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Interim Evaluation of the NJ FamilyCare 1115 Substance Use Disorder Demonstration

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August 2022

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Acknowledgments

Prepared for the New Jersey Department of Human Services. Any opinions expressed in this report are those of the authors and do not necessarily represent the view of the New Jersey Department of Human Services.

We would like to thank the New Jersey Department of Human Services for funding the evaluation of the NJ FamilyCare 1115 SUD Demonstration. We also gratefully acknowledge representatives from the New Jersey Division of Medical Assistance and Health Services, including staff in the Office of Business Intelligence, for their assistance in providing data and necessary contextual information for the preparation of this report. Finally, we would like to thank our CSHP colleagues Jose Nova, Bram Poquette, Margaret Koller, and Joel C. Cantor for their help on this project.

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Executive Summary

The five-year NJ FamilyCare SUD Demonstration began on October 31, 2017 with the goal of bringing a full continuum of evidence-based care to beneficiaries with opioid use disorder or substance use disorder (OUD/SUD) in an effort to improve accessibility, treatment quality, and health outcomes for this population. This interim report presents preliminary quantitative findings from analysis of utilization, quality, and cost metrics to measure the State's progress towards the Demonstration goals. It provides evidence needed to assess the following evaluation Research Question (RQ) enumerated in the Special Terms and Conditions of the §1115 Comprehensive Demonstration (CMS 2017a):

(a) What is the impact of providing substance use disorder services to Medicaid beneficiaries? (b) Including paying for services rendered in an Institution for Mental Disease (IMD)?

Using Medicaid fee-for-service (FFS) claims and managed care encounter data over 2016-2019, we calculated outcome measures aligned with six hypotheses. We also analyze patterns and trends in Medicaid costs associated with the OUD/SUD demonstration to determine whether it results in higher, lower, or unchanged health care spending. We use secondary data from NJCARES and the CDC on overdose death rates in NJ in this interim report until data on overdose deaths specifically for the Medicaid population are available from the State.

We present descriptive statistics on trends and then examine the OUD/SUD demonstration impact using two regression modeling techniques. For evaluating the overall impact of the Demonstration (RQa) on the entire population of beneficiaries with OUD/SUD based on outcomes that are only defined for this population and thus, precluding a comparison group, we use segmented regression analysis (SRA) modeling. The SRA examines whether there is a change in outcome level (immediately following the policy implementation) and, additionally, whether there is a change in trend over the Demonstration period. Based on these levels and trends, we also assess what the counterfactual outcome (without the policy implementation) would have been at the end of the study period and compare this to the observed outcome to identify the overall policy effect. When examining the overall effect of the OUD/SUD program (RQa) on

outcomes which are not restricted to individuals with SUD, we employ difference-in-differences estimation (DD) with a propensity score matched comparison group. We used Medicaid recipients with behavioral health conditions, but not OUD/SUD, as a comparison group in DD models. When we examined the effect of the policy eliminating the IMD exclusion for SUD services (RQb), we also utilize the DD framework. We classified beneficiaries between ages 55-64 with OUD/SUD as the intervention group and beneficiaries between ages 65-75 with OUD/SUD as a comparison group.

Below we report key findings by each outcome measure. **Except for *Use of Opioids at High Dosage* and the NJ overall overdose death rates, for which only descriptive analyses could be conducted, all findings summarized here are based on regression analyses adjusting for beneficiary characteristics.**

Initiation and Engagement of Alcohol or Other Drug Treatment

Overall SUD Demonstration Impact:

- By the end of 2019 we estimate an increase in the probability of initiating SUD treatment (0.6 pp increase) and OUD treatment (1.8 pp increase) compared to what there would have been without the SUD demonstration. However, these changes are not statistically significant.
- By the end of 2019 there is a decrease in the probability of engagement in SUD treatment (-1.1 pp) and an increase in the probability of engagement in OUD treatment (1.0 pp) compared to what there would have been without the SUD demonstration. Neither of these changes are statistically significant.

Medication Assisted Treatment

Overall SUD Demonstration Impact:

- There is no significant effect of the SUD Demonstration on the level of MAT immediately following implementation of the first major Demonstration policy in July 2018, but there is a statistically significant ($p<0.05$), but small, increase in the MAT utilization trend over the subsequent six quarters.
- The combined effect of both the level and trend changes was significant ($p<0.05$). By the end of 2019 that amounts to a 0.9 pp increase in the percentage of beneficiaries with SUD using MAT compared with what there would have been without the SUD Demonstration.

Impact of Removal of IMD Exclusion:

- The removal of the IMD exclusion is associated with an increase in the proportion of Medicaid beneficiaries with SUD age 55-64 utilizing MAT by 6.4 pp. This increase is statistically significant ($p<0.001$).

Follow-up after Emergency Department Visit for Alcohol or Other Drug (AOD) Use

Overall SUD Demonstration Impact:

- There is no significant effect of the SUD demonstration on the level or trend of 7-day follow up visits.
- There is a small increase in the rates of 30-day follow-up visits (marginally statistically significant ($p< 0.1$)) immediately following implementation of the demonstration policy in July 2018 (increase in level). However there was no significant effect on trend over the subsequent six quarters after the policy implementation.
- The joint effect of both level and trend changes was not significant in 7-day and 30-day follow up rates. By the end of 2019, the net change in the rates of 7-day and 30-day follow up was 0.6 pp and 1.0 pp higher than there would have been without the SUD demonstration, although this was not statistically significant.

Impact of Removal of IMD Exclusion:

- The IMD exclusion removal increased the proportion of beneficiaries age 55-64 with SUD (relative to a comparison group of beneficiaries 65-75) who had a follow up visit after their ED visit within both 7-days (1.3 pp increase in quarter) and 30-days (2.4 pp increase in quarter); however, neither of the effects were statistically significant.
- Our test of pre-demonstration trends shows there is a significant difference in trends of quarterly rates of 30-day follow up between beneficiaries age 55-64 and those age 65-75 ($p<0.05$). Accordingly, based on the estimated DD coefficient, we may be underestimating the effect of removing the IMD exclusion on rates of follow-up after ED visit for AOD.

Use of Opioids at High Dosage

The following are descriptive, unadjusted results which may not reflect policy effects:

- Overall, the proportion of adults prescribed opioids and using high doses of opioids show a small decrease (-1.5 pp) in 2018-2019 following the start of the SUD Demonstration compared to 2016-2017.
- A t-test of differences in proportions of beneficiaries using high doses of opioids in year 2016-2017 compared to 2018-2019 showed that the decrease was statistically significant ($p<0.05$).

Overdose Deaths – NJ overall

The following are descriptive, unadjusted results which may not reflect policy effects:

- The overall deaths, including deaths involving opioids, stimulants and psychoactive drugs, increased 35.5% from 2016 to 2018. In 2019, there was a small decrease (-3.1%) in the overall deaths compared to the previous year.

- The number of deaths involving prescription opioids in NJ decreased by 11.8% from 2018 to 2019. Moreover, the age-adjusted death rate per 100,000 population decreased by 13.8% from 2018 to 2019 and this decrease was statistically significant.
- Deaths involving fentanyl showed a very small increase from 2018 to 2019 (+1.0%) compared to increases from 2016 to 2017 (+74.7%) and from 2017 to 2018 (+55.7%).
- For deaths involving fentanyl analogs, there was a sharp increase from 2016 to 2017 (+267.1%) followed by a small increase (+12.8%) from 2017 to 2018. In 2019, the number of deaths involving fentanyl analogs decreased by 35.5%.

Inpatient Stays for OUD and SUD

Overall SUD Demonstration Impact:

- There is no significant effect of the SUD demonstration program on the level or trend in inpatient (IP) stays for SUD.
- There was a small but significant decrease ($p<0.05$) in the level of IP stays for OUD after policy implementation (-0.007 pp in a quarter), but no significant change in the IP stays trend in the six quarters following the policy implementation.

