiaries with opioid use disorder (OUD). The goal of the Value in Opioid Use Disorder Treatment (VIT-OUD) Demonstration is to test whether specialized OUD care teams, supported by two new payments, increase access to OUD treatment services, improve health outcomes, and reduce or do not increase Medicare expenditures. Providers participating in the demonstration receive resources and flexibilities needed to (1) provide Medicare beneficiaries with OUD treatment services that are not otherwise eligible for payment under Medicare or that are difficult to provide under current Medicare rules; (2) implement multidisciplinary OUD care teams to address needs; and (3) expand the care management, care coordination, and social support services delivered by auxiliary personnel. The demonstration started on April 1, 2021, and is expected to end on December 31, 2024.

Section 6042 of the SUPPORT Act requires the Secretary of Health and Human Services to conduct an intermediate and final evaluation of the demonstration to determine the extent to which the VIT-OUD Demonstration does the following:

- Reduces hospitalizations and emergency department (ED) visits
- Increases use of medications to treat opioid use disorder (MOUDs)
- Improves health outcomes of individuals with OUD, including by reducing the incidence of infectious diseases (such as hepatitis C and HIV)
- Does not increase total spending
- Reduces deaths from opioid overdose
- Reduces the utilization of residential substance use disorder (SUD) treatment

Fifty-three providers were selected to participate in the demonstration in 2021; 47 providers remain as of September 2023. Between April 2021 and September 2022, 18 of the participating providers enrolled 943 beneficiaries. Provider participants reported multiple challenges associated with recruiting and enrolling beneficiaries that may have contributed to the lower-than-expected enrollment. Provider participants shared that many of the beneficiaries they identified with current OUD diagnoses were either already enrolled in Medicare Advantage or were switching from FFS Medicare to Medicare Advantage. Section 6042 of the SUPPORT Act limited enrollment to FFS Medicare beneficiaries, so Medicare Advantage beneficiaries were not eligible to enroll.

This report constitutes the intermediate evaluation required by Section 6042. It contains interim findings from the first 1.5 years of the demonstration, which found that, despite challenges with enrolling beneficiaries, the demonstration had significant impacts on hospital-based utilization and Medicare expenditures. Compared with a matched comparison group, VIT-OUD beneficiary enrollees had:

- 15% lower Medicare spending before accounting for demonstration payments and 11% lower spending after accounting for demonstration payments; most of the estimated cost savings were accounted for by 26% lower inpatient spending
- 17% fewer hospitalizations (for all causes)
- 18% fewer ED visits (for all causes), 51% fewer SUD-related ED visits, and 30% lower probability of having at least one SUD-related ED visit

The demonstration was not associated with statistically significant changes in:

- Initial use of an MOUD
- Continued use of MOUD
- Use of residential SUD treatment
- Incidence of hepatitis C

Incidence of HIV/AIDS and opioid overdose deaths were too rare to report.

The magnitude of the cost and utilization findings are surprising because the VIT-OUD Demonstration was not associated with an impact on the use of MOUDs, and MOUD use has previously been shown to reduce hospitalizations and ED visits.[1] Without data on the specific services and staff added as a result of the demonstration and how they were employed relative to the comparison group, it is unclear how the demonstration has had these impacts.

The Final Report to Congress, due in April 2027, will contain the final results for the full duration of the demonstration for all beneficiaries who enrolled.

[1] Mark, TL, Parish, WJ, Zarkin, GA. Association of formulary prior authorization policies with buprenorphine-naloxone prescriptions and hospital and emergency department use among Medicare beneficiaries. JAMA Netw Open. 3(4):e20312. https://doi.org/10.1001/jamanetworkopen.2020.3132.

1 Legislative Summary

The Centers for Medicare & Medicaid Services (CMS) is implementing a 4-year demonstration, called the Value in Opioid Use Disorder Treatment (VIT-OUD) Demonstration. The VIT-OUD Demonstration was authorized under Section 1866F of the Social Security Act and was added by Section 6042 of the Substance Use-Disorder Prevention that Promotes Opioid Recovery and Treatment for Patients and Communities Act of 2018 (SUPPORT Act). The goal of the VIT-OUD Demonstration is to increase access for Medicare beneficiaries to opioid use disorder (OUD) treatment; improve participating beneficiaries' physical and mental health outcomes; and, to the extent possible, reduce Medicare program expenditures. **Figure 1** shows the VIT-OUD Demonstration timeline.

Figure 1. The VIT-OUD Demonstration Timeline

2 Background

In 2022, there were over 80,000 opioid-related overdose deaths in the United States. Most of these deaths involved synthetic opioids, such as illicit fentanyl. About 52,000 Medicare beneficiaries experienced an opioid overdose in 2022. Although effective treatments such as medications and counseling are available to treat OUD, these treatments are used by a small percentage of Medicare beneficiaries with OUD. In 2022, about 1.1 million Medicare beneficiaries had an OUD diagnosis, yet only 18% of these beneficiaries (about 211,000) received medications to treat opioid use disorder (MOUDs) through Medicare in outpatient settings.[2]

Improving access to effective treatments for OUD is a key objective of the VIT-OUD Demonstration, and recent research highlights that this access can have significant impacts on Medicare spending and other health care outcomes. For example, a recent study estimated that, in 2019, fee-for-service (FFS) Medicare beneficiaries with OUD who had not received MOUDs had between $1,214–$1,565 more in Medicare expenditures per beneficiary per month (PBPM) than beneficiaries without OUD, whereas beneficiaries with OUD who had received

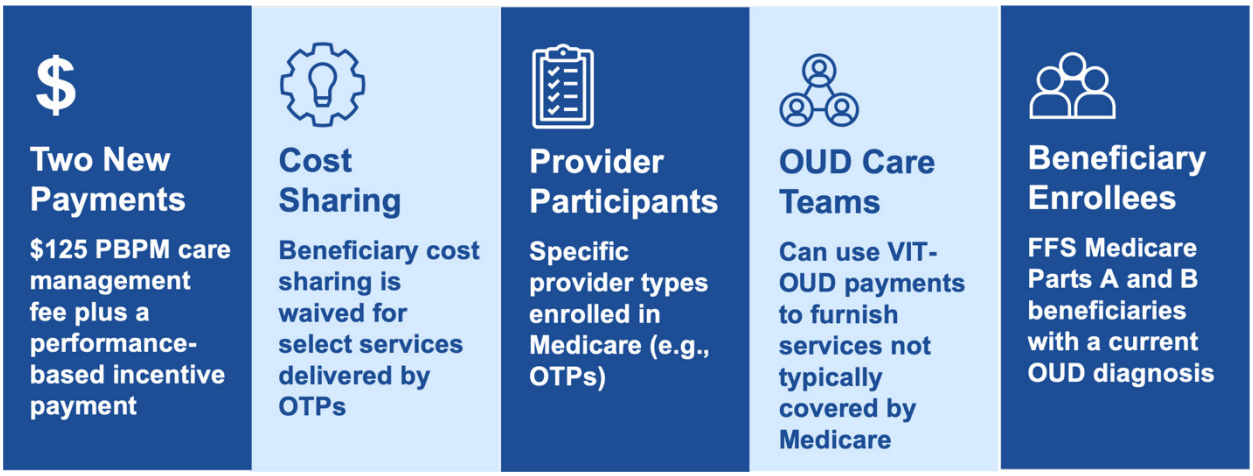
[2] Office of the Inspector General. The Consistently Low Percentage of Medicare Enrollees Receiving Medication to Treat Their Opioid Use Disorder Remains a Concern. December 2023, OEI-02-23-00250. https://oig.hhs.gov/oei/reports/OEI-02-23-00250.pdf

MOUDs had between $324–$354 more in Medicare expenditures PBPM than beneficiaries without OUD.[3]

3 Demonstration Overview

Figure 2 illustrates the main components of the VIT-OUD Demonstration. Additional details of the demonstration follow.

Figure 2. Main Components of the VIT-OUD Demonstration[4]



3.1 The VIT-OUD Demonstration Provides Two New Payments

The VIT-OUD Demonstration provides two new payments for participating providers: a PBPM care management fee (CMF) and a performance-based incentive payment (PBIP). The CMF is $125 per applicable beneficiary per month paid to participants every quarter through the appropriate Medicare Administrative Contractor. CMS created a demonstration-specific G-code to identify claims submitted by participants for the CMF.

A portion of participant CMF payments is subject to a quality withhold (i.e., the PBIP) (0% in performance year 1; 5% in performance year 2; and 10% in each of performance years 3–4). Participants are assessed on a PBIP metric, and if they perform adequately, they earn back withheld funds. CMS selected the prescription or administration of pharmacotherapy to treat OUD as the PBIP metric. This measure captures the percentage of a provider's applicable beneficiaries who filled a prescription for or were administered a U.S. Food and Drug Administration (FDA)-approved MOUD within 30 days of their first attributable OUD treatment

[3] Mark TL, Parish WJ, Weber EM, Steinberg DG, Henretty K. The cost of opioid use disorder-related conditions in Medicare. Drug Alcohol Depend. 244, Mar 2023. https://doi.org/10.1016/j.drugalcdep.2023.109778.
[4] The cost-sharing component is specific to this demonstration, since FFS Medicare beneficiaries already pay no copayments for OTP services.

encounter with that provider. Participant performance is assessed on an annual basis in the second quarter following the performance year.[5] This approach allows for 3 months of claims runout during the first quarter following the performance year. The performance-based incentive is paid to eligible participants based on their quality of performance, and payments are dispersed in quarter 3 of the following performance year. For example, payments for the second performance year (2022) were paid in quarter 3 of 2023.

The threshold for adequate performance on the PBIP metric was approximately 25%, meaning that at least 25% of VIT-OUD beneficiary enrollees needed to have filled a prescription for or had administered an FDA-approved MOUD within 30 days of their first visit with a provider participant. Due to lower-than-expected enrollment numbers within and across provider participants, participant performance assessment was conducted by pooling data across all provider participants rather than calculating separate rates for each provider participant. In the second performance year, almost 90% of beneficiary enrollees filled or were administered an MOUD within 30 days of their first visit with provider participant. As such, all provider participants who enrolled at least one beneficiary in the second performance year were eligible to receive the PBIP.

Thirty-eight percent of participating providers (18 out of 47 providers) received PBIPs in the second performance year, with cumulative PBIPs totaling more than $30,000.

3.2 Cost Sharing

In addition to the two demonstration payments to participants, CMS used its waiver authority under Section 1866F(i) of the Social Security Act to waive the requirements of Sections 1833(a) and 1833(b) for Medicare Part B payment systems, such that Medicare pays 100% of the cost of services furnished to applicable beneficiaries by opioid treatment programs (OTPs) and for services furnished through the OUD-bundled payments finalized in the calendar year 2020 Medicare Physician Fee Schedule final rule.[6] This waiver is applied to claims submitted by participants for applicable beneficiaries for Healthcare Common Procedure Coding System (HCPCS) codes G2067–G2080, G2086–G2088, and any other HCPCS codes specified by CMS for use by OTPs.[7] Because these codes already have zero coinsurance since FFS Medicare beneficiaries do not pay copayments for OTP services, the cost sharing waiver applies to beneficiary deductibles.

[5] Due to the low volume of beneficiaries enrolled by each individual provider participant, participants were assessed in the second performance year based on a pooled population of VIT-OUD beneficiary enrollees rather than on each individual provider participant's beneficiary population.
[6] Current and historical physician fee schedules can be accessed online at: https://www.cms.gov/medicare/payment/fee-schedules/physician.
[7] HCPCS codes G2067–G2080, G2086–G2088 are reserved procedure codes for OTPs billing under Medicare. They are used when billing for medication and other services that OTPs provide in the treatment of OUD.

3.3 Provider Participants

3.3.1 Provider Eligibility for the Demonstration

To be eligible to participate in the VIT-OUD Demonstration, providers had to meet the following criteria:

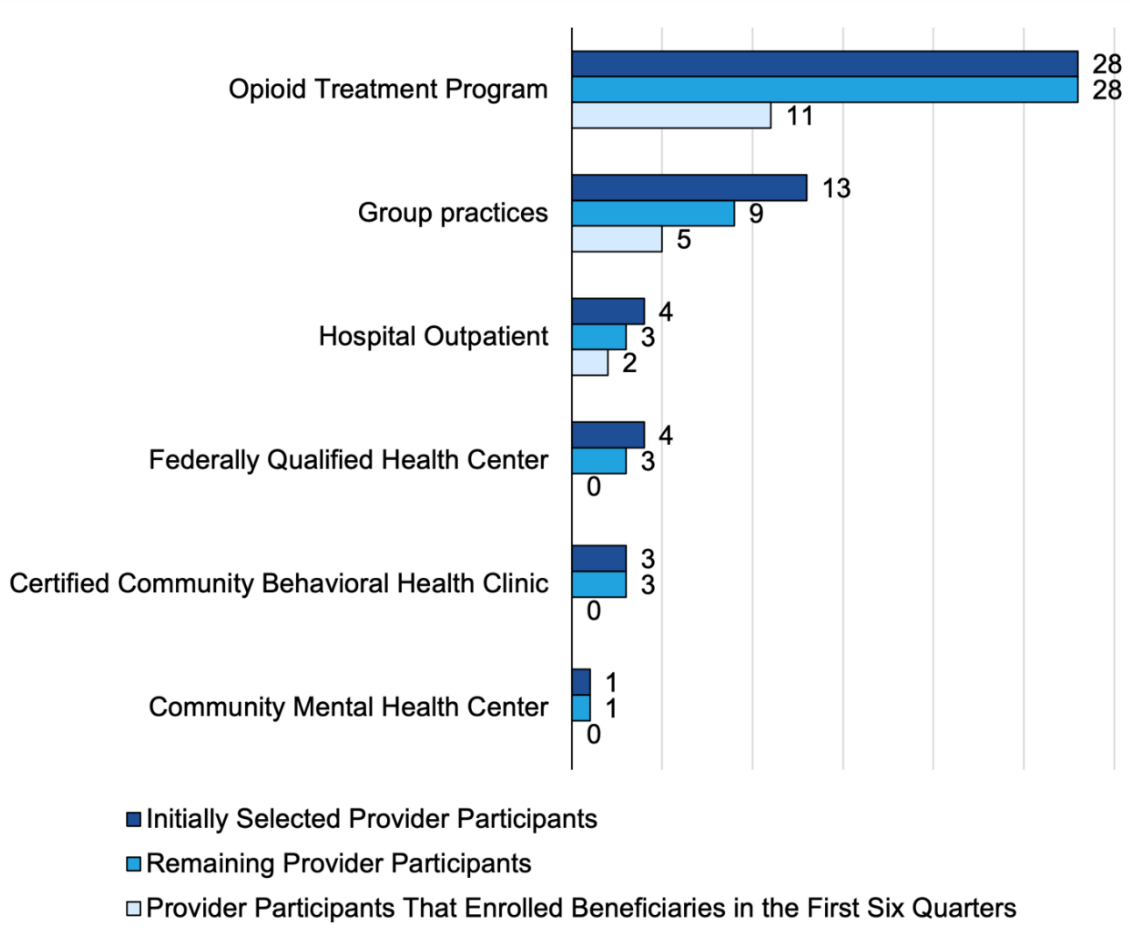
- Be enrolled in Medicare Part A or B as specified under Section 1866(j)(1)
- Establish an OUD care team and use the team to furnish or arrange for OUD treatment services in the outpatient setting
- Be one of the following provider types: physician, group practice, hospital outpatient department (HOP), Federally Qualified Health Center (FQHC), rural health clinic, Community Mental Health Center (CMHC), Certified Community Behavioral Health Clinic (CCBHC, including both participants of the CCBHC Medicaid demonstration as well as those of the Substance Abuse and Mental Health Services Administration CCBHC grant, OTP, or critical access hospital
- Have applied for and been selected to participate in the demonstration program by CMS

3.3.2 Types of Providers Participating in the Demonstration

Figure 3 shows that, in April 2021 (the start of the demonstration), there were 53 provider participants in the VIT-OUD Demonstration: 28 OTPs, 13 physician/nurse practitioner group practices, 4 HOPs, 4 FQHCs, 3 CCBHCs, and 1 CMHC. Of these, 94% were for-profit entities. As of September 2023, six provider participants (four physician/nurse practitioner group practices, one HOP, and one FQHC) had dropped out of the demonstration, leaving 47 providers. Providers primarily dropped out due to an inability to enroll beneficiaries in the demonstration. Of the 47 remaining provider participants, only 18 enrolled any beneficiaries between April 2021 and September 2022: 11 OTPs; 5 group practices; 2 HOPs; and no CMHCs, CCBHCs, or FQHCs. Enrollment is low primarily due to the SUPPORT Act's exclusion of beneficiaries with Medicare Advantage and beneficiaries not wanting their personal information to be shared with the government.

Figure 4 shows the states in which the 47 VIT-OUD providers were located, distinguishing between those that enrolled beneficiaries between April 2021 and September 2022 (yellow states) and those that did not enroll any beneficiaries between April 2021 and September 2022 (blue states). Relative to all provider participants, those that enrolled beneficiaries were as likely to be OTPs and more likely to be physician/nurse practitioner group practices. This may be because OTPs have more experience working with patients with OUDs than other types of practices, and physician/nurse practitioners may have more general experience working with new demonstrations and models.

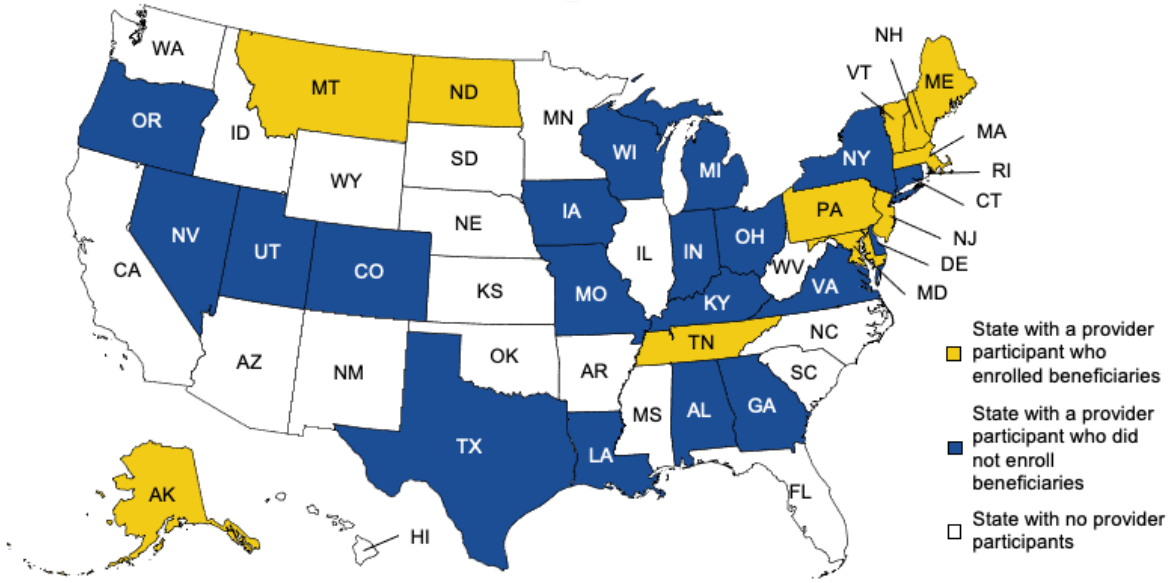
Figure 3. Number and Type of VIT-OUD Demonstration Provider Participants



Notes. Initially, in April 2021, CMS selected 53 provider participants for the VIT-OUD Demonstration. As of September 2022, 47 provider participants remain in the VIT-OUD Demonstration.[8] Over the first six quarters of the demonstration, 18 provider participants enrolled at least one beneficiary. Additional providers may have enrolled beneficiaries since September 2022.

[8] Provider participants dropped out primarily due to an inability to recruit beneficiaries for the demonstration.

Figure 4. States Where the 47 VIT-OUD Demonstration Provider Participants Who Did and Did Not Enroll Beneficiaries Were Located



Notes. Yellow states (AK, MA, MD, ME, MT, ND, NH, NJ, PA, TN, VT) represent states where VIT-OUD provider participants that enrolled beneficiaries between April 2021 and September 2022 are located. Blue states (AL, CO, CT, DE, GA, IA, IN, KY, LA, MI, MO, NV, NY, OH, OR, TX, UT, VA, WI) represent states where VIT-OUD provider participants that did not enroll beneficiaries between April 2021 and September 2022 are located. From April 2021 through September 2022, VIT-OUD funded 18 provider participants in 11 states. Collectively, these 18 provider participants treated 943 unique Medicare beneficiaries.
Additional providers may have enrolled beneficiaries since September 2022.

3.3.3 OUD Care Teams

As a condition of participation in the demonstration, providers were required to have or establish an OUD care team that employed or contracted with at least one physician furnishing primary care services or addiction treatment services and at least one physician or other health care practitioner authorized to prescribe schedule III medications or dispense schedule II medications to individuals for maintenance treatment or withdrawal management treatment. Additionally, providers could optionally include in their OUD care team one or more practitioners licensed under state law to furnish psychological, counseling, or social services.

All OUD care teams included staff who can prescribe or order MOUDs, as required by the demonstration. All but one (52 of 53) of the provider participants reported that they had at least one medical doctor on their proposed OUD care teams. The one provider participant without a medical doctor on its care team had at least one other type of staff who could prescribe (i.e., a nurse practitioner or physician assistant).

Care teams varied in the other types of staff included. OTPs had fewer medical doctors, nurse practitioners, registered nurses, and physician assistants than group practices had (19% vs. 60%). Conversely, OTPs had more counselors, therapists, social workers, peer specialists, and community health works than group practices had (44% vs. 32%).

3.4 Services That Provider Participants Furnished Under the Demonstration

The services provided under the demonstration must be based on a beneficiary's individualized OUD treatment plan, be aligned with OUD treatment services as they are defined in the statute and with other services furnished to the beneficiary for treating OUD, and have a reasonable expectation of improving or maintaining the health or overall function of the beneficiary. CMS anticipated that the demonstration would enable the provision of enhanced services and comprehensive care coordination by allowing participants and their OUD care teams to provide services that address physical, behavioral, and health-related social needs for beneficiaries.

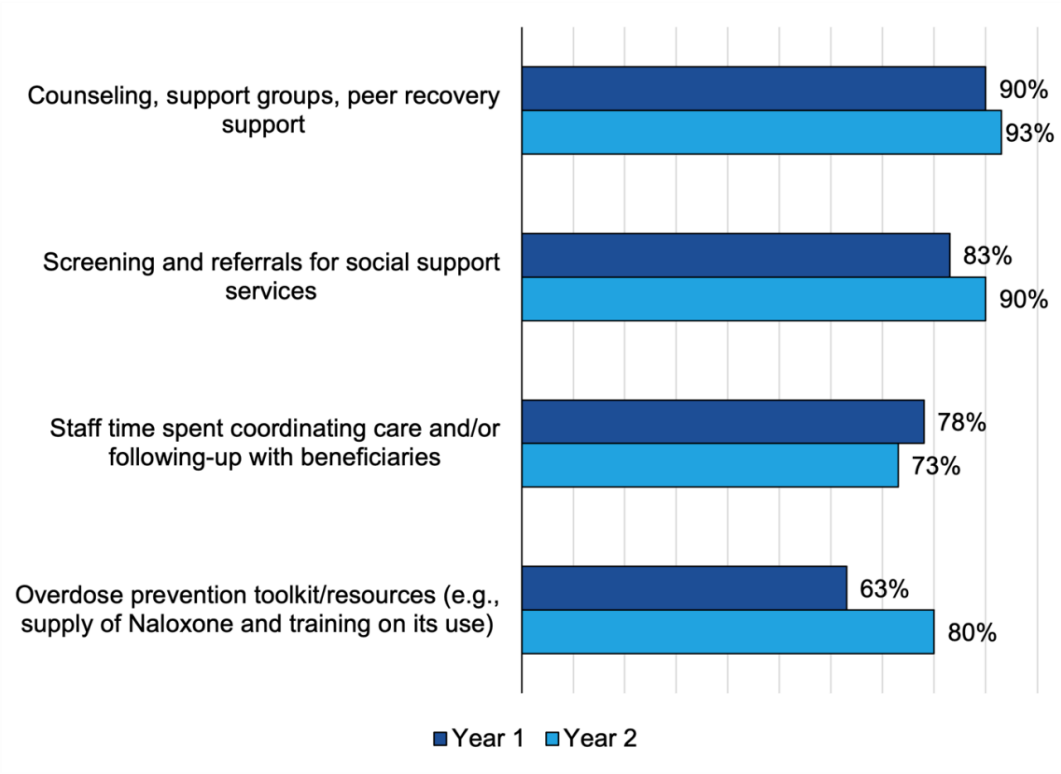
Provider participants furnished services beyond prescribing/administering medications. **Figure 5** shows that the following were the most common bundles of services reported:

- Counseling, support groups, peer recovery support
- Screening and referrals for social support services
- Coordination of care and follow-up
- Overdose prevention toolkits or resources

Providers may or may not have added these services because of their participation in the VIT-OUD Demonstration. However, FFS Medicare does not typically cover all the services reported.[9] For example, peer recovery support specialists are not eligible to bill to Medicare. Most providers also offered both in-person office visits and telehealth visits. Home visits and after-hours access to OUD treatment services were less commonly offered. Two of 31 providers responding to a participant provider survey offered home visits, and 12 of 31 offered after-hours access to OUD services. The mix of services offered did not differ significantly across demonstration years, except for a notable increase in the percentage of providers that reported offering overdose prevention toolkits or resources (**Figure 5**).