Impact of Removal of IMD Exclusion:

- The removal of the IMD exclusion decreased the probability of SUD-related IP stays in Medicaid beneficiaries age 55-64 by 0.4 pp in a quarter. However, this change is not statistically significant.
- The removal of the IMD exclusion triggered a small decrease in the probability of an OUD-related IP stay in Medicaid beneficiaries age 55-64 (-0.02 pp in a quarter), but this decrease was not statistically significant.

Emergency Department Visits for OUD and SUD

Overall SUD Demonstration Impact:

- There was a small and significant decrease of 0.03 pp in the probability of an SUD-related ED visit per person per quarter (a change in level) ($p<0.01$) after the first major policy of the SUD Demonstration went into effect.
- There is a very small and marginally significant increase in the SUD ED visits trend over the subsequent six quarters following the policy implementation.
- The joint effect of both level and trend changes was also statistically significant for SUD ED visits ($p<0.01$), amounting to a cumulative, though not statistically significant, net change of 0.01 pp higher probability of an SUD-related ED visit per quarter at the end of the study period in December 2019, compared to what there would have been without the SUD demonstration.

- There was a small and non-significant decrease in the level of OUD-related ED visits and a non-significant increase in the OUD ED visits trend in the six quarters following the policy implementation.
- The combined effect of level and trend changes was not significant for OUD-related ED visit rates.

Impact of Removal of IMD Exclusion:

- The effect of lifting the IMD exclusion on the rate of SUD-related ED visits in Medicaid beneficiaries age 55-64 compared to beneficiaries age 65-74 was not statistically significant (+ 0.07 pp per quarter).
- The removal of the IMD exclusion is associated with a small decrease in the likelihood of OUD-related ED visits in Medicaid beneficiaries age 55-64 (-0.08 pp per quarter), but this decrease is not statistically significant.

30-Day Readmissions

Overall SUD Demonstration Impact:

- The SUD Demonstration slightly increased the 30 day readmission rate in Medicaid beneficiaries with SUD by 0.6 pp in quarter, but this increase is not statistically significant.
- Our test of pre-trends shows a significant difference in pre-Demonstration trends between beneficiaries with SUD and the comparison population ($p<0.01$). Our finding of slightly increased readmission rates may be underestimated in terms of magnitude.

Impact of Removal of IMD Exclusion:

- The removal of the IMD exclusion increased the proportion of Medicaid beneficiaries with SUD age 55-64 who had a 30 day readmission by 1.5 pp, but this increase was not statistically significant.

Avoidable Inpatient Hospitalizations

Overall SUD Demonstration Impact:

- The SUD demonstration slightly decreased the rate of avoidable hospitalizations by 0.4 per 1,000 beneficiaries with SUD in a quarter; however, this decline is not statistically significant.

Avoidable Emergency Department Visits

Overall SUD Demonstration Impact:

- The impact of the SUD demonstration program on the rate of avoidable ED visits was an increase of 9.8 avoidable ED visits per 1,000 beneficiaries with SUD in a quarter. This change was statistically significant ($p<0.05$).

- Our test of pre-demonstration trends shows a statistically significant small difference in trends between beneficiaries with SUD and those in the comparison group ($p< 0.05$). Our finding of an increase in avoidable ED visits may be underestimated in terms of magnitude.

Cost of Care Drivers

Overall SUD Demonstration Impact:

- In adjusted analyses, costs related to treatment in an IMD increased under the Demonstration while costs for other SUD treatment decreased. Both of these changes were statistically significant.
- In adjusted analyses, outpatient costs, both for ED and non-ED components, also show decreases as a result of the Demonstration through the end of 2019.

Summary

The table below summarizes the direction and statistical significance of computed effects of the OUD/SUD Demonstration based on all of the treatment and utilization measures analyzed in this report. A "+" means the direction of the estimated impact indicates an improvement, while "-" means the direction of the estimated impact indicates a worsening. Blue shading indicates level of significance (darker shade: $p<0.05$ and lighter shade $p<0.1$). Lack of any shading indicates that there was no statistical significance.

Summary of Treatment and Utilization Measure Regression Results

Measure	RQ(a)		RQ(b)
	Level	Trend	
Hypothesis 1: Rates of identification, initiation and engagement in treatment for OUD and other SUDs will increase as a result of the OUD/SUD program.			
Initiation of SUD Treatment	+	+	n/a
Engagement in SUD Treatment	+	-	n/a
Initiation of OUD Treatment	-	+	n/a
Engagement in OUD Treatment	+	-	n/a
Hypothesis 2: Rates of adherence to, and retention in treatment for OUD and other SUDs, overall and for individuals aged 21-64, will increase as a result of the OUD/SUD program.			
Use of Medication Assisted Treatment	+	+	+
7-day Follow-up After ED Visit for AOD	+	+	+
30-day Follow-up After ED Visit for AOD	+	+	+
Hypothesis 3: Overdose deaths, particularly those due to opioids, will decline overall and for individuals aged 21-64 as a result of the OUD/SUD program.			
Use of Opioids at High Dosage	+		n/a
Death[1]	+		data not available yet
Hypothesis 4: Utilization of emergency departments and inpatient hospital settings for OUD and other SUD treatment where the utilization is preventable or medically inappropriate through improved			

Measure	RQ(a)		RQ(b)
	Level	Trend	
access to other continuum of care services will decline overall (including individuals aged 21-64) as a result of the OUD/SUD program.			
Inpatient Stays for SUD	+	-	+
Inpatient Stays for OUD	+	-	+
ED Visits for SUD	+	-	-
ED Visits for OUD	+	-	+
Hypothesis 5: Readmissions to the same or higher level of care where readmission is preventable or medically inappropriate for individuals with OUD and other SUD will decline overall (including individuals aged 21-64) as a result of the OUD/SUD program.			
30-day Hospital Readmissions	-		-
Hypothesis 6: Access to care for physical health conditions among beneficiaries with OUD or other SUDs will improve as a result of the OUD/SUD program.			
Avoidable Inpatient Hospitalizations	+		n/a
Avoidable ED Visits	-		n/a

Notes: RQ=Research Question; Research Question: (a) What is the impact of providing substance use disorder services to Medicaid beneficiaries? (b) Including paying for services rendered in an institution for mental disease (IMD)?
"+" means direction of the estimated impact indicates either no effect or an improvement; "-" means direction of the estimated impact indicates a worsening; $p<0.1$; $p<0.05$. Lack of any shading indicates there was no statistical significance.
[1]Available data are for NJ overall, and not specifically for Medicaid beneficiaries.
[2]Significance of the result is based on a t-test for the difference in proportion of the beneficiaries with high-dose opioid prescriptions pre- and post- policy implementation (2016-17 vs 2018-19).

The table below summarizes the direction and statistical significance of computed effects of the OUD/SUD Demonstration on each of the cost drivers analyzed in this report. A "↑" means costs increased, while "↓" means costs decreased.

Summary of Cost Measure Regression Results

Cost Measures	Direction of Change
Total	↓
Total federal	↓
SUD Cost Drivers	
SUD-IMD	↑
SUD-Other	↓
Non-SUD	↑
Source of Care Cost Drivers	
Outpatient, non-ED	↓
Outpatient, ED	↓
Inpatient	↓
Pharmacy	↑
Long-term care	↓

"↑" means increase in costs; "↓" means decrease in costs; $p<0.1$; $p<0.05$. Lack of any shading indicates no statistical significance.

Conclusions

These analyses provide preliminary evidence regarding the effects of New Jersey's 1115 SUD Demonstration. The majority of statistically significant findings are in a direction consistent with the Demonstration goals and support the conclusion that, overall, there are positive outcomes of the policy changes implemented under the SUD Demonstration. The one notable exception is avoidable ED visits for non-SUD related reasons, which show an increase among the population with SUD. However, improvements in this outcome are hypothesized to occur in the longer-term, beyond the time period examined in this interim report. When specifically examining the impact of lifting the IMD exclusion on outcomes for the non-elderly adult population, most findings, though not statistically significant, support the positive impact of this change.

There are a number of notable limitations in our analyses. We have a short post period following implementation of Demonstration policies and the robustness of findings will require testing alternative modeling specifications, adjustments for significant differences in pre-Demonstration trends in outcomes, as well as ongoing validations of claims-based metrics. We also anticipate refinements to our cost analysis with the incorporation of administrative costs and a qualitative assessment of pre-Demonstration non-Medicaid costs. Finally, stakeholder interviews will help contextualize our findings, an even more important component given that subsequent Demonstration years covered in the final report will reflect the impacts of the COVID-19 pandemic.

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Introduction

Under the NJ FamilyCare 1115 Comprehensive Demonstration, the New Jersey Division of Medical Assistance and Health Services (DMAHS) participated in an initiative for addressing the opioid use disorder/substance use disorder (OUD/SUD) crisis in the State. The five-year NJ FamilyCare OUD/SUD Demonstration began on October 31, 2017 with the goal of bringing a full continuum of evidence-based care to beneficiaries with OUD/SUD in an effort to improve accessibility, treatment quality, and health outcomes for this population.

The Implementation Plan for New Jersey's OUD/SUD program was approved by the Centers for Medicare & Medicaid Services (CMS) on May 17, 2018 (DMAHS 2018a). In this plan, the State details the overall goals of the OUD/SUD program. They are:

1. Increase the rates of identification, initiation and engagement in treatment for OUD and other SUDs;
2. Increase adherence to, and retention in, treatment for OUD and other SUDs;
3. Reduce overdose deaths, particularly those due to opioids;
4. Reduce utilization of emergency departments and inpatient hospital settings for OUD and other SUD treatment, where the utilization is preventable or medically inappropriate;
5. Reduce preventable, or potentially preventable, readmission to the same or higher level of care for OUD and other SUD; and
6. Improve access to care for physical health conditions among beneficiaries with OUD or other SUDs.

The Rutgers Center for State Health Policy (CSHP) was engaged to evaluate New Jersey's 1115 OUD/SUD Demonstration. In this draft interim evaluation report, we present progress on proposed evaluation activities from the approved evaluation plan (CMS 2019). This includes preliminary quantitative findings from analysis of utilization, quality, and cost metrics which are intended to measure the State's progress towards the Demonstration goals.

Background

The implementation of New Jersey's OUD/SUD Demonstration is governed by milestones prescribed by CMS (CMS 2017a; 2017b). These milestones require the State to:

1. Establish new benefits for access to critical levels of care for OUD/SUDs;
2. Establish requirements for evidence-based, SUD-specific patient placement criteria to govern providers' assessments of beneficiaries and guide utilization management;
3. Establish residential treatment provider qualifications using evidence-based, SUD program standards and require that residential treatment providers offer access to Medication Assisted Treatment (MAT), and ensure provider compliance with standards of care;
4. Assess provider capacity at each level of care (including MAT for OUD) and develop a plan for addressing any identified gaps;
5. Implement comprehensive treatment and prevention strategies to address opioid abuse and OUD via prescribing guidelines, access to Naloxone, and an SUD Health Information Technology (IT) Plan for prescription drug monitoring;
6. Develop and implement policies to improve transitions between levels of care and improve care coordination between residential/inpatient facilities and community supports.

The timeframes laid out in the Demonstration's Special Terms and Conditions (STCs) (CMS 2017a) required completion of Milestones 1-5 within 24 months of Demonstration approval on October 31, 2017. Milestone 6 is to be carried out over the course of the five-year demonstration period.

To allow for the flexibility and innovation needed to craft a successful program for addressing OUD/SUD in Medicaid, the State was provided waiver authority by CMS to make key service delivery changes. Due to an existing federal policy, only Medicaid members ages 18 to 20 and 65 or older were covered for both detox-rehabilitative services and short-term residential treatment (STR) in an Institution for Mental Disease (IMD). Any hospital, nursing facility, or other institution with more than 16 beds caring for individuals where the majority (over 50%) have a diagnosis of mental disease qualifies as an IMD, thus severely limiting the bed capacity in the state available for treatment of Medicaid beneficiaries with OUD/SUD aged 21-64. These individuals had to self-pay or access state funding for treatment, which entailed waiting for a bed in one of only four facilities statewide. The result was delayed treatment admission for withdrawal management services that are vital to the continuum of care in New Jersey. Subsequent to approval of the SUD Demonstration on October 31, 2017, gaps in the care continuum, like the IMD exclusion, could

be closed. Specifically, the State was granted waiver authority to make these service delivery changes (DMAHS 2018a):

1. Remove the exclusion prohibiting withdrawal management or residential treatment services delivered in an IMD;
2. Add long-term residential treatment, including treatment in an IMD, as a new level of care in the OUD/SUD service continuum;
3. Add peer recovery support specialist and case management programs to the benefit package for individuals with OUD/SUD;
4. Move to a managed care delivery system with integrated physical and behavioral health services, with gubernatorial approval, over the course of the five year demonstration under an amendment to the waiver.

Consistent with their Implementation Plan, the first three of these service delivery changes and other benefits for OUD/SUD treatment were operationalized by the State during the years of the Demonstration covered by this interim report. New Jersey received approval from CMS in May 2018 to receive federal financial participation (FFP) for NJ Medicaid recipients residing in IMDs (DMAHS 2018a) and implemented the approval for Short-term Residential (STR) and Residential Withdrawal Management (RWM) claims with service dates on or after July 1, 2018. Long Term Residential (LTR) services were added as a Medicaid service on October 1, 2018 with no IMD exclusion for FFP (DMAHS 2018b).

Office Based Addictions Treatment (OBAT) became available to Medicaid beneficiaries through managed care plans and fee-for-service providers effective January 1, 2019, and without prior authorization for Medication Assisted Treatment (MAT) as of April 1, 2019 (DMAHS 2019). Under OBAT, providers must offer navigator services to help beneficiaries address non-medical factors related to SUD. The State offers free training for providers on navigator services and has partnered with Centers for Excellence (COE) in the northern and southern parts of the state. These COEs are comprehensive providers of addiction treatment and serve as resources to the community and mentors/trainers of other providers through the OBAT program.

Under a State Plan Amendment (SPA) approved December 11, 2019, but effective July 1, 2019, Independent Clinic Drug and Alcohol providers of Outpatient SUD treatment could be reimbursed on a fee-for-service basis for peer recovery support specialist (PRSS) services (DMAHS 2020). Under the supervision of a licensed clinical professional, a Certified Peer Recovery Specialist provides non-clinical assistance and support throughout all stages of the SUD recovery and rehabilitation process. Peer services must be coordinated within the context of a care plan that is developed by a licensed clinician. Additionally, effective July 1, 2019 and subsequent to