[9] The survey questionnaire did not clarify whether services were added because of the VIT-OUD Demonstration, or whether they were services that would have been provided outside of the demonstration.

Figure 5. Services That VIT-OUD Provider Participants Reported Offering



Source: Calculations using a provider participant survey.

Provider participants also routinely screened for social needs and reported that most enrollees needed assistance with transportation and housing. In the second performance year, over 90% of provider participants reported that they screened VIT-OUD beneficiaries for social needs. More than 90% of provider participants reported that they had identified social service needs (e.g., the need for community engagement groups, support groups, or peer support) among their beneficiary population. The most common social needs that participants reported they had identified were transportation (97% reported in first demonstration year; 92% reported in the second demonstration year) and housing (91% reported in the first demonstration year; 92% reported in the second demonstration year). More than half of provider participants also reported treating beneficiaries with legal, employment, childcare, and safety needs.

3.5 Beneficiary Enrollees

3.5.1 Beneficiary Eligibility in the VIT-OUD Demonstration

To be eligible to enroll in the VIT-OUD Demonstration, beneficiaries must meet the following criteria:

- Be enrolled in Medicare Part A and Medicare Part B
- Not be enrolled in a Medicare Advantage plan under Medicare Part C
- Have a current OUD diagnosis

Under the demonstration statute, applicable beneficiaries enrolled in the demonstration must sign an agreement form to receive OUD treatment services from a provider participant. Before submitting a claim for an applicable beneficiary under the demonstration, participants must also notify the beneficiary via written notice of their enrollment in VIT-OUD, along with a summary of the beneficiary's rights under Section 1866(f) of the Social Security Act. These rights allow beneficiaries to terminate enrollment in the demonstration at any time and to continue to see any Medicare provider from which they wish to receive medically necessary services that are covered by Medicare.

3.5.2 Beneficiary Enrollee Characteristics

Overall, 943 beneficiaries were enrolled in the VIT-OUD Demonstration during the first six quarters of the demonstration.

Consistent with data comparing other Medicare populations with substance use disorder (SUD) to the overall Medicare population, VIT-OUD beneficiary enrollees had several characteristics that were different from the overall Medicare population.[10] Specifically, **Figure 6** shows that VIT-OUD beneficiary enrollees were more likely than the overall Medicare population to be:

- ***Younger:*** 70% of VIT-OUD enrollees were aged 65 years or younger, whereas 13% of the overall Medicare population were aged 65 years or younger in 2021.
- ***Male:*** 57% of VIT-OUD beneficiary enrollees were male, whereas 46% of the overall Medicare population were male in 2021.
- ***Originally entitled to Medicare due to a disability:*** 81% of VIT-OUD enrollees had a disability, whereas 13% of the overall Medicare population had a disability.
- ***Dually eligible for Medicare and Medicaid:*** 74% of VIT-OUD beneficiary enrollees were dually eligible in 2021, whereas 17% of the overall Medicare population were dually eligible.
- ***Enrolled in a Medicare Part D plan:*** 89% of VIT-OUD beneficiary enrollees were enrolled in a Medicare Part D plan, whereas 77% of the overall Medicare population were enrolled in such a Medicare Part D plan in 2021.[11]

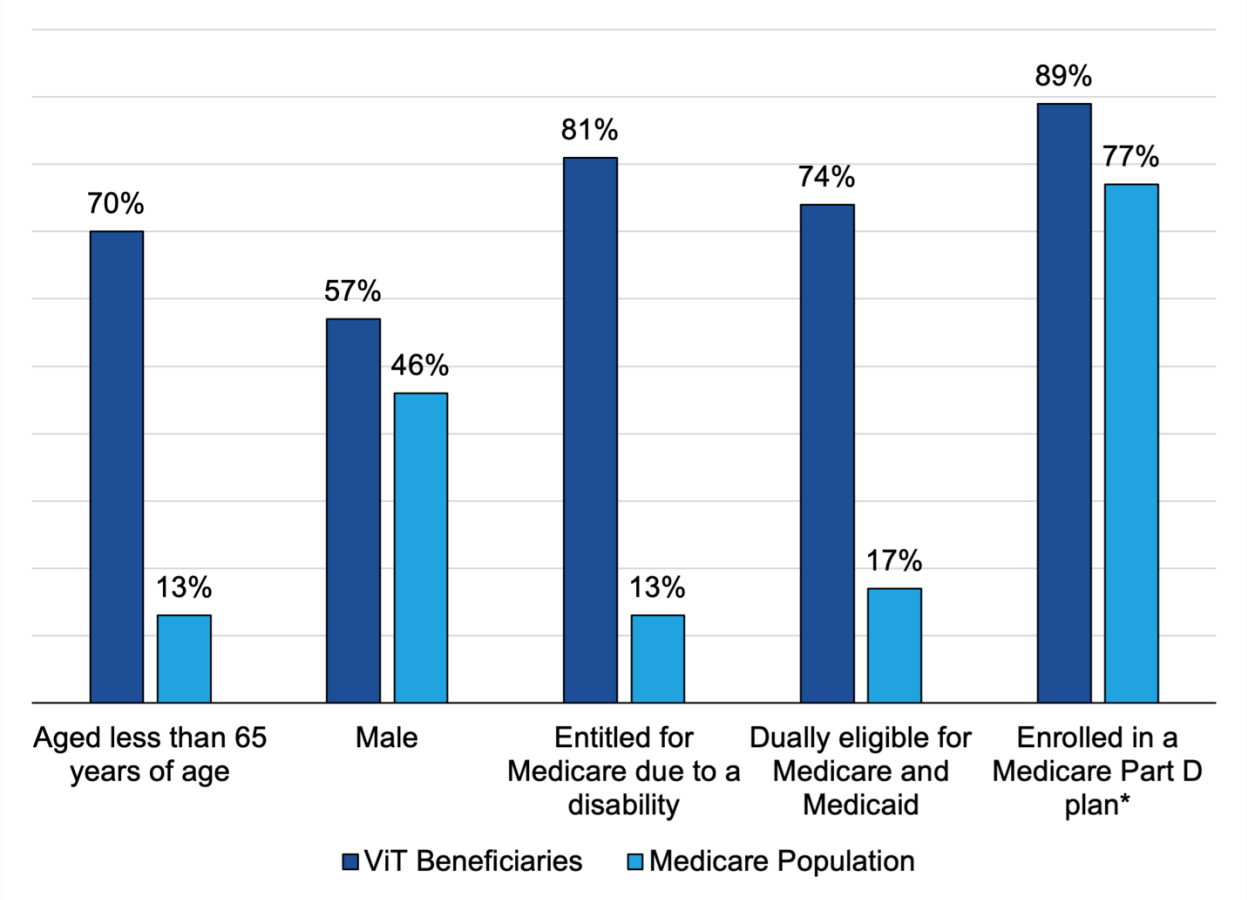
Seventy-four percent of VIT-OUD beneficiary enrollees were non-Hispanic White. This percentage is similar to that of the overall Medicare population: in 2021, 73% were non-Hispanic White.[12]

[10] Parish WJ, Mark TL, Weber EM, Steinberg DG. Substance use disorders among Medicare beneficiaries: prevalence, mental and physical comorbidities, and treatment barriers. Am J Prev Med. 2022 Aug;63(2):225-232. https://doi.org/10.1016/j.amepre.2022.01.021. Epub 2022 Mar 21. PMID: 35331570.

[11]. For the VIT-OUD enrollees, we included anyone who enrolled in a stand-alone Part D plan or another type of Part D coverage (not including MA-PD). For the overall Medicare population, we included anyone who had enrolled in any Medicare Part D plan, including those in stand-alone Part D plans, MA-PD plans, or other types of Part D coverage.

[12] Calculations based on Medicare enrollment data for VIT-OUD beneficiary enrollees. Sociodemographic statistics for the overall Medicare population were obtained from data published on the Chronic Conditions Data Warehouse website and were based on 2021 Medicare enrollment files. Data were obtained from the following website on November 18, 2023: https://www2.ccwdata.org/web/guest/medicare-charts.

Figure 6. Characteristics of VIT-OUD Beneficiary Enrollees Relative to the Medicare Population



* For the VIT-OUD enrollees, we included anyone who enrolled in a stand-alone Part D plan or another type of Part D coverage (not including Medicare Advantage Part D [MA-PD]). For the overall Medicare population, we included anyone who had enrolled in any Medicare Part D plan, including those in stand-alone Part D plans, MA-PD plans, or other types of Part D coverage. Source: Calculations based on Medicare enrollment data for VIT-OUD beneficiary enrollees. Sociodemographic statistics for the overall Medicare population were obtained from data published on the Chronic Conditions Data Warehouse website and were based on 2021 Medicare enrollment files. Data were obtained from the following website on November 18, 2023: https://www2.ccwdata.org/web/guest/medicare-charts.

In addition to these differences, VIT-OUD beneficiary enrollees also had multiple comorbid chronic conditions and were likely to have co-occurring SUDs and/or mental health conditions. On average, VIT-OUD beneficiary enrollees had 2.7 comorbid chronic conditions, and 91% of VIT-OUD beneficiary enrollees had two or more co-occurring SUDs and/or mental health conditions. Previous studies have highlighted that Medicare beneficiaries with SUDs are at a high risk for co-occurring mental health conditions. For example, a recent study highlighted that Medicare beneficiaries with SUDs were more than twice as likely to have

symptoms of serious psychological distress and were about four times as likely to have suicidal ideation than Medicare beneficiaries without SUDs.[13]

Prior to enrollment, VIT-OUD beneficiary enrollees were already receiving MOUDs. Eighty-four percent of VIT-OUD beneficiary enrollees had received an MOUD at least once during the 12 months before VIT-OUD enrollment. In contrast, data from 2021 show that only about 45% of FFS Medicare beneficiaries with a primary OUD diagnosis received an MOUD.

3.6 Provider Participation Challenges

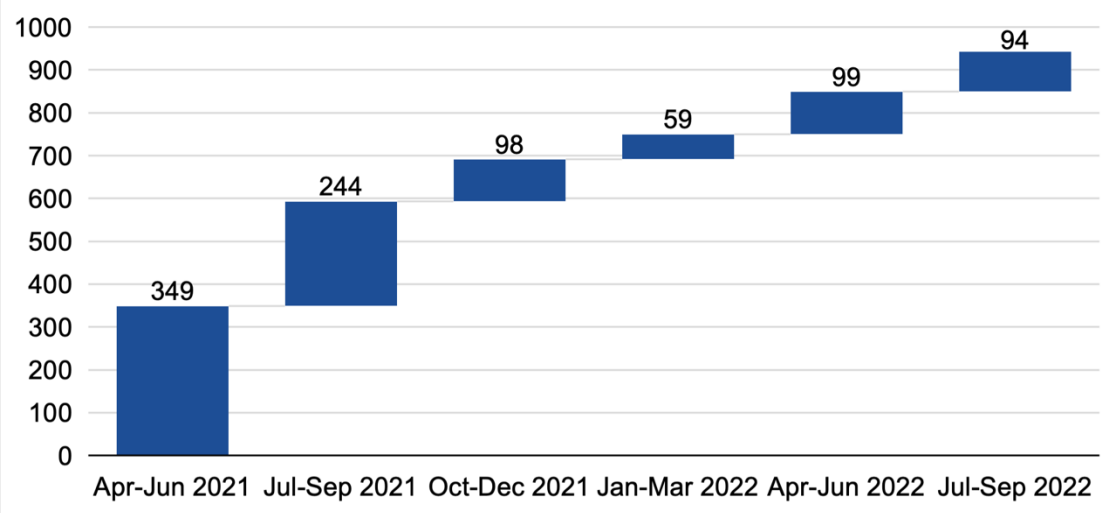
Provider participants reported the following challenges related to their participation in the demonstration:

- ***Enrolling eligible beneficiaries in the demonstration.*** Beneficiary enrollment was lower than expected. Only 18 of the 47 provider participants enrolled any beneficiaries in the VIT-OUD Demonstration between April 2021 and September 2022. **Figure 7** shows that enrollment of new beneficiaries slowed from quarter 1 to quarter 6 of the demonstration, for a total of 943 enrolled beneficiaries. Lower-than-expected enrollment may have been due to beneficiaries primarily being enrolled in Medicare Advantage rather than FFS Medicare (beneficiaries enrolled in Medicare Advantage are not eligible for the demonstration). Provider participants reported that many of the beneficiaries they identified with OUD who would have otherwise been eligible for the demonstration were already enrolled in a Medicare Advantage plan or were considering switching from FFS Medicare to Medicare Advantage. In addition, some OTPs reported difficulty in getting beneficiaries to sign agreement forms because OTPs already provide a robust level of services and beneficiaries do not see additional benefits of participating in the demonstration.
- ***Engaging and retaining staff.*** Staff turnover was a challenge and stemmed from ongoing or downstream effects associated with staffing disruptions resulting from the COVID-19 pandemic, which was particularly impactful among these provider participants.
- ***Lack of familiarity with implementing a demonstration.*** Provider participants who are not OTPs or group practices reported issues with startup and were unfamiliar with how to implement a demonstration.
- ***Obtaining beneficiary agreement forms.*** Some provider participants reported challenges with obtaining beneficiary agreement forms, which were required by the demonstration. These beneficiary agreement forms asked beneficiaries to agree to participate in the VIT-OUD Demonstration and to allow their health data to be shared.
- ***Billing issues.*** Billing challenges included difficulty successfully submitting CMF claims and incorrect denials.

[13] Mark TL, Parish WJ, Weber EM, Steinberg DG, Henretty K. The cost of opioid use disorder-related conditions in Medicare. Drug Alcohol Depend. 244, Mar 2023. https://doi.org/10.1016/j.drugalcdep.2023.109778.

- ***Financial incentives that were not large enough to cover the cost of providers participation in the demonstration.*** The VIT-OUD Demonstration pays $125 PBPM minus payment adjustments specified in the participant agreement. The $125 PBPM payment was set by CMS and informed by peer-reviewed and gray literature related to interventions with similar types of items or services allowable under the VIT-OUD Demonstration. Over half of participants across both years (56% in the first year and 59% in the second year) reported that this amount did not sufficiently cover the VIT-OUD services that participants had intended to provide using VIT-OUD funds.

Figure 7. The Unique Number of Beneficiaries Enrolled in Each of the First Six Demonstration Quarters, April 2021 to September 2022



Source: Calculations using FFS Medicare claims data.

CMS worked with provider participants to help overcome some barriers. For example, CMS conducted multiple webinars with provider participants to identify challenges and solutions through a peer-learning environment. CMS also developed a billing manual that provided more detailed guidance to provider participants, which resolved the billing issues.

In contrast, challenges related to enrollment were difficult for CMS to address. Although the SUPPORT Act made $10 million available for the purpose of making CMF and incentive payments over the entire 4-year demonstration period, just over a tenth of the VIT-OUD Demonstration payment budget has been expended over the first half of the demonstration because enrollment has been lower than expected. Unfortunately, due to statutory restrictions, CMS was unable to shift funds from the VIT-OUD Demonstration payment budget to the operational budget so that the demonstration could be more in line with implementation costs for other demonstrations. This limitation in finance resources directly impacted the ability to more directly intervene with providers to increase enrollment numbers.

Despite this, provider participants identified some strategies that helped with enrolling beneficiaries:

- Identifying eligible Medicare beneficiaries with an existing OUD diagnosis and enrolling them on the same day during a face-to-face visit

- Conducting data analyses to identify Medicare beneficiaries with OUD in the community
- Educating external partners on VIT-OUD services

4 Evaluation Overview

4.1 Evaluation Questions

This report answers questions about the impact of the demonstration on outcomes specified in the SUPPORT Act. Specifically, the goal of this report is to answer the following questions:

1. Did the VIT-OUD Demonstration reduce hospitalizations and ED visits?
2. Did the VIT-OUD Demonstration increase use of MOUDs?
3. Did the VIT-OUD Demonstration improve health outcomes of individuals with OUD, including by reducing the incidence of infectious diseases (such as hepatitis C and HIV/AIDS)?
4. Did the VIT-OUD Demonstration increase or not increase the total spending on items and services covered under the original Medicare legislation?
5. Did the VIT-OUD Demonstration reduce the number of deaths from opioid overdose?
6. Did the VIT-OUD Demonstration reduce the utilization of residential SUD treatment?

4.2 Evaluation Approach

To evaluate the VIT-OUD Demonstration, CMS first matched VIT-OUD beneficiary enrollees to a comparison group of Medicare beneficiaries who had OUD and received care from similar provider types as the VIT-OUD provider participants. Second, CMS compared outcomes between the VIT-OUD beneficiary enrollees and the matched comparison group. For example, to assess whether the VIT-OUD Demonstration reduced hospitalizations, CMS calculated the difference in the hospitalization rate observed among VIT-OUD beneficiary enrollees post-enrollment and the hospitalization rate observed in the matched comparison group after they received care from a comparison practice. Comparison group strategy details are provided in **Appendix A**. Question-by-question details about the approach used are provided in **Appendix B**. Outcome specifications are provided in **Appendix C**.

CMS used FFS Medicare claims data from April 2021 through December 2022 to derive all outcome measures. These data represent the first two performance years of the demonstration. To allow for at least 3 months of post-enrollment data, CMS restricted the sample to those who were enrolled as of September 2022 (i.e., the first 18 months of the demonstration).

5 Evaluation Findings

5.1 Did the VIT-OUD Demonstration Reduce Hospitalizations and ED Visits?

The VIT-OUD Demonstration was associated with statistically significantly fewer hospitalizations, ED visits, and SUD-related ED visits. **Table 1** shows that, compared with a matched comparison group, VIT-OUD beneficiary enrollees had 17% fewer hospitalizations (p = .06), 18% fewer ED visits (p = .10), and 51% fewer SUD-related ED visits (p = .002). The difference in the number of SUD-related inpatient admissions was not statistically significant.

Table 1. Impacts of the VIT-OUD Demonstration on Hospitalizations and ED Visits

Outcome	VIT-OUD Demonstration Beneficiary Enrollees	Matched Comparison Group	Difference	Percentage Difference	P-Value
Number of Hospitalizations per 1,000 Beneficiaries	47.8	57.3	**–9.5**	**17%**	**.06**
Number of SUD-Related Hospitalizations per 1,000 Beneficiaries	5.9	5.9	.04	.7%	.98
ED Visits per 1,000 Beneficiaries	98.4	119.7	**–21.3**	**18%**	**.10**
SUD-Related ED Visits per 1,000 Beneficiaries	6.2	12.5	**–6.4**	**51%**	**.002**

Bolded numbers indicate estimates that are statistically significant with a p-value less than .10.
Time frame: Data include beneficiaries who were enrolled or assigned to a comparison practice within the first six quarters after the demonstration began (i.e., April 2021 through September 2022).
Methods: Beneficiaries in the comparison group were propensity score matched with beneficiaries in the demonstration group. An average treatment effect on the treated was estimated as the difference in the demonstration group average and the matched comparison group average.
Sample size: 943 demonstration beneficiaries and 2,829 comparison beneficiaries.

Table 2 shows that the VIT-OUD Demonstration was also associated with a 30% lower probability of having at least one SUD-related ED visit (p = .007). The probabilities of having at least one hospitalization (estimate: –7%; p = .32), at least one SUD-related hospitalization (estimate: –9%; p = .55), and at least one ED visit (estimate: .1%; p = .99) were not significantly different between VIT-OUD beneficiary enrollees and the matched comparison group.

Table 2. Impacts of the VIT-OUD Demonstration on the Probability of Having at Least One Hospitalization or ED Visit

Outcome	Percentage Difference in Probability	P-Value
Probability of Having a Hospitalization	–7%	.32
Probability of Having an SUD-Related Hospitalization	–9%	.55
Probability of Having an ED Visit	.1%	.99
Probability of Having an SUD-Related ED Visit	**–30%**	**.007**

Bolded numbers indicate estimates that are statistically significant with a p-value less than .10.
Time frame: Data include beneficiaries who were enrolled or assigned to a comparison practice within the first six quarters after the demonstration began (i.e., April 2021 through September 2022).
Methods: Beneficiaries in the comparison group were propensity score matched with beneficiaries in the demonstration group. A Cox proportional hazards model was then estimated among the matched sample. The hazard ratio associated with demonstration group membership was estimated and converted into a percentage difference in risk by subtracting 1 from the hazard ratio and multiplying by 100.
Sample size: 943 demonstration beneficiaries and 2,829 comparison beneficiaries.

5.2 Did the VIT-OUD Demonstration Increase Use of MOUDs?

The VIT-OUD Demonstration was not associated with a statistically significant change in starting to use an MOUD or the continued use of MOUDs. **Table 3** shows that, in both the demonstration and matched comparison groups, a large percentage (89%–90%) of patients received an MOUD within 30 days of their earliest visit to a demonstration or comparison practice. The difference in the percentage of patients receiving MOUDs within 30 days of their earliest visit was not statistically significant (p = .50). Data on continuous use of MOUDs showed that 59% of VIT-OUD beneficiary enrollees received MOUDs continuously for at least 180 days. This percentage difference was not statistically significantly different than the 59% of beneficiaries in the matched comparison group who received MOUDs continuously for at least 180 days (p = .58).

Table 3. Impacts of the VIT-OUD Demonstration on Use of MOUDs

Outcome	VIT-OUD Demonstration Beneficiary Enrollees, %	Matched Comparison Group, %	Difference in Percentages	P-Value
Beneficiaries Who Used MOUDs Within 30 Days of Their First Visit	89%	90%	–1 pp	.50
Beneficiaries Who Used an MOUD Continuously for at Least 180 Days	59%	59%	.6 pp	.58

pp = percentage point.
Inclusion criteria: Beneficiaries with Medicare Part D. The percentage of beneficiaries who used an MOUD continuously for at least 180 days only includes those who had at least one MOUD prescription fill or claim at least 180 days before December 31, 2022.
Time frame: Data include beneficiaries who were enrolled or assigned to a comparison practice within the first six quarters after the demonstration began (i.e., April 2021 through September 2022).
Methods: Beneficiaries in the comparison group were propensity score matched to beneficiaries in the demonstration group. An average treatment effect on the treated was estimated as the difference in the demonstration group percentage and the matched comparison group percentage.
Sample size: 835 demonstration beneficiaries and 2,505 comparison beneficiaries were included in the use of MOUDs within 30 days measure. 717 demonstration beneficiaries and 2,151 comparison beneficiaries were included in the continuous use of MOUDs measure.

5.3 Did the VIT-OUD Demonstration Improve Health Outcomes of Individuals with OUD, Including by Reducing the Incidence of Infectious Diseases, Such as Hepatitis C and HIV?

The VIT-OUD Demonstration was not associated with a statistically significant reduction in new diagnoses (incidence) of hepatitis C. **Table 4** shows that, among VIT-OUD beneficiary enrollees with no history of hepatitis C diagnosis in the past 3 years (n = 786), 5% had a new diagnosis of hepatitis C after enrollment. This percentage difference was not statistically significantly different than the 6% of beneficiaries in the matched comparison group who had a new diagnosis of hepatitis C (p = .30).

Table 4. Impact of the VIT-OUD Demonstration on Incidence of Hepatitis C

Outcome	VIT-OUD Demonstration Beneficiary Enrollees	Matched Comparison Group	Difference in Percentages	P-Value
Percentage Who Had a New Incident Diagnosis of Hepatitis C	5%	6%	–1 pp	.30

pp = percentage point.
Inclusion criteria: Beneficiaries who had not had a hepatitis C diagnosis in the 3 years before they enrolled or were attributed to a comparison practice.
Time frame: Data include beneficiaries who were enrolled or assigned to a comparison practice within the first six quarters after the demonstration began (i.e., April 2021 through September 2022).
Methods: Beneficiaries in the comparison group were propensity score matched to beneficiaries in the demonstration group. An average treatment effect on the treated was estimated as the difference in the demonstration group percentage and the percentage in the matched comparison group.
Sample size: 786 demonstration beneficiaries and 2,358 comparison beneficiaries.