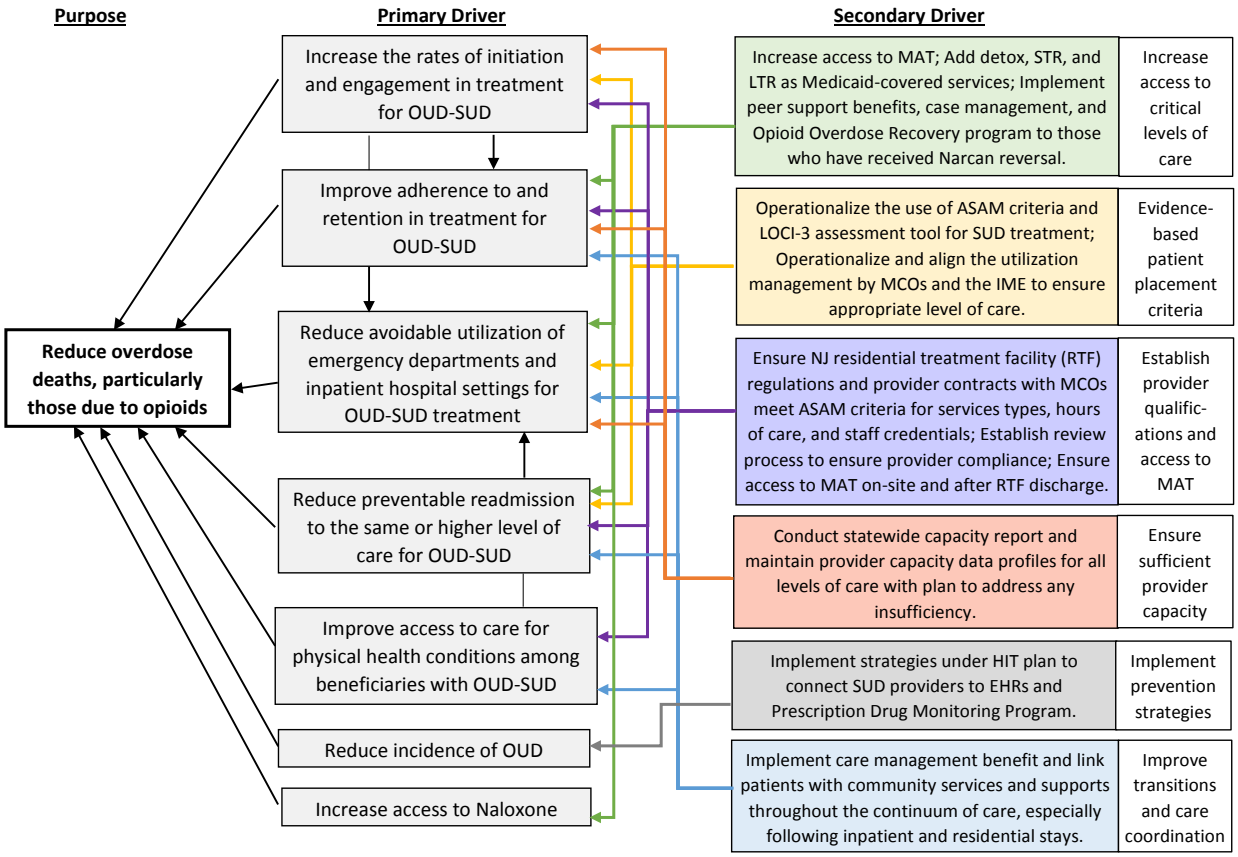
approval of a November 11, 2019 SPA, reimbursement for the Opioid Overdose Recovery Program (OORP) began. OORP deploys peer recovery specialists to hospital emergency departments where they can engage overdose survivors in treatment services. Finally, on October 1, 2019 case management for certain qualifying high need adults with SUD began as a State-funded service, pending SPA approval before becoming part of the Medicaid service package.

These service delivery changes complement additional activities and policies enacted by the State under the OUD/SUD program in accordance with the State's Implementation Plan. Briefly, these include:

- Operationalizing the use of American Society for Addiction Medicine (ASAM) criteria and the LOCI-3 assessment tool for SUD treatment;
- Operationalizing and aligning the utilization management by managed care organizations and the Interim Managing Entity (IME) to ensure the appropriate level of care;
- Ensuring NJ residential treatment facility (RTF) regulations and provider contracts with MCOs (managed care organizations) meet ASAM criteria for services types, hours of care, and staff credentials and establishing a review process to ensure provider compliance;
- Ensuring access to MAT on-site and after RTF discharge;
- Conducting a statewide capacity report and maintaining provider capacity data profiles for all levels of care with a plan to address any insufficiency;
- Implementing strategies under the Health IT plan to connect SUD providers to EHRs and the Prescription Drug Monitoring Program;
- Utilizing and expanding training and use of Naloxone to reverse overdoses; and
- Implementing an Opioid Overdose Recovery program to those who have received Narcan reversal.

All together, these changes under the Demonstration enable New Jersey to achieve the programmatic milestones and ultimately, the goals described above. The links between the milestones and goals are shown in the following driver diagram which was presented in our evaluation plan and which informs our analytic approach. This diagram depicts this relationship between the service delivery changes that fulfill each milestone (secondary drivers), the care and treatment goals they are intended to impact (primary drivers), and the overall purpose of the OUD/SUD Demonstration, which is to reduce deaths due to drug overdose.

Driver Diagram for NJ OUD/SUD Program



Research Questions and Hypotheses

The STCs set forth the following research question (RQ) having two components (a) and (b) relevant to the OUD/SUD program:

(a) What is the impact of providing substance use disorder services to Medicaid beneficiaries? (b) Including paying for services rendered in an Institution for Mental Disease (IMD)?

In this evaluation, hypotheses aligning with the overall goals of the OUD/SUD initiative will be tested to answer this research question.

Hypothesis 1: Rates of identification, initiation and engagement in treatment for OUD and other SUDs will increase as a result of the OUD/SUD program.

Hypothesis 2: Rates of adherence to, and retention in treatment for OUD and other SUDs, overall and for individuals aged 21-64, will increase as a result of the OUD/SUD program.

Hypothesis 3: Overdose deaths, particularly those due to opioids, will decline overall and for individuals aged 21-64 as a result of the OUD/SUD program.

Hypothesis 4: Utilization of emergency departments and inpatient hospital settings for OUD and other SUD treatment where the utilization is preventable or medically inappropriate through improved access to other continuum of care services will decline overall (including individuals aged 21-64) as a result of the OUD/SUD program.

Hypothesis 5: *Readmissions to the same or higher level of care where readmissions is preventable or medically inappropriate for individuals with OUD and other SUD will decline overall (including individuals aged 21-64) as a result of the OUD/SUD program.*

Hypothesis 6: *Access to care for physical health conditions among beneficiaries with OUD or other SUDs will improve as a result of the OUD/SUD program.*

These hypotheses are evaluated for the overall OUD/SUD program. Select outcomes for a subset of hypotheses (e.g. 2, 3, 4 and 5) are also separately assessed to isolate the impact of removing the IMD exclusion on beneficiaries ages 21-64.

Methods

Data Sources

The analyses in this report were generated using Medicaid fee-for-service (FFS) claims and managed care encounter data and recipient enrollment files to create population indicators, utilization, quality, and cost measures for calendar years 2016-2019. All utilization and spending estimates reflect claims adjustments and updates through a minimum of 6 months from the date of service. We also use the publicly available New Jersey Coordinator for Addiction Responses and Enforcement Strategies (NJ CARES) (NJDLPS 2021) and the Centers for Disease Control's National Center for Health Statistics (CDC/NCHS) National Vital Statistics System online dashboards for estimates of overdose deaths in New Jersey (CDC 2021) in 2016-2019.

Claims-based Measures

Our evaluation plan identified an inventory of candidate measures which would reflect effects of the service delivery changes under each of the OUD/SUD program milestones. These measures included nationally-recognized quality measures such as the National Committee for Quality Assurance's (NCQA) Healthcare Effectiveness Data and Information Set (HEDIS) and measures developed by CMS specifically for State monitoring of SUD Demonstrations. The first aim of our

evaluation strategy was to identify the subset of these measures that would address each hypothesis, would be most relevant to the Demonstration goals and policy changes implemented in NJ's demonstration, and would be feasible to construct in our Medicaid claims database. We conferred informally with stakeholders and State subject matter experts, reviewed technical specifications for SUD Demonstration monitoring metrics, and conducted a review of the peer-reviewed and gray literature to identify the measures being used by researchers to measure quality of care for individuals with substance use disorder.

For this interim report, we calculated nine treatment/utilization measures and the spending measures required for the cost analysis. Table A lists and describes these measures along with the hypotheses and drivers with which they are aligned. Measures 2, 6, 7, and 9-14 are population-based and calculated for all eligible beneficiaries over each enrolled quarter. Measures 1, 3 and 8 are based on index events and the resulting estimate is a percentage of all index events meeting the outcome criteria. Measure 4 is recipient-level annual measure and the resulting estimate is a percentage of all recipients meeting the outcome criteria. Measure 5 is an annual measure from secondary data sources. Appendix A contains additional details on the preparation of each of the claims-based measures.