Data were insufficient to determine the impact of the demonstration on the incidence of HIV/AIDS. There were fewer than 11 new diagnoses (incident cases) of HIV/AIDS among VIT-OUD beneficiary enrollees. CMS has a policy of not reporting data on fewer than 11 cases to protect the privacy of individuals.

5.4 Did the VIT-OUD Demonstration Increase Total Spending?

The VIT-OUD Demonstration was associated with lower Medicare spending. **Table 5** shows that, compared with a matched comparison group, VIT-OUD beneficiary enrollees spent 15% less PBPM before accounting for demonstration payments (p = .01) and 11% less PBPM after accounting for demonstration payments (p = .06). The estimated cost savings are almost entirely accounted for by lower inpatient and ED expenditures. Compared with a matched comparison group, VIT-OUD beneficiary enrollees spent 26% less PBPM on inpatient care (p = .009) and 16% less PBPM on ED care (p = .08).

Table 5. Impacts of the VIT-OUD Demonstration on Total Spending on Items and Services Covered Under the Original Medicare Legislation

Outcome	VIT-OUD Demonstration Beneficiary Enrollees	Matched Comparison Group	Difference	Percentage Difference	P-Value
Total Medicare Expenditures (Excluding VIT-OUD Demonstration Payments) PBPM	$1,934.24	$2,270.02	**–$335.78**	**15%**	**.01**
Total Medicare Expenditures (Including VIT-OUD Demonstration Payments) PBPM	$2,017.85	$2,270.02	**–$252.17**	**11%**	**.06**
Inpatient Expenditures PBPM	$649.22	$881.90	**–$232.68**	**26%**	**.009**
ED Expenditures PBPM	$83.52	$99.17	**–$15.65**	**16%**	**.08**

Bolded numbers indicate estimates that are statistically significant with a p-value < .10.
Time frame: Data include beneficiaries who were enrolled or assigned to a comparison practice within the first six quarters after the demonstration began (i.e., April 2021 through September 2022).
Methods: Beneficiaries in the comparison group were propensity score matched with beneficiaries in the demonstration group. An average treatment effect on the treated was estimated as the difference in the demonstration group average and the matched comparison group average.
Sample size: 943 demonstration beneficiaries; 2,829 comparison beneficiaries.

5.5 Did the VIT-OUD Demonstration Reduce the Number of Deaths from Opioid Overdose?

Data were insufficient to determine the impact of the demonstration on opioid overdose. Fewer than 11 VIT-OUD beneficiaries died for any reason. CMS has a policy of not reporting data on fewer than 11 cases to protect the privacy of individuals.

5.6 Did the VIT-OUD Demonstration Reduce the Utilization of Residential Treatment?

The VIT-OUD Demonstration was not associated with a significant reduction in the utilization of residential SUD treatment. **Table 6** shows that the probability of having at least one residential stay (estimate: –9%; p = .81) was not significantly different between VIT-OUD beneficiary enrollees and the matched comparison group.

Table 6. Impacts of the VIT-OUD Demonstration on Residential Treatment

Outcome	Impact (% Difference in Probability)	P-Value
Probability of Having at Least One Residential Stay	–9%	.81

Time frame: Data include beneficiaries who were enrolled or assigned to a comparison practice within the first six quarters after the demonstration began (i.e., April 2021 through September 2022).
Methods: Beneficiaries in the comparison group were propensity score matched with beneficiaries in the demonstration group. A Cox proportional hazards model was then estimated among the matched sample. The hazard ratio associated with demonstration group membership was estimated and converted into a percentage difference in risk by subtracting 1 from the hazard ratio and multiplying by 100.
Sample size: 943 demonstration beneficiaries; 2,829 comparison beneficiaries.

6 Discussion and Summary

Despite struggles with enrolling beneficiaries in the demonstration, data show significant impacts on hospital-based utilization and Medicare expenditures. Compared with a matched comparison group, VIT-OUD beneficiary enrollees had fewer hospitalizations, fewer ED visits, and fewer SUD-related ED visits. Medicare expenditures, with and without including VIT-OUD Demonstration payments, were lower among VIT-OUD beneficiary enrollees than among the matched comparison group. Most of the estimated cost savings were attributable to savings associated with inpatient and ED expenditures. Considering the high mortality and morbidity rates associated with OUD, and the challenges of engaging patients in high-quality treatment, these findings are promising.[14, 15]

The findings are surprising because the use of medications to treat OUD was not significantly impacted by the VIT-OUD Demonstration. Previous research has shown that higher use of medications to treat OUD can reduce hospitalizations and ED visits.[16] Absent data to explain why the VIT-OUD Demonstration has had impacts on cost and utilization, it is unclear what component of the VIT-OUD Demonstration could explain these findings.

One reason that the demonstration may have had little impact on the use of medications to treat OUD may be because VIT-OUD beneficiary enrollees were already using medications for OUD at a high rate prior to enrollment. Almost 90% of beneficiaries in both the demonstration and comparison groups received MOUD within 30 days of their earliest visit to a provider participant.

The demonstration had no impact on patients having at least one residential stay or on the incidence of hepatitis C in patients. Two other outcomes were too rare to report. Incidence of HIV/AIDS and opioid overdose fatalities occurred for fewer than 11 beneficiaries, and the CMS data use agreement requires suppressing these data.

The evaluation had some limitations. First, although we controlled for observable differences between beneficiaries in the demonstration and comparison group, it is possible that unobservable differences existed. For example, the beneficiaries who agreed to participate in the demonstration may have been more motivated to reduce their drug use or may have had more family and social supports than the comparison beneficiaries. Second, the sample sizes resulted in two outcomes that could not be reported. Third, the fact that most VIT-OUD beneficiary enrollees were already receiving MOUDs prior to enrollment suggests that the results may not generalize to Medicare beneficiaries who have never received treatment in the past. Fourth, CMS collected one wave of data on beneficiaries' perceived health status through a beneficiary survey. Unfortunately, survey response rates were low despite efforts to increase

[14] Spencer MR, Miniño AM, Warner M. Drug overdose deaths in the United States, 2001–2021. NCHS Data Brief, no 457. Hyattsville, MD: National Center for Health Statistics. 2022. https://doi.org/10.15620/cdc:122556.
[15] Han, BH., Sherman, SE., Palamar JJ. Prescription opioid misuse among middle-aged and older adults in the United States, 2015-2016. Prev. Med. 121:94-98, Apr 2019.
[16] Mark, TL, Parish, WJ, Zarkin, GA. Association of formulary prior authorization policies with buprenorphine-naloxone prescriptions and hospital and emergency department use among Medicare beneficiaries. JAMA Netw Open. 3(4):e20312. https://doi.org/10.1001/jamanetworkopen.2020.3132.

them, and CMS decided that the data were not representative enough to include in this report. Future waves of the survey have been canceled as a result.

The data presented in this report are interim data and only represent beneficiaries who were enrolled over the first six quarters of the demonstration. In the Final Report to Congress, CMS will include all beneficiaries enrolled through the end of the demonstration. CMS efforts in improving provider participants' recruitment and enrollment of beneficiaries may impact the number and types of beneficiaries who are enrolled in the VIT-OUD Demonstration. These efforts may lead to more significant impacts in the Final Report to Congress.

Appendix A: Comparison Group Approach

CMS used a two-phased comparison group selection strategy. In the first phase, the Centers for Medicare & Medicaid Services (CMS) matched demonstration provider participants to a pool of comparison practices. In the second phase, CMS matched demonstration beneficiary enrollees to a pool of beneficiaries who were attributed to the practices selected in the first phase. The purpose of this appendix is to document details of this comparison group selection strategy.

A.1 Matching Comparison Practices

To identify comparison practices, we undertook the following steps:

- Identified practices participating in the demonstration.
- Identified potential comparison practices.
- Created practice- and geographic-level characteristics to match demonstration and comparison practices.
- Matched comparison practices to demonstration participants on practice- and area-level characteristics.

A.1.1 Identifying Practices That Participated in the Demonstration

As of September 2023, there were 47 practices participating in the Value in Opioid Use Disorder Treatment (VIT-OUD) Demonstration (see **Table A-1**). CMS had the following information that was used to identify demonstration practices in the Medicare claims data: Tax Identification Number (TIN), CMS certification number (CCN), National Provider Identifier (NPI), demonstration state(s), and demonstration Social Security Administration county code(s). CMS decided that the following information would be used to identify demonstration practices in the claims data: TIN on noninstitutional claims (i.e., carrier claims), and CCN on institutional claims (i.e., outpatient claims).

Table A-1. Practice Entity Types Selected for Participation in the VIT-OUD Demonstration

Entity Type	Number of Demonstration Practices (%)	Number of Demonstration Practices That Enrolled Beneficiaries, April 2021–September 2022 (%)
OTP	28 (60%)	11 (61%)
Physician/Nurse Practitioner Group Practice	9 (19%)	5 (28%)
HOP	3 (6%)	2 (11%)
FQHC	3 (6%)	0 (0%)
CCBHC	3 (6%)	0 (0%)
CMHC	1 (2%)	0 (0%)
Total	47	18

CCBHC = Certified Community Behavioral Health Center; CMHC = Community Mental Health Center; FQHC = Federally Qualified Health Center; HOP = hospital outpatient; OTP = opioid treatment program.

Not all of the 47 practices enrolled beneficiaries during the study period. After identifying practices in the claims data, CMS identified the practices that had enrolled beneficiaries in the demonstration between April 2021 and September 2022. Of the 47 participating practices, only 18 enrolled beneficiaries during this time. **Table A-1** also shows the distribution of practices that had enrolled beneficiaries.

CMS looked for demonstration practices (TINs and CCNs) in the carrier and outpatient claims, respectively, from April 2020 through March 2021. This period is the 12 months before the VIT-OUD Demonstration was implemented.

A.1.2 Identifying Potential Comparison Practices

CMS used the same carrier and outpatient claims from April 2020 through March 2021 that we used to identify demonstration practices to identify a pool of potential comparison practices. We applied the following steps:

- Identify all TINs and CCNs that met the following criteria:
  - The TIN/CCN was on at least one claim with a primary diagnosis of opioid use disorder (OUD) and
  - The TIN/CCN was on at least one claim where the practice location was within one of the states where the VIT-OUD Demonstration practices are located.

  This provided us with a set of TINs or CCNs that provided some treatment for OUD in the year before the VIT-OUD Demonstration was implemented and that were in the same states as the VIT-OUD Demonstration practices.
- Eliminate practices (TINs or CCNs) that did not overlap on entity type with the demonstration practices. **Table A-2** describes the place of service (POS), Healthcare Common Procedure Coding System (HCPCS) codes, and CCNs (referred to as provider numbers in the claims data) that were used to identify entity types.
- Identify whether any of the TINs or CCNs remaining in the pool of potential comparison practices were participating in any of the following Centers for Medicare and Medicaid Innovation (CMMI) models: Maryland Primary Care Physicians, Primary Care First, or Comprehensive Primary Care Plus using demonstration IDs. Practices participating in these CMMI models were ineligible to participate in the VIT-OUD Demonstration and were thus removed from the pool of potential comparison practices.

Table A-2. Algorithms for Identifying Entity Type on Carrier and Outpatient Claims

Entity Type	Algorithm for Identifying on Carrier Claims	Algorithm for Identifying on Outpatient Claims
OTP	POS = 58 plus HCPCS_CD = G2067–G2080 or G2215–G2216	HCPCS_CD = G2067–G2080 or G2215–G2216
Physician/Nurse Practitioner Group Practice	▪ Define as a group practice if: – There is a provider specialty code for physician or nurse practitioner on at least 50% of claim line items billed by the TIN and – At least two unique NPIs are affiliated with the TIN	Not applicable.
HOP	Not applicable	PRVDR_NUM* = 0001–0879
FQHC	POS = 50	PRVDR_NUM* = 1800–1989
CMHC	POS = 53	PRVDR_NUM* = 1400–1499, 4600–4799, or 4900–4999

* PRVDR_NUM is a 6-digit code. The first two digits represent the state where the provider is located, and the last four digits can be used to categorize the type of provider. All PRVDR_NUMs listed in this table represent the third through sixth digits of the six-digit number.

A.1.3 Creating Practice- and Geographic-Level Characteristics to Match Demonstration and Comparison Practices

Beyond matching on entity type and state, CMS attempted to match on the following practice- and geographic-level characteristics:

- Entity type (e.g., opioid treatment program [OTP], hospital outpatient department [HOP])
- State in which the practice is located
- Number of Medicare beneficiaries with OUD treated by the practice within the 12 months prior to the start of the demonstration
- Number of practitioners in the practice's service location(s) that were waived by the Drug Enforcement Agency to prescribe buprenorphine
- Number of behavioral health facilities that can prescribe or administer a medication to treat OUD (MOUD) in the practice's service location
- Indicator for whether the practice's service location(s) were only in metropolitan areas, only in nonmetropolitan areas, or in a mixture of metropolitan and nonmetropolitan areas

Matching on entity type is important because we anticipate that some entity types, such as OTPs, will have better outcomes across most measures because they have the existing staffing and other infrastructure to provide MOUDs and other ancillary services such as HIV testing.[17] We also matched on the number of beneficiaries who were treated for OUD in the 12 months prior to the VIT-OUD Demonstration. To facilitate the matching process, the number of beneficiaries who were treated for OUD in the 12 months prior to the VIT-OUD Demonstration

[17] Cohn A, Stanton C, Elmasry H, Ehlke S, Niaura R. Characteristics of U.S. substance abuse treatment facilities offering HIV services: results from a national survey. Psychiatr Serv. 2016 Jun 1;67(6):692-5. https://doi.org/10.1176/appi.ps.201500078. Epub 2016 Mar 15. PMID: 26975517.

was dichotomized. Specifically, we calculated the 75th percentile of the distribution of the number of patients treated by each practice and matched on whether the practice treated at least as many patients as the 75th percentile or less than the 75th percentile. The 75th percentile of the distribution of the number of patients treated for OUD was 23 patients. This approach captures a dimension of the practice size and baseline familiarity with treating Medicare beneficiaries for OUD. Nonprofit and for-profit providers often have different structures and service arrays that may influence their ability to impact OUD outcomes.

Practices that are in larger urban areas may have access to more resources to successfully treat patients with OUD, such as health care services to treat their comorbid conditions. Medications to treat OUD are an important aspect to control for because higher levels of supply could explain better baseline access to MOUDs in the demonstration population. The last two variables are included to capture area-level and organizational characteristics that may confound the relationships we are testing in this evaluation. A practice's service location was defined by the zip codes on the census of claims submitted by each TIN or CCN where the primary diagnosis was for OUD.

A.1.4 Matching Demonstration and Comparison Practices

Table A-3 shows that we identified 3,175 OTPs, physician/nurse practitioner group practices, or HOPs that could serve as potential comparison practices for the 18 demonstration practices that had enrolled beneficiaries in the VIT-OUD Demonstration. The comparison practices differ in some observable ways from the demonstration practices. Specifically, the proportion of comparison practices that are physician/nurse practitioner group practices or HOPs is substantially higher among comparison practices than among demonstration practices. In contrast, there are much fewer OTPs among the comparison practices than among demonstration practices. Although almost all demonstration practices are in a service location area with at least one facility that administers MOUDs, only 68% of comparison practices were in a similar service location area. Comparison practices also treated far fewer Medicare beneficiaries for OUD in the 12 months prior to the implementation of the VIT-OUD Demonstration—94% of demonstration practices had treated more than 23 beneficiaries (i.e., more than the 75th percentile) in the past 12 months, whereas only 35% of comparison practices had treated more than 23 beneficiaries in the past 12 months. Lastly, comparison practices were much more likely than demonstration practices to be nonprofit practices (54% vs. 6%), for a total of 94% of practices being for-profit organizations.

Table A-3. Characteristics of the Value in OUD Treatment Demonstration Practices and Potential Comparison Practices, Before Matching

Characteristic	Demonstration Practices, Mean/%	Potential Comparison Practices, Mean/%
N	18	3,175
Entity type:		
OTP	61%	15%
Group practice	28%	37%
HOP	11%	48%
MOUD supply in practice's service location(s):		
Any facilities that administer medications to treat OUD	94%	68%
Number of buprenorphine-waived physicians per 100,000 residents	5.99	6.76
Practice treated more than 23 beneficiaries for OUD in the past 12 months	94%	35%
Practice only operates in metropolitan areas	17%	15%

Description of the matching methods employed. CMS chose to use coarsened exact matching.[18] Although CMS tested multiple different specifications, ultimately, the following approach produced the best balance as evidenced by the smallest absolute standardized mean differences (ASMDs):

- CMS started with a matching model that exact matched on entity type and state. This model also matched on the number of beneficiaries who were treated for OUD in the 12 months prior to the implementation of the VIT-OUD Demonstration and the number of facilities in the practice's service location(s) that administered MOUDs. For the number of beneficiaries who were treated for OUD in the 12 months prior to the implementation of the demonstration, we used the 75th percentile of the practice-level distribution as a cut point. For the number of facilities in the practice's service location(s) that administered MOUDs, we used at least one facility. After this step, we found 165 comparison practices that matched to 17 of the 18 demonstration practices.
- After excluding the demonstration and comparison practices that were matched in the first pass, we then exact matched on just entity type and state. This produced an additional 17 comparison practices that matched to the single demonstration practice that was unmatched in the first step.

Matching results. Table A-4 shows that, after matching 182 comparison practices to the 18 demonstration practices, there was good balance on entity type. There were some remaining imbalances on other characteristics. However, balance improved on all characteristics except

[18] Iacus S, King G, Porro, G. Causal inference without balance checking: coarsened exact matching. Polit Anal. 2012;20(1):1-24. https://doi.org/10.1093/pan/mpr013

for metropolitan status. We tested specifications that included metropolitan status as an additional variable in the previously described first pass. However, although this approach improved balance on this one variable, it resulted in worse balance on multiple other characteristics. Therefore, we chose not to include it in the matching model. Although the remaining imbalances are not ideal, analyses at the beneficiary level tested the degree to which these covariates were correlated with each of the outcomes assessed in this report. This analysis showed almost no correlation between the outcomes and the variables with remaining imbalances. As such, it is highly unlikely that the remaining imbalances in these characteristics has had a meaningful effect on the outcome results.

Table A-4. Characteristics of the Value in OUD Treatment Demonstration Practices and Potential Comparison Practices, Before and After Matching

Characteristic	Demonstration Practices, Mean/%	Potential Comparison Practices, Mean/%	ASMD Before Matching	Matched Comparison Practices, Mean/%	ASMD After Matching
N	18	3,175		182	
Entity type:					
OTP	61%	15%	1.076	59%	.041
Physician/nurse practitioner group practice	28%	37%	.193	27%	.022
HOP	11%	48%	.888	14%	.091
Medications to treat in practice's service location(s):					
Any facilities that administer medications to treat OUD	94%	68%	.702	91%	.114
Number of buprenorphine-waived physicians per 100,000 residents	5.99	6.76	.124	5.51	.062
Number of beneficiaries treated for OUD in 12 months before demonstration is in the upper quartile	94%	35%	1.566	85%	.297
Practice only operates in metropolitan areas	17%	15%	.055	12%	.142

Interpretation: ASMD < 0.1 indicates a high level of balance between the demonstration and comparison practices.

A.2 Approach for Balancing Beneficiary-Level Characteristics

The goal of the second phase of the comparison group strategy was to identify a beneficiary comparison group. To identify a beneficiary comparison group, we undertook the following steps:

- Identified VIT-OUD Demonstration beneficiaries.
- Identified potential comparison beneficiaries.

- Created baseline and sociodemographic characteristics of the VIT-OUD beneficiary enrollees and beneficiaries who were attributed to a matched comparison practice.
- Performed 1:3 propensity score matching on baseline and sociodemographic characteristics.

A.2.1 Identifying VIT-OUD Demonstration Beneficiary Enrollees

VIT-OUD Demonstration beneficiary enrollees were identified as beneficiaries for whom the demonstration practices submitted a care management fee (CMF) claim. CMF claims are defined in the claims as those claim lines wherein:

- the TIN or CCN is associated with one of the demonstration provider participants;
- the organizational NPI is one of the NPIs that CMS approved for billing under the VIT-OUD Demonstration;
- a HCPCS code = G2172; and
- a demonstration code = 99.

For each beneficiary enrollee, we also recorded the first demonstration quarter in which they had a CMF claim.

A.2.2 Identifying Potential Comparison Beneficiaries

Comparison beneficiaries were identified as beneficiaries whom CMS could attribute to the matched comparison practices from the first phase of the comparison group strategy. Attribution was conducted on a quarterly basis. In each quarter, CMS identified beneficiaries who were receiving OUD treatment from the comparison practices and assigned beneficiaries to the practice at which they received most of their care during that quarter. If there were ties between comparison practices in terms of number of OUD treatment visits, the beneficiary was assigned to the practice where they most recently received OUD treatment within the quarter. CMS also recorded the first quarter in which each comparison beneficiary was attributed to a comparison practice. Prior to conducting this attribution, CMS excluded beneficiaries who were ever enrolled by demonstration practices. This approach ruled out the possibility of a beneficiary switching from the comparison group to demonstration group or vice versa.

A.2.3 Creating Baseline Characteristics Upon Which to Match

CMS matched beneficiaries on the following characteristics:

- Sociodemographic characteristics: age, sex, race/ethnicity, and original reason for Medicare entitlement
- Baseline clinical characteristics: Hierarchical Condition Category (HCC) risk score, number of comorbid chronic conditions, co-occurring mental health diagnoses, new or existing OUD diagnosis, baseline testing for infectious diseases, and baseline diagnosis of infectious diseases
- Coverage characteristics: Part D plan enrollment, enrollment in a low-income subsidy Part D plan, and dual eligibility for Medicare and Medicaid

- Other characteristics: baseline use of medications to treat OUD and baseline time in treatment prior to the demonstration

In addition to these characteristics, CMS also derived measures capturing baseline use of prescription opioid analgesics and benzodiazepines, baseline health care utilization and expenditure measures, and indicators for any methadone or buprenorphine use prior to enrollment.

A.2.4 Matching Beneficiaries from the Comparison Group with Those in the Demonstration Group

To match beneficiaries from the comparison group to those in the demonstration group, CMS performed 1:3 propensity score matching. Under this approach, a probit regression was used to estimate the probability that a beneficiary was in the demonstration group as a function of sociodemographic and baseline characteristics. The specific characteristics included were outcome dependent. For each outcome type, CMS assessed the extent to which each of the characteristics outlined above were correlated with the outcome. To ensure a parsimonious model specification, CMS only included characteristics that correlated with the outcome. This was important given the relatively small sample size within the demonstration group. CMS then performed 1:3 matching on the estimated propensity score, matching exactly three beneficiaries without replacement from the comparison group for each beneficiary in the demonstration group.

A.3 Propensity Score Matching Results for Questions 1, 4, and 6

Table A-5 shows the propensity score matching results for questions 1 (hospitalizations and emergency department [ED] visits), 4 (Medicare spending), and 6 (utilization of residential treatment). A single propensity score matching approach was used for all outcomes.