For our final evaluation report, we may expand upon this list. Use of peer services is a measure of interest which is not part of the State's monitoring metrics. Peer services were not implemented until the end of 2019 and there were billing issues that needed to be resolved. Therefore, this measure could not be done for this interim report. Additionally, we are working on the HEDIS measure *Transitions of Care – Patient Engagement after Hospital Discharge* which could take the place of our current 30-day all-cause hospital readmission measure to reflect care coordination. We see value in creating an SUD-specific readmission metric, but doing so is contingent on finding appropriate and valid specifications to follow. As of now the specifications for State monitoring metrics do not include instructions for this candidate metric we proposed in our evaluation plan. The Use of Opioids from Multiple Providers metric could not be calculated until our claims data extract was modified to include prescriber NPI information. This was done for data received going forward starting with year 2020, but has not been built in retrospectively. Therefore, this measure could not be considered for this interim report. Finally, we had proposed examining mortality using claims data for beneficiaries with OUD/SUD as a potential outcome measure, but this measure would not be specific to overdose deaths and would eventually capture COVID-related mortality as well. Therefore, data on mortality due to drug overdose, anticipated to be available from the State Medical Examiner for the final evaluation, was a preferred measure.

Reporting Criteria

Estimates are suppressed if they are not based on sufficient sample sizes. For all measures, estimates are not shown if the numerator is between 1 and 10 or the denominator is less than 30.

Table A: OUD/SUD Program Evaluation Measures

#	Measure	Steward/ NQF #	Numerator	Denominator	Drivers
Treatment/Utilization					
	Hypothesis 1: Rates of identification, initiation and engagement in treatment for OUD and other SUDs will increase as a result of the OUD/SUD program.				
1	Initiation and Engagement of Alcohol and Other Drug Dependence Treatment	NCQA; NQF #0004	Initiation: Number of persons who initiate treatment through an inpatient admission, outpatient visit, intensive outpatient encounter, or partial hospitalization within 14 days of the index episode start date. Engagement: Number of persons with initiation of treatment and two or more additional services for treatment within 30 days of the initiation encounter.	Medicaid recipients age 13 or older diagnosed with a new episode of AOD dependency	-Use evidence-based, SUD-specific patient placement criteria; -Establish evidence-based residential treatment provider qualifications; -Ensure access to MAT on-site and after discharge; -Ensure sufficient provider capacity at each level of care
	Hypothesis 2: Rates of adherence to and retention in treatment for OUD and other SUDs, overall and for individuals aged 21-64, will increase as a result of the OUD/SUD program.				
2	Use of critical levels of care for OUD/SUD	CMS/ Mathematica	Number using MAT services	Medicaid recipients with OUD/SUD	-Increase access to critical levels of care; -Establish evidence-based residential treatment provider qualifications; -Ensure access to MAT on-site and after discharge;

#	Measure	Steward/ NQF #	Numerator	Denominator	Drivers
					-Ensure sufficient provider capacity at each level of care
3	Follow-up after Discharge from Emergency Department for Alcohol or Other Drug Dependence	NCQA	Number with a follow-up visit within 7 and/or 30 days of the ED visit.	ED visits by Medicaid recipients age 13 or older with a principal diagnosis of AOD abuse or dependence	-Increase access to critical levels of care; -Establish evidence-based residential treatment provider qualifications; -Ensure access to MAT on-site and after discharge; -Ensure sufficient provider capacity at each level of care; -Improve care coordination and transitions between levels of care
	Hypothesis 3: Overdose deaths, particularly those due to opioids, will decline overall and for individuals aged 21-64 as a result of the OUD/SUD program.				
4	Use of Opioids at High Dosage in Persons Without Cancer	NCQA with permission from Pharmacy Quality Alliance; NQF #2940	Number with opioid prescription claims where the morphine equivalent dose for 90 consecutive days or longer is greater than 90 mg	Medicaid recipients age 18 and older with two or more prescription claims for opioids filled on at least two separate days, for which of the sum of the days' supply is $\geq$ 15.	-Implement comprehensive prevention strategies to address opioid abuse via prescribing guidelines and monitoring
5	Rate of all and OUD overdose deaths[1]	N/A	Number of overdose deaths by drug type	NJ residents	-Increase access to critical levels of care; -Use evidence-based SUD-specific patient placement criteria; -Establish evidence-based residential treatment provider qualifications -Ensure access to MAT on-site and after discharge;

#	Measure	Steward/ NQF #	Numerator	Denominator	Drivers
					-Ensure sufficient provider capacity at each level of care; -Implement comprehensive prevention strategies to address opioid abuse via prescribing guidelines and monitoring; -Improve care coordination and transitions between levels of care
	Hypothesis 4: Utilization of emergency departments and inpatient hospital settings for OUD and other SUD treatment where the utilization is preventable or medically inappropriate through improved access to other continuum of care services will decline overall and for individuals aged 21-64 as a result of the OUD/SUD program.				
6	Rate of emergency department visits for SUD-related diagnoses and specifically for OUD	CMS/ Mathematica	Number of ED visits for: • SUD • OUD	Medicaid recipients	-Increase access to critical levels of care; -Use evidence-based SUD-specific patient placement criteria; -Ensure sufficient provider capacity at each level of care; -Improve care coordination and transitions between levels of care
7	Rate of Inpatient admissions for SUD and specifically OUD	CMS/ Mathematica	Number of IP visits for: • SUD • OUD	Medicaid recipients	
	Hypothesis 5: Readmissions to the same or higher level of care where readmissions is preventable or medically inappropriate for individuals with OUD and other SUD will decline overall and for individuals aged 21-64 as a result of the OUD/SUD program.				
8	30-day all-cause hospital readmissions among beneficiaries with SUD and specifically OUD	CMS; NQF #1789	Number of readmissions	Acute inpatient discharges by Medicaid recipients age 18 and older with SUD and separately OUD[2]	-Improve care coordination and transitions between levels of care
	Hypothesis 6: Access to care for physical health conditions among beneficiaries with OUD or other SUDs, will improve as a result of the OUD/SUD program.				
9	PQI/PDI rate among individuals with OUD/SUD (AHRQ)	AHRQ	Number of hospitalizations for ambulatory care sensitive conditions	Medicaid recipients age 6 and older with OUD/SUD	-Establish evidence-based residential treatment provider qualifications;

#	Measure	Steward/ NQF #	Numerator	Denominator	Drivers
10	Avoidable ED visits for individuals with OUD/SUD	NYU[3]	Number of avoidable ED visits	Medicaid recipients with OUD/SUD	-Improve care coordination and transitions between levels of care
Costs					
11	SUD-IMD costs	CMS/ Mathematica	Total costs of claims for inpatient/residential treatment within IMDs	Medicaid recipients with OUD/SUD	-Increase access to critical levels of care; -Use evidence-based SUD-specific patient placement criteria; -Establish evidence-based residential treatment provider qualifications -Ensure access to MAT on-site and after discharge; -Ensure sufficient provider capacity at each level of care; -Implement comprehensive prevention strategies to address opioid abuse via prescribing guidelines and monitoring; -Improve care coordination and transitions between levels of care
12	SUD-other costs	CMS/ Mathematica	Total SUD costs excluding IMD costs	Medicaid recipients with OUD/SUD	
13	Total costs - Total - Total federal	N/A	Total costs on all claims; federal costs estimated using NJ FMAP percentage	Medicaid recipients	
14	Source of care costs - Outpatient – nonED - Outpatient – ED - Inpatient - Pharmacy - Long-term care costs	N/A	Total costs on claims identified by claim-type and/or provider-type for each source of care category	Medicaid recipients	

AOD=Alcohol or other drug, MAT=Medication Assisted Treatment; ED=Emergency Department

[1]DMAHS is working on a process for collecting overdose death data from the State Medical Examiner's Office, and it was not available to us in time for this interim report. We used data from secondary sources on overdose deaths in New Jersey overall as a substitute in this interim report. For the final report, analysis is still contingent on the quality and timeliness of the death data from the State, and examination of the impact of lifting the IMD exclusion is only possible if age-stratified data are available.

[2]Readmission rates among those with OUD specifically will be calculated only if sample size is sufficient

[3]https://wagner.nyu.edu/faculty/billings/nyued-background; This measure is being used to assess avoidable ED use for physical health conditions among individuals with OUD/SUD. The fact that visits due to mental health, alcohol use, and substance abuse are not classified by this algorithm does not affect the utility of this measure for examining physical health outcomes consistent with Hypothesis 6. The measure "Rate of emergency department visits for SUD-related diagnoses and specifically for OUD" under Hypothesis 4 will address ED use for substance abuse.

Population Definitions

Population indicators were created for the Medicaid beneficiaries with SUD, OUD, and a comparison population comprised of individuals with a behavioral health condition, but not substance use disorder. All population indicators were created on an annual basis.

Medicaid Eligibility: Beneficiaries with any period of active enrollment in a particular year, as indicated by the effective dates of their Program Status Codes in the enrollment file, made up the beneficiary cohort for that year.

Beneficiaries with SUD and OUD: Our primary indicator for beneficiaries with SUD was created using NCQA HEDIS value sets (NCQA 2018; 2020). Beneficiaries enrolled in a given year and having a claim with a diagnosis of Alcohol Abuse and Dependence, Opioid Abuse and Dependence, or Other Drug Abuse and Dependence were considered to have SUD.[1] In addition, beneficiaries with a claim for Medication-Assisted Treatment (MAT) identified using HEDIS value sets and medication lists were also considered to have SUD (see Appendix A for more detail on how MAT was defined). We also maintained an alternative version of the indicator which did not include those only identified via receipt of MAT for use when MAT utilization was the outcome measure. The analogous indicator for the subset of individuals with SUD having OUD was created using diagnoses from the Opioid Abuse and Dependence value set. We used HEDIS 2018 value sets for defining this population in 2016-2018 and the HEDIS 2020 value sets for defining this population in 2019. HEDIS measure names refer to what we call SUD as Alcohol or Other Drug Dependence (AOD). These acronyms (SUD and AOD) are synonymous in this report.

Mental Health Conditions: We identified beneficiaries in each year with a mental health condition to create a potential comparison group for some measures. Using the Healthcare Cost and Utilization Project (HCUP) Clinical Classification Software Revised (CCSR) (HCUP 2020) for ICD-10, we scanned all claims for any behavioral health condition. Behavioral health comprises two mutually exclusive categories: problems related to mental health (MH) and substance abuse (SA). Mental health conditions include mood disorders, schizophrenia, anxiety disorder, delirium, and dementia; substance abuse includes alcohol and substance-related disorders (see Appendix D for additional details). Beneficiaries with any claim flagged using the diagnoses in this algorithm were considered part of the BH population in the year of the diagnosis. We could then use the individual category indicators to subset this population to those with MH, but not having SA, as per the CCSR definition, or having SUD, as per our definition above.

[1] We chose to be inclusive in defining this population and did not require claims with a qualifying diagnosis to also have a qualifying service code for SUD treatment as recommended by CMS technical specifications. We did not want the population to be *limited* to those receiving treatment since this could change in the pre and post-Demonstration periods. While this may mean some individuals without SUD are captured in our population indicator, this would at worst have a conservative effect on our findings.

Costs

Data on costs come from the payment fields in the Medicaid claims data. We only tabulated costs to Medicaid and Medicaid HMOs incurred via direct payment for services. Capitation payments, which include costs for the organization and procurement of services, are excluded from totals. Payments made by Medicare or from any other source are also not included. Notably, we do not have SUD treatment costs from non-Medicaid sources, such as SAMHSA (Substance Abuse and Mental Health Services Administration) block grants or state funds. Costs for inpatient hospital use or emergency department visits only reflect facility charges and do not include any physician or lab charges associated with hospitalization or outpatient visits. Recent guidance from CMS has advised including a per member per month estimate of administrative costs for the SUD Demonstration program in cost analyses. The State has recently collected and provided an estimate of these costs to us, but it was not available soon enough to be incorporated. The cost analyses we present in this interim report will should be interpreted with these limitations in mind. We will consult with State officials to qualitatively assess the extent of cost shifting from non-Medicaid sources in the final evaluation report. All costs were inflation adjusted and expressed in year 2012 purchasing power using the Consumer Price Index for medical care (BLS 2020).

Analytic Approach

In this interim report with data available through December 2019, we compared the period immediately following policy implementation to a baseline period. The definition of these periods was determined by the timing of the specific policy changes aligned with the corresponding drivers for each outcome measure and the measure's unit of analysis. Because multiple policies impacting providers and services for beneficiaries with SUD were implemented at different points in time, we used the date of the earliest key policy change requiring waiver authority as the cut point between the baseline and policy periods. This was July 2018, when the IMD exclusion was lifted for most measures. The *Use of Opioids at High Dosage* measure is annual, so January 2018 marked the beginning of the policy implementation period for this measure. For two outcomes intended to capture improvements in care coordination and transitions between levels of care (avoidable inpatient stays and avoidable emergency department visits), we used July 2019 when peer recovery support services were implemented since this policy change supports the care coordination driver. This means there is a very short post policy/follow up period for these two outcomes. In some models we incorporate indicator variables for the period that is after waiver approval, but before our policy period start point. In our final evaluation with more years of data, the Demonstration period can be segmented into three intervals comprising the baseline period, policy implementation period, and post-policy period (starting after the policy changes and associated billing procedures are fully in effect).

We conducted descriptive analyses, calculating estimates for outcome measures on a quarterly or annual basis over 2016-2019. To examine the policy impact and test the hypotheses stated above we ran multivariate regression models employing two different statistical techniques: difference-in-differences estimation (DD) (Chakravarty et al. 2015; Ashenfelter and Card 1985) and segmented regression analysis (SRA) (Wagner et al. 2002). In this interim report, for estimating the effect of the OUD/SUD program overall (RQa), we primarily use SRA due to the lack of a suitable comparison group, except in those cases where the outcome is not SUD-specific and a comparison group can be identified. For estimating the effect of the removal of the IMD exclusion specifically (RQb), we utilize DD models. We also conducted preliminary analysis that informs the RD model estimation that will be included in the final report for addressing RQb.

Difference-in-Differences Estimation: This estimation technique identifies the impact of the demonstration by comparing the trend in outcomes for the policy targeted (intervention) population from the pre- to the post-implementation period to that of a comparison group which is otherwise similar, but not subject to the policy effect. Such an estimation strategy is able to identify changes in outcomes that are due to program impact and distinct from secular trends. It accounts for the effect of unobserved factors, as long as their impact on one of the groups relative to the other does not change over time. The following equation illustrates the general DD specification:

$$Y_{it} = \beta_0 + \beta_1(target)_i + \beta_2(post\ policy)_t + \beta_3(target_i * post\ policy_t) + \beta_4 Z_t + \gamma X_{\ it} + \varepsilon_{it} \quad (1)$$

In the above equation, variable Y_{it} represents the outcome measure enumerated for the recipient with OUD/SUD at time t. Post policy is an indicator (0/1) variable that identifies the period the policy under examination was in effect, and target is an indicator variable for the group that is subject to the policy intervention. In this model, β_3 represents the DD estimate measuring the program impact. Z_t represents a vector of indicator variables for specific periods during the demonstration when other waiver policies were in effect (e.g. period after removal of the IMD exclusion but before peer services operationalized). X_{it} is a vector of other control variables relating to the recipient, and ε_{it} represents the random error term.

When examining the overall effect of the OUD/SUD program (RQa) on non-SUD specific outcomes, and when conducting analyses of costs, the population with SUD was the intervention group and we used Medicaid recipients with behavioral health conditions, but not OUD/SUD (as described earlier), as a comparison group in DD models. When we examined the effect of the policy eliminating the IMD exclusion for SUD services (RQb) utilizing the DD framework, we classified beneficiaries between ages 55-64 with OUD/SUD as the intervention group and

beneficiaries between ages 65-75 with OUD/SUD as a comparison group. [2] As required in a DD framework, the comparison group did not experience a change in the policy related to IMD exclusion. It helps account for the effect of other non-IMD related policy changes under the Demonstration, or secular changes over time that need to be factored in while examining the effect of the IMD policy change on the treatment group. While this specification could include individuals in the intervention group who may have actually received SUD services in smaller residential facilities not subject to the IMD exclusion, or under state-only funding, this would only introduce a conservative bias into the estimate of the policy effect.

In accordance with CMS recommendations (CMS 2021a), we did not use a static cohort of continuously enrolled beneficiaries over time in our intervention and comparison group because individuals on Medicaid with SUD are likely to have high levels of eligibility churn. Also, those maintaining a diagnosis of OUD/SUD over several years are not a representative subset of all individuals with OUD/SUD. Using a repeated cross-sectional design without minimum enrollment durations instead allows individuals to contribute to the estimation for the periods when they have active SUD treatment needs. However, it leaves open the possibility that unobserved differences in characteristics of individuals diagnosed with OUD/SUD over time might underlie estimated differences in outcomes.

We used propensity score analysis to select individuals from the comparison group to use in regression models. Such a method helps balance the covariate distribution between the intervention and comparison groups (Austin and Stuart 2015). An initial probit regression modeled the likelihood of being in the OUD/SUD intervention group as a function of characteristics such as sex, health status, race/ethnicity, dual eligibility status, and enrollment duration. The weights from this model are used to weigh observations in the main regression models. Incorporating such propensity score reweighting (Nichols 2007; 2008) generates an optimal comparison group for the difference-in-differences analysis that is similar to the intervention group. For all propensity matching, we followed standard methodology utilizing a common support that entailed dropping treatment observations whose estimated propensity score is higher than the maximum or lower than the minimum propensity score of the control observations. Due to the repeated cross-sectional design, we conducted separate propensity score matching for each quarter (or year, if sample size by quarter was insufficient) and then pooled the observations for the overall regression. Appendix G contains tables showing the balance of covariates before and after matching for all applicable outcomes.

A crucial assumption relating to the DD approach is that there are no unmeasured factors whose effect on the intervention group relative to the comparison group changes over time. This may

[2] Using similar groups to mitigate unmeasured confounding from age is common in the academic literature to assess policy effects that may differentially impact such populations (Chakravarty et al. 2015).

not always be fulfilled. In that case, the unobserved factors may result in the two groups having differential trends and the computed effect size will include this difference over time. Accordingly, we tested to see whether there existed statistically significant differences in trends between the intervention and comparison group prior to policy implementation after adjusting for observed factors (Antwi et al 2015). If this difference is in the same direction as the DD estimate and of comparable magnitude, it would imply that the DD model may be overestimating the effect. There are well-established methods in peer-reviewed academic publications (Harman et al. 2014; Willage 2020) for computing effect sizes that adjust for these differential pre-trends, which we will undertake as needed in our final report when we have a longer follow-up period. Briefly, we will interact the binary exposure variable (e.g., indicator for the targeted age group) with a trend variable defined for the pre-intervention period and include this in our regression model. This would take into account the differential pre-trends while estimating policy effects and could be applied consistently across examined outcomes.

Segmented Regression Analysis/Interrupted Time Series Modeling: We used Segmented Regression Analysis (SRA) to examine the effect of the Demonstration on outcomes where a comparison group was not available. The SRA model assumes that the policy effect may lead to a change in level, and also a change in the existing time trend of the metric measuring quality or any other relevant outcome of interest. The regression analysis is able to measure this change in trend or level. Potential confounding may arise from factors that determine our outcomes of interest and change at the same time as the policy implementation. However, our multivariate analysis adjusting for patient, provider and geographic factors are expected to mitigate such effects. The equation below illustrates the general SRA specification (Wagner et al. 2002):

$$Y_{it} = \beta_0 + \beta_1(time)_t + \beta_2(policy\ post)_t + \beta_3(\ policy\ time)_t + \gamma X_{\ it} + \varepsilon_{it} \quad (2)$$

Here, Y_{it} reflects the outcome related to the i^{th} index event or recipient at time t. On the right hand side of the equation, time is a continuous variable indicating time in calendar quarters from the start of the study period. The variable policy post is an indicator (0/1) variable for the period subsequent to these policy changes under the OUD/SUD program. The variable policy time is a continuous variable equaling the number of quarters after the corresponding policy change. Coefficient β_0 estimates the baseline level of the outcome at the first time period, and coefficient β_1 indicates the baseline trend, i.e., the trend in the outcome prior to the first policy change. In this model, the specific effect of the OUD/SUD program on the overall population with OUD/SUD is given by the magnitude of β_2 that gives the change in level and β_3 that gives the change in trend of the specific outcome being examined after the policy implementation period began, and we further tested whether these values are statistically significant. For interpretability purposes, we further compared predicted values of outcomes post-policy with counterfactual values (that simulate a scenario where the policy implementation did not occur). We computed whether the

difference in the last quarter or year of the study period was statistically significant. In SRA models, we include hospital or patient zip code fixed effects, depending on the measure specification to control for time-invariant factors which may influence outcomes that vary by hospital or zip code.

In all models for treatment and utilization outcomes, we used linear probability models for both continuous and binary (0/1) outcomes. When used with binary outcomes, linear probability models produce coefficients easily interpreted as percentage point changes in outcomes. In all models where costs were the outcome, we utilized a gamma distribution with a log link. For spending model results we do not report the coefficients produced directly by the model, but instead report average marginal effects (AME), standard errors, and statistical significance in accordance with CMS guidance (CMS 2021a). If the AME is a positive dollar amount, then the demonstration is associated with an increase in costs (relative to the comparison group trend, if applicable). Similarly, if the estimate is a negative dollar amount, then the demonstration is associated with a decrease in costs.

We control for a number of patient characteristics and time effects in our models. The vector of patient characteristics for models includes individual-level control variables such as age, sex, race/ethnicity, enrollment days, Medicaid eligibility category, and dual eligibility status. Assignment to eligibility categories (e.g., Aged/Blind/Disabled) was based on the protocol used for Medicaid's monthly public reporting. We use the first program status code in the year along with age and any concurrent special program codes to make this assignment. We also account for any change in disease diagnoses and burden of illness over time by controlling for health status. The measures of health status used are: 1) a categorization of the diagnosis-based Chronic Illness and Disability Payment System (CDPS) risk score that measures disease diagnoses and burden of illness, with higher values indicating greater disease burden (Kronick et al. 2000); 2) number of chronic conditions calculated using the Chronic Conditions Warehouse (CMS 2018); and 3) presence of a mental health condition as captured by the Healthcare Cost and Utilization Project (HCUP) Clinical Classification Software Revised (CCSR) (HCUP 2020). For the hospital readmission metric we used the full set of risk-adjustment variables that are defined by the CMS methodology related to Risk Standardized Readmission Rates (QualityNet 2016; see Appendix E). We include controls for year and quarter to adjust for seasonality effects and variation in our claims runout. The specific control variables included in each model are noted in the table of results. In addition, since the IMD policy was targeted specifically to ages 21-64, we did not control for age when examining the overall impact of the SUD Demonstration under Research Question (a) since that would predict the intervention group for some of the policy effects.

For measures with a hospital index event, we incorporate clustering by provider, and in SRA/ITS models of these outcomes, we also incorporate adjustments for provider characteristics by using hospital fixed effects. For all other claims-based metrics, we incorporate clustering by recipient zip code and also zip code fixed effects in SRA/ITS models. Therefore, observations with invalid recipient zip codes were excluded.

Table B below shows key modeling details for each of the outcome measures.

Our estimation procedures were conducted using SAS Enterprise Guide 7.15 and STATA MP 16.1 software. Propensity matching utilized the psmatch2 commands.

Table B: Modeling Details for OUD/SUD Program Evaluation Measures

#	Measure	Unit of Analysis	Start of Policy Period	Inclusion Criteria	Modeling Details[1]
	Hypothesis 1: Rates of identification, initiation and engagement in treatment for OUD and other SUDs will increase as a result of the OUD/SUD program.				
1	Initiation and Engagement of Alcohol and Other Drug (AOD) Dependence Treatment	Index Event	July 2018	Recipients with an episode of AOD dependence	**RQ(a):** SRA/ITS, LPM with zip code FE and zip code clustering
	Hypothesis 2: Rates of adherence to and retention in treatment for OUD and other SUDs, overall and for individuals aged 21-64, will increase as a result of the OUD/SUD program.				
2	Use of critical levels of care (MAT) for OUD/SUD	Person-quarter	July 2018	Recipients with SUD[2] RQ(b) DD model further restricted to age 55-64 (intervention) and age 65-75 (comparison)	**RQ(a):** SRA/ITS, LPM with zip code FE and zip code clustering **RQ(b)**: DD, LPM with propensity-matched near-age comparison group, zip code clustering
3	Follow-up after Discharge from Emergency Department for Alcohol or Other Drug Dependence	Index Event	July 2018	Recipients with a qualifying ED visit for AOD. RQ(b) DD model further restricted to age 55-64 (intervention) and age 65-75 (comparison)	**RQ(a):** SRA/ITS, LPM with provider FE and provider clustering **RQ(b):** DD, LPM with propensity-matched near-age comparison group, provider clustering
	Hypothesis 3: Overdose deaths, particularly those due to opioids, will decline overall and for individuals aged 21-64 as a result of the OUD/SUD program.				
4	Use of Opioids at High Dosage in Persons Without Cancer[3]	Person-year	Jan 2018	Recipients prescribed opioids	**RQ(a):** Test of difference in baseline and policy period means
5	Rate of all and OUD overdose deaths[5]	Annual	Jan 2018	All NJ residents	**RQ(a):** Test of difference in annual means as reported in secondary data source **RQ(b):** Cannot address as the data are not available by age
	Hypothesis 4: Utilization of emergency departments and inpatient hospital settings for OUD and other SUD treatment where the utilization is preventable or medically inappropriate through improved access to other continuum of care services will decline overall and for individuals aged 21-64 as a result of the OUD/SUD program.				
6	Rate of emergency department visits for SUD-	Person-quarter	July 2018	All Medicaid recipients	**RQ(a):** SRA/ITS, LPM with zip code FE and zip code clustering

#	Measure	Unit of Analysis	Start of Policy Period	Inclusion Criteria	Modeling Details[1]
	related diagnoses and specifically for OUD			RQ(b) DD model restricted to age 55-64 (intervention) and age 65-75 (comparison)	**RQ(b):** DD, LPM with propensity-matched near-age comparison group, zip code clustering
7	Rate of Inpatient admissions for SUD and specifically OUD	Person-quarter	July 2018	All Medicaid recipients RQ(b) DD model restricted to age 55-64 (intervention) and age 65-75 (comparison)	**RQ(a):** SRA/ITS, LPM with zip code FE and zip code clustering **RQ(b):** DD, LPM with propensity-matched near-age comparison group, zip code clustering
	Hypothesis 5: Readmissions to the same or higher level of care where readmissions is preventable or medically inappropriate for individuals with OUD and other SUD will decline overall and for individuals aged 21-64 as a result of the OUD/SUD program.				
8	30-day all-cause readmissions	Index Event	July 2018	RQ(a) DD model includes recipients with SUD (intervention) and a non-SUD BH condition (comparison) RQ(b) DD model includes age 55-64 with SUD (intervention) and age 65-75 with SUD (comparison)	**RQ(a):** DD, LPM with propensity-matched BH comparison group, provider clustering **RQ(b):** DD, LPM with propensity-matched near age comparison group, provider clustering
	Hypothesis 6: Access to care for physical health conditions among beneficiaries with OUD or other SUDs, will improve as a result of the OUD/SUD program.				
9	Avoidable hospitalizations (PQI/PDI) among individuals with SUD/OUD	Person-quarter	July 2019	Recipients with SUD/OUD (intervention) or a non-SUD BH condition (comparison)	**RQ(a):** DD, LR with propensity-matched BH comparison group, zip code clustering
10	Avoidable ED visits for individuals with SUD/OUD	Person-quarter	July 2019	Recipients with SUD/OUD (intervention) or a non-SUD BH condition (comparison)	**RQ(a):** DD, LR with propensity-matched BH comparison group, zip code clustering
11-12	SUD costs	Person-quarter	July 2018	Recipients with SUD/OUD	**RQ(a)(b):** SRA/ITS, Gamma distribution with log link, zip code clustering

#	Measure	Unit of Analysis	Start of Policy Period	Inclusion Criteria	Modeling Details[1]
13-14	Total and non-SUD specific costs	Person-quarter	July 2018	Recipients with SUD/OUD (intervention) or a non-SUD BH condition (comparison)	**RQ(a):** DD, Gamma distribution with log link, propensity-matched BH comparison group, zip code clustering

Notes: AOD=Alcohol or other drug, MAT=Medication Assisted Treatment; ED=Emergency Department; RQ=Research Question; DD=Difference-in-differences; SRA=Segmented Regression Analysis; ITS=Interrupted Time Series; LPM=Linear Probability Model; LR=Linear Regression; FE=Fixed effects; BH=Behavioral Health

Research Question: (a) What is the impact of providing substance use disorder services to Medicaid beneficiaries?

(b) Including paying for services rendered in an institution for mental disease (IMD)?

[1]Control variables included in models are noted in footnotes to each results table.

[2]This was our alternative version of the SUD population indicator which included only individuals having a claim with an SUD diagnosis and did not include individuals only identified as having SUD by receipt of MAT. This ensures greater independence of the denominator criteria and the outcome.

[3]This is an annual measure that could not be segmented into quarterly periods. Therefore, we only had two data points each for the baseline and policy periods, which is insufficient for conducting SRA/ITS.

[4]Disenrollment due to death is in the Medicaid claims data; however, we lack mortality information on individuals who disenroll from Medicaid for any other reason.

[5]DMAHS is working on a process for collecting this data from the State Medical Examiner's Office for Medicaid recipients, and it was not available to us in time for this interim report. We used data from secondary sources on overdose deaths in New Jersey overall as a substitute. For the final report, analysis is still contingent on the quality and timeliness of the death data from the State, and examination of the impact of lifting the IMD exclusion is only possible if age-stratified data are available.

Results

In this section, we present findings by each outcome measure in two sections: Unadjusted and Adjusted. **First, we report observations based on descriptive annual or quarterly rates over 2016-2019. These have not been adjusted for any covariates and may not reflect policy effects (Unadjusted). Then we present results from regression models that estimate the policy effect after accounting for all control variables (Adjusted).** This corresponds to the coefficient(s) of the key regression terms reflecting policy impact as described above and shown in Equations (1) and (2).

Treatment and Utilization Outcomes

Initiation and Engagement of Alcohol and Other Drug Treatment

Unadjusted

Figures 1-2 show annual rates over 2016-2019 of initiation and engagement in alcohol and other drug treatment by age for the population with a qualifying index episode of substance use disorder and among those with a qualifying opioid use disorder index episode. Rates for ages 13-17 in the OUD cohort were not shown due to insufficient sample size in most years.

Key observations:

Initiation of OUD/SUD treatment:

- The unadjusted rate of initiation of SUD treatment has slightly decreased in age group 13-17 years old (-1.3 pp) and increased in beneficiaries age 18+ (3.1 pp) over this period. (Figure 1)
- The unadjusted rate of initiation of opioid treatment shows a slight increase in age group 18+ (2.4 pp). (Figure 2)
- The unadjusted rates of initiation for SUD treatment were higher in age group 18+ compared to 13-17 years old. (Figure 1)

Engagement in OUD/SUD treatment:

- Unadjusted engagement rates are generally lower than the rates of initiation in both SUD and opioid treatment. (Figure 1-2)
- The unadjusted rate of engagement for SUD treatment has slightly decreased in age group 13-17 (-2.3 pp) and increased in beneficiaries age 18+ (3.1 pp). The rate of engagement for opioid treatment shows an increase in age group 18+ (5.6 pp) over the study period. (Figure 2)
- The unadjusted rates of engagement for SUD treatment were generally higher in age group 18+ compared to 13-17 years old. (Figure 2)

Adjusted

Tables 1-2 report the Segmented Regression Analysis-based effect of the SUD Demonstration on rates of initiation and engagement in alcohol and other drug treatment. The coefficient for *policy_post* reflects changes in the level of the outcome subsequent to implementation of the first key policy in the Demonstration. The *policy_quarter* estimate indicates whether there was any change in the time trend of the outcome over all the quarters in our dataset subsequent to policy implementation (i.e. through December 2019). Figures 3-4 provide a graphical interpretation of the net changes reported in Tables 1-2 by line graphs denoting the probability of initiation and engagement based on regression modeling. In the period spanning July 2018-December 2019, the solid line graphs give the values taking into account the SUD