Table A-5. Propensity Score Matching Results for Utilization and Expenditure Outcomes

Characteristic	VIT-OUD Beneficiary Enrollees Mean/%	VIT-OUD Beneficiary Enrollees Std. Dev.	Comparison Group Beneficiaries Mean/%	Comparison Group Beneficiaries Std. Dev.	Std. Diff.
Number of beneficiaries	943		2,829		
Sociodemographic characteristics					
Aged 40 years or younger, %	11%		11%		.030
Aged 40–49 years, %	17%		18%		.029
Aged 50–59 years, %	26%		25%		.010
Aged 60–69 years, %	35%		33%		.035
Aged 70–79 years, %	10%		11%		.007
Aged 80 years or older, %	1%		1%		.025
Female, %	43%		43%		.015
Non-Hispanic White, %	74%		73%		.024
Non-Hispanic Black, %	22%		23%		.013
Hispanic, %	2%		2%		.003
Dually eligible for Medicare and Medicaid, %	74%		73%		.024
Originally eligible for Medicare due to a disability, %	81%		80%		.019
Baseline opioid and benzodiazepine use					
Opioid pain medication was prescribed within 12 months prior to enrollment, %	27%		29%		.049
Baseline OUD treatment engagement					
Diagnosed with OUD within the 12 months prior to enrollment, %	81%		80%		.014
Diagnosed with a co-occurring non-OUD SUD in the 12 months prior to enrollment, %	90%		89%		.058
Fewer than 60 days using a medication to treat OUD prior to enrollment, %	24%		21%		.063
Between 60 and 90 days using a medication to treat OUD prior to enrollment, %	6%		6%		.036
More than 90 days using a medication to treat OUD prior to enrollment, %	71%		72%		.039
Any methadone use prior to enrollment, %	46%		50%		.076
Any buprenorphine use prior to enrollment, %	34%		35%		.028

(continued)

Table A-5. Propensity Score Matching Results for Utilization and Expenditure Outcomes (continued)

Characteristic	VIT-OUD Beneficiary Enrollees Mean/%	VIT-OUD Beneficiary Enrollees Std. Dev.	Comparison Group Beneficiaries Mean/%	Comparison Group Beneficiaries Std. Dev.	Std. Diff.
Health status					
HCC risk score	1.5	1.3	1.5	0.8	.028
Number of chronic conditions	2.7	2.2	2.7	1.4	.017
Baseline health care utilization and expenditure					
Had at least one SUD-related ED visit in past 12 months, %	3%		3%		.008
Had at least one SUD-related inpatient admission in past 12 months, %	3%		2%		.054
Total expenditures per beneficiary per month	$1,185.48	$1,806.50	$1,210.82	$2,670.41	.011
Medicare Part D coverage					
Enrolled in a Medicare Part D plan, %	89%		88%		.032
Enrolled in a Medicare Part D plan with no to low subsidy, %	45%		48%		.068
Enrolled in a Medicare Part D Low-Income Subsidy (LIS) plan with 100% premium subsidy and high copayment, %	26%		28%		.034
Enrolled in a Medicare Part D LIS plan with other subsidy arrangement, %	1%		1%		.010
Provider characteristics					
OTP, %	48%		50%		.048
Physician group practice, %	47%		45%		.040
Hospital outpatient program, %	5%		5%		.019

Time frame: Data include beneficiaries who were enrolled or assigned to a comparison practice within the first six quarters after the demonstration began (i.e., April 2021 through September 2022).
Methods: 1:3 matching without replacement was conducted. A probit specification was used to estimate the propensity score. Standardized differences <.1 indicate sufficient balance.

A.4 Propensity Score Matching Results for Question 2

Tables A-6 and **A-7** show the balance in beneficiary characteristics between the demonstration and comparison groups after performing 1:3 propensity score matching. **Table A-6** presents propensity score matching results for the outcome analysis of the percentage of beneficiaries who used an MOUD within 30 days of their first visit to a demonstration or comparison practice. This outcome analysis only included beneficiaries with Medicare Part D to ensure that Medicare Part D event records were available for all included beneficiaries. **Table A-7** presents propensity score matching results for the outcome analysis of the percentage of beneficiaries who used

MOUDs continuously for at least 180 days. This outcome analysis only included beneficiaries with Medicare Part D who had received their first medication at least 180 days before December 31, 2022. Separate propensity score analyses were conducted because the samples were different across the two outcomes.

Table A-6. Propensity Score Matching Results for Percentage of Beneficiaries Who Used an MOUD Within 30 Days of Their First Visit to a Demonstration or Comparison Provider

Characteristic	VIT-OUD Beneficiary Enrollees Mean/%	VIT-OUD Beneficiary Enrollees Std. Dev.	Comparison Group Beneficiaries Mean/%	Comparison Group Beneficiaries Std. Dev.	Std. Diff.
Number of beneficiaries	835		2,505		
Sociodemographic characteristics					
Aged 40 years or younger, %	11%		11%		.015
Aged 40–49 years, %	18%		19%		.030
Aged 50–59 years, %	27%		28%		.026
Aged 60–69 years, %	33%		31%		.048
Aged 70–79, %	10%		9%		.020
Aged 80 years or older, %	1%		1%		.009
Female, %	43%		44%		.005
Non-Hispanic White, %	73%		73%		.007
Non-Hispanic Black, %	23%		22%		.013
Hispanic, %	2%		2%		.018
Dually eligible for Medicare and Medicaid, %	83%		83%		.003
Originally eligible for Medicare due to a disability, %	83%		81%		.042
Baseline opioid and benzodiazepine use					
Opioid pain medication was prescribed within 12 months prior to enrollment, %	31%		33%		.058
Baseline OUD treatment engagement					
Fewer than 60 days using a medication to treat OUD prior to enrollment, %	20%		17%		.083

(continued)

Table A-6. Propensity Score Matching Results for Percentage of Beneficiaries Who Used an MOUD Within 30 Days of Their First Visit to a Demonstration or Comparison Provider (continued)

Characteristic	VIT-OUD Beneficiary Enrollees Mean/%	VIT-OUD Beneficiary Enrollees Std. Dev.	Comparison Group Beneficiaries Mean/%	Comparison Group Beneficiaries Std. Dev.	Std. Diff.
Between 60 and 90 days using a medication to treat OUD prior to enrollment, %	6%		6%		.006
More than 90 days using a medication to treat OUD prior to enrollment, %	74%		77%		.072
Any methadone use prior to enrollment, %	46%		50%		.087
Any buprenorphine use prior to enrollment, %	38%		39%		.027
Health status					
HCC risk score	1.5	1.3	1.5	0.8	.021
Number of chronic conditions	2.8	2.2	2.8	1.4	.013
Baseline health care utilization and expenditure					
Had at least one SUD-related ED visit in past 12 months, %	3%		2%		.015
Had at least one SUD-related inpatient admission in past 12 months, %	3%		2%		.032
Medicare Part D coverage					
Enrolled in a Medicare Part D plan with no to low subsidy, %	51%		54%		.070
Enrolled in a Medicare Part D LIS plan with 100% premium subsidy and high copayment, %	30%		32%		.062
Enrolled in a Medicare Part LIS plan with other subsidy arrangement, %	1%		1%		.037
Provider characteristics					
OTP, %	47%		50%		.065
Physician group practice, %	47%		45%		.061
Hospital outpatient program, %	5%		5%		.013

Inclusion criteria: Beneficiaries with Medicare Part D coverage.
Time frame: Data include beneficiaries who were enrolled or assigned to a comparison practice within the first six quarters after the demonstration began (i.e., April 2021 through September 2022).
Methods: 1:3 matching without replacement was conducted. A probit specification was used to estimate the propensity score. Standardized differences < 0.1 indicate sufficient balance.

Table A-7. Propensity Score Matching Results for Percentage of Beneficiaries Who Used an MOUD Continuously for at Least 180 Days

Characteristic	VIT-OUD Beneficiary Enrollees Mean/%	VIT-OUD Beneficiary Enrollees Std. Dev.	Comparison Group Beneficiaries Mean/%	Comparison Group Beneficiaries Std. Dev.	Std. Diff.
Number of beneficiaries	717		2,151		
Sociodemographic characteristics					
Aged 40 years or younger, %	12%		12%		.020
Aged 40–49 years, %	20%		23%		.064
Aged 50–59 years, %	28%		27%		.023
Aged 60–69 years, %	31%		29%		.058
Aged 70–79 years, %	8%		8%		.010
Aged 80 years or older, %	0%		0%		<.001
Female, %	43%		44%		.016
Non-Hispanic White, %	76%		74%		.050
Non-Hispanic Black, %	20%		20%		.021
Hispanic, %	2%		2%		.067
Dually eligible for Medicare and Medicaid, %	83%		83%		.003
Originally eligible for Medicare due to a disability, %	83%		81%		.042
Baseline opioid and benzodiazepine use					
Opioid pain medication was prescribed within 12 months prior to enrollment, %	36%		37%		.032
Baseline OUD treatment engagement					
Fewer than 60 days using medication to treat OUD prior to enrollment, %	11%		9%		.055
Between 60 and 90 days using a medication to treat OUD prior to enrollment, %	7%		6%		.007
More than 90 days using a medication to treat OUD prior to enrollment, %	82%		84%		.051
Any methadone use prior to enrollment, %	53%		55%		.042
Any buprenorphine use prior to enrollment, %	44%		44%		.003

(continued)

Table A-7. Propensity Score Matching Results for Percentage of Beneficiaries Who Used an MOUD Continuously for at Least 180 Days (continued)

Characteristic	VIT-OUD Beneficiary Enrollees Mean/%	VIT-OUD Beneficiary Enrollees Std. Dev.	Comparison Group Beneficiaries Mean/%	Comparison Group Beneficiaries Std. Dev.	Std. Diff.
Health status					
HCC risk score	1.5	1.3	1.5	0.8	.003
Number of chronic conditions	2.8	2.2	2.7	1.6	.026
Baseline health care utilization and expenditure					
Had at least one SUD-related ED visit in past 12 months, %	3%		3%		.007
Had at least one SUD-related inpatient admission in past 12 months, %	3%		3%		<.001
Provider characteristics					
OTP, %	54%		55%		.016
Physician group practice, %	41%		41%		.003
Hospital outpatient program, %	5%		4%		.036

Inclusion criteria: Beneficiaries with Medicare Part D who had at least one prescription or claim for a medication to treat OUD at least 180 days before December 31, 2022.
Time frame: Data include beneficiaries who were enrolled or assigned to a comparison practice within the first six quarters after the demonstration began (i.e., April 2021 through September 2022).
Methods: 1:3 matching without replacement was conducted. A probit specification was used to estimate the propensity score. Standardized differences <.1 indicate sufficient balance.

A.5 Propensity Score Matching Results for Question 3

Table A-8 shows the balance in beneficiary characteristics between the demonstration and comparison groups after performing 1:3 propensity score matching for the outcome analysis of the percentage of beneficiaries with a new diagnosis of hepatitis C. This outcome analysis included only beneficiaries who had not had a hepatitis C diagnosis on any claim in the 3 years prior to enrollment or prior to being assigned to a comparison practice.

Table A-8. Propensity Score Matching Results for Percentage of Beneficiaries with a New Diagnosis of Hepatitis C

Characteristic	VIT-OUD Beneficiary Enrollees Mean/%	VIT-OUD Beneficiary Enrollees Std. Dev.	Comparison Group Beneficiaries Mean/%	Comparison Group Beneficiaries Std. Dev.	Std. Diff.
Number of beneficiaries	786		2,358		
Sociodemographic characteristics					
Aged 40 years or younger, %	10%		9%		.032
Aged 40–49 years, %	18%		20%		.067
Aged 50–59 years, %	27%		27%		.017
Aged 60–69 years, %	34%		33%		.025
Aged 70–79 years, %	9%		9%		.004
Aged 80 years or older, %	1%		2%		.025
Female, %	44%		43%		.021
Non-Hispanic White, %	74%		75%		.010
Non-Hispanic Black, %	22%		21%		.021
Hispanic, %	1%		2%		.025
Dually eligible for Medicare and Medicaid, %	71%		69%		.056
Originally eligible for Medicare due to a disability, %	81%		81%		.011
Baseline OUD treatment engagement					
Fewer than 60 days using a medication to treat OUD prior to enrollment, %	24%		22%		.066
Between 60 and 90 days using a medication to treat OUD prior to enrollment, %	5%		5%		.002
More than 90 days using medication to treat OUD prior to enrollment, %	70%		73%		.065
Any methadone use prior to enrollment, %	46%		49%		.071
Health status					
HCC risk score	1.3	1.015	1.3	0.711	.010
Number of chronic conditions	2.6	2.181	2.6	1.489	.007
Two or more co-occurring mental health conditions, %	90%		91%		.066

(continued)

Table A-8. Propensity Score Matching Results for Percentage of Beneficiaries with a New Diagnosis of Hepatitis C (continued)

Characteristic	VIT-OUD Beneficiary Enrollees Mean/%	VIT-OUD Beneficiary Enrollees Std. Dev.	Comparison Group Beneficiaries Mean/%	Comparison Group Beneficiaries Std. Dev.	Std. Diff.
Baseline health care utilization and expenditure					
Had at least one SUD-related ED visit in past 12 months, %	2%		2%		.000
Had at least one SUD-related inpatient admission in past 12 months, %	2%		2%		.025
Medicare Part D coverage					
Enrolled in a Medicare Part D plan, %	87%		86%		.051
Enrolled in a Medicare Part D plan with no to low subsidy, %	69%		71%		.030
Provider characteristics					
OTP, %	47%		50%		.059
Physician group practice, %	48%		46%		.049
Hospital outpatient program, %	5%		5%		.026

Inclusion criteria: Beneficiaries who had not had a hepatitis C diagnosis in the 3 years before they enrolled or were attributed to a comparison practice.
Time frame: Data include beneficiaries who were enrolled or assigned to a comparison practice within the first six quarters after the demonstration began (i.e., April 2021 through September 2022).
Methods: 1:3 matching without replacement was conducted. A probit specification was used to estimate the propensity score. Standardized differences < 0.1 indicate sufficient balance.

Appendix B: Question-by-Question Analytic Approach

The purpose of this appendix is to provide a research question by research question overview of the analyses that were conducted for the *Value in Opioid Use Disorder Treatment (VIT-OUD) Demonstration Evaluation: Intermediate Report to Congress*.

B.1 Did the VIT-OUD Demonstration Reduce Hospitalizations and ED Visits?

CMS modeled hospitalizations and ED visits in two ways. First, we conducted a survival analysis to determine whether there are differences between the VIT-OUD Demonstration group and the comparison group with respect to the length of time from enrollment to each type of event. This measures the percentage difference in the probability of having at least one of each type of event. CMS used propensity score matching to control for confounders. Second, hospitalizations and ED visits were modeled by comparing the average number of hospitalizations and ED visits per 1,000 beneficiaries in the post-enrollment period between the demonstration and matched comparison group.

B.2 Did the VIT-OUD Demonstration Increase Use of Medications to Treat OUDs?

MOUDs were defined to include all U.S. Food and Drug Administration–approved medications that have an indication for OUD treatment (i.e., methadone, buprenorphine, buprenorphine-naloxone, and naltrexone). Prescribed medications were captured from Part D prescription drug event data, and administered medications (e.g., methadone; long-acting injectable naltrexone) were captured as procedures on Part B medical claims, including the bundled payment codes that OTPs use.

CMS measured the use of medications to treat OUD in two ways: (1) the probability of initiating a new medication to treat OUD episode and (2) the probability of adhering to a medication to treat OUD for at least 180 days. Initiation of a new medication to treat an OUD episode was defined as having at least one prescription fill event or medication to treat OUD administration claim within 30 days from the earliest visit to a demonstration provider participant. Adherence to MOUDs for at least 180 days was measured using the National Quality Forum's continuity of pharmacotherapy measure. Both outcomes were modeled by calculating the propensity score matched difference in the percentage of beneficiaries who met each of the two outcome numerator conditions. Each matching analysis controlled for whether the beneficiaries were already receiving MOUDs prior to the beginning of the VIT-OUD Demonstration period. Other factors were controlled for and were chosen based on identifying that they were strongly correlated with the outcomes.

B.3 Did the VIT-OUD Demonstration Improve Health Outcomes of Individuals With OUD, Including by Reducing the Incidence of Infectious Diseases (Such as Hepatitis C and HIV/AIDS)?

The incidence of hepatitis C and HIV/AIDS were captured in the Medicare claims data using ICD-10 diagnosis codes (i.e., B18.2 and B20). Incidence was defined as having a diagnosis after enrolling in the VIT-OUD Demonstration or being attributed to a comparison provider *and* not having been diagnosed in the 3 years prior to enrollment. The analytic approach was the same as how we measured the impact of the demonstration on use of MOUDs. Specifically, we calculated the propensity score matched difference in incidence rate between the demonstration and comparison groups. Preliminary data on HIV/AIDS incidence, however, showed that incidence was too rare to report results related to this outcome. Specifically, we found that fewer than 11 beneficiaries in the demonstration group had HIV/AIDS incidence and reporting on cell sizes this small is not permissible under the CMS privacy policies.

B.4 Did the VIT-OUD Demonstration Increase the Total Spending on Items and Services Covered Under the Original Medicare Legislation?

The VIT-OUD Demonstration may result in reduced Medicare expenditures if beneficiaries shift their utilization from higher-cost services (e.g., inpatient care) to lower-cost services (e.g., medication treatment). However, to achieve this, CMS is providing additional payments to support expanded benefits for beneficiaries, and it is important to account for these payments in assessing the extent to which the VIT-OUD Demonstration affected Medicare expenditures. To do so, we measured total Medicare expenditures in two ways. First, we measured the net total Medicare payments across all fee-for-service (FFS) claims, excluding claims for the CMFs and performance-based incentive payments (PBIPs). Second, we used the total payments calculated in the VIT-OUD Demonstration participant's annual financial reports divided by the number of beneficiaries in the annual financial reports to estimate the per-beneficiary additional costs incurred for the VIT-OUD Demonstration. These additional costs were added as a flat dollar amount to all beneficiaries in the VIT-OUD Demonstration group within each participant's list of enrolled beneficiaries to measure a gross total Medicare payment. Lastly, because the theory of change for the VIT-OUD Demonstration is that beneficiaries are substituting high-cost services (e.g., inpatient care) for lower-cost services (e.g., peer recovery supports), we also modeled inpatient and ED expenditures. We compared averages for each of these outcomes between the demonstration group and the matched comparison group during the post-period.

B.5 Did the VIT-OUD Demonstration Reduce the Number of Deaths from Opioid Overdose?

CMS had access to the National Death Index segment for the Master Beneficiary Summary File. These data provide a record of all beneficiary deaths and ICD-10 codes to capture the cause of death and underlying multiple causes of death. CMS used data through December 2021 to identify all beneficiaries who died for any reason and those whose cause of death was from

drug poisoning and whose underlying multiple causes of death included at least one ICD-10 code specific to opioid poisoning. The 2022 files were not yet available when this report was completed. Preliminary data on mortality showed that fewer than 11 beneficiaries in the demonstration group died for any reason; therefore, we could not report this outcome.

B.6 Did the VIT-OUD Demonstration Reduce the Utilization of Residential Treatment?

CMS modeled residential treatment via a survival analysis model to determine whether there were differences between the VIT-OUD Demonstration and comparison groups with respect to the length of time from enrollment to the first residential treatment stay. CMS used propensity score matching to control for a variety of confounders.

Appendix C: Measure Specifications

The purpose of this appendix is to provide details for all outcome measure specifications.

C.1 Outcome Measure Specifications

Outcome measure specifications are presented by research question.

C.1.1 Did the VIT-OUD Demonstration Reduce Hospitalizations and ED Visits?

- **Number of hospitalizations:** This measure is defined over the entire follow-up period and measures the number of acute care hospital admissions. The count of hospitalizations was divided by the number of months that a beneficiary was observed eligible after enrollment or assignment to a comparison practice. The count was also scaled by 1,000 to represent the number of hospitalizations per 1,000 beneficiaries. Substance use disorder (SUD)-related hospitalizations were defined as those hospitalizations with a primary diagnosis of SUD.
- **Time to hospitalization:** This measure is defined over the entire follow-up period and measures the number of days from enrollment to each beneficiary's first acute care hospital admission. For beneficiaries who are not observed with an acute care hospital admission during the follow-up period, we used the number of days since they were enrolled in the VIT-OUD Demonstration (or assigned to a comparison provider).
- **Number of ED visits:** This measure is defined over the entire follow-up period and measures the number of ED visits. The count of ED visits was divided by the number of months that a beneficiary was observed eligible after enrollment or assignment to a comparison practice. The count was also scaled by 1,000 to represent the number of ED visits per 1,000 beneficiaries. We identify ED visits in the outpatient claims file as visits with a line-item revenue center code equal to 0450–0459 or 0981 (ED care). Claims were excluded from this measure if every line item has a procedure code equal to any of the following values: 70000–89999, G0106, G0120, G0122, G0130, G0202, G0204, G0206, G0235, G0252, G0255, G0288, G0389, S8035, S8037, S8040, S8042, S8080, S8085, S8092, or S9024. Claims for radiological or pathology/laboratory services only were excluded. Observation stays were identified as claims with a line-item revenue center code equal to 0760, a Current Procedural Terminology code equal to G0378, and a number of times the service is performed greater than or equal to 8 or line-item revenue center code equal to 0762 (treatment or observation room). Multiple ED visits or observation stays on a single day were counted only once. SUD-related ED visits were defined as ED visits with a primary diagnosis of SUD.
- **Time to ED visit:** This measure is defined over the entire follow-up period and measures the number of days from enrollment to each beneficiary's first ED visit. For beneficiaries without an ED visit during the follow-up period, we used the number of days since they were enrolled in the VIT-OUD Demonstration (or assigned to a comparison provider). We identified ED visits in the outpatient claims file as previously specified.

C.1.2 Did the VIT-OUD Demonstration Increase Use of Medications to treat OUD?

- **Percentage of beneficiaries who received an MOUD within 30 days of their first visit to a demonstration or comparison practice:** This is a binary variable that equals 1 if the beneficiary had at least one medication to treat an OUD event within 30 days of their earliest visit to a demonstration or comparison practice. The denominator for this variable includes beneficiaries who have Medicare Part D insurance. The numerator is set to 1 if the beneficiary had any medication to treat OUD fills or claim events within 30 days from the earliest claim with a demonstration or comparison provider during their enrollment/attribution quarter. Medication to treat OUD fills were determined by looking for National Drug Codes in the Part D event file, and the list of National Drug Codes will be based on the 2021 Healthcare Effectiveness Data and Information Set (HEDIS) medication list: OUD Treatment Medications list. Medications to treat OUD claim events will be identified by looking for claims that meet the criteria for the Alcohol and Other Drug Medication Treatment value set in the 2021 HEDIS value set directory or the OUD Weekly Drug Treatment Service set.
- **Percentage of beneficiaries who used MOUDs continuously for at least 180 days:** This is a binary variable that equals 1 if the beneficiary used MOUDs for at least 180 days continuously with no gap larger than 7 days. The denominator includes beneficiaries who had at least one claim for medication to treat OUD for OUD administration or at least one Part D event record for an MOUD prescription fill at least 180 days before the end of the measurement period (i.e., December 31, 2022).

C.1.3 Did the VIT-OUD Demonstration Improve Health Outcomes of Individuals With OUD, Including by Reducing the Incidence of Infectious Diseases (Such as Hepatitis C and HIV/AIDS)?

- **Percentage of beneficiaries with a new diagnosis for hepatitis C:** This measure is a binary variable that equals 1 if the beneficiary had any claims during the measurement period with a diagnosis code for hepatitis C: B17.10, B17.11, B18.2, Z22.52, B19.20, or B19.21. Beneficiaries with these diagnosis codes in the past 3 years were excluded.
- **Percentage of beneficiaries with a new diagnosis for HIV:** This measure is a binary variable that equals 1 if the beneficiary had any claims during the measurement period with a diagnosis code for HIV: B20, B97.35, or Z21. Beneficiaries with these diagnosis codes in the past 3 years were excluded.

C.1.4 Did the VIT-OUD Demonstration Increase Total Spending on Items and Services Covered Under the Original Medicare Legislation?

- **Total net Medicare expenditures:** This measure represents the overall net payment amounts from all inpatient and outpatient (facility and professional) claims (i.e., Part A and Part B), excluding member cost sharing. CMF payments were excluded from this measure.

- **Total gross Medicare expenditures:** This measure is defined as the total net Medicare expenditures plus the CMF payments plus PBIP payments calculated at a per beneficiary per month level.
- **Inpatient facility expenditures:** This measure represents the sum of net facility payments to a hospital for covered services during all inpatient admissions. Inpatient admissions were defined as above.
- **ED visit expenditures:** This measure represents the overall net payment amount for ED visits that did not lead to hospitalization and for observation stays. ED visits and observation stays that did not lead to a hospitalization were defined as above.

C.1.5 Did the VIT-OUD Demonstration Reduce the Utilization of Residential Treatment?

- **Time to residential treatment encounters:** This measure is defined over the entire follow-up period and measures the number of days from enrollment to each beneficiary's first residential treatment encounter. For beneficiaries without an residential treatment encounter during the follow-up period, we used the number of days since they were enrolled in the VIT-OUD Demonstration (or assigned to a comparison provider). Inpatient rehabilitation encounters were identified as inpatient claims wherein the third through sixth digits of the provider number are 3025–3099 (rehabilitation hospitals), the third digit of the provider number is "R" (rehabilitation critical access hospitals), or the third digit of the provider number is "T" (rehabilitation units). CMS explored whether any residential SUD treatment encounters could be identified. However, we found none, likely because Medicare does not cover residential SUD treatment. Residential SUD treatment encounters were identified by claims with a POS code of 55 (residential substance abuse treatment facility), a HCPCS code of H0008–H0011, or a revenue center code of 1002 (residential treatment-chemical dependency).

C.1.6 Did the VIT-OUD Demonstration Reduce the Number of Deaths from Opioid Overdose?

Although we do not report on this outcome because of data privacy concerns, we did measure the outcome and look at descriptive statistics, which is how we determined that the outcome was too rare to include in the report.

- **Opioid overdose deaths:** To measure opioid overdose deaths, we used data from the National Death Index segment of the Master Beneficiary Summary File. We then used the Centers for Disease Control and Prevention's value sets for opioid overdose deaths to categorize deaths as having been caused by opioid overdose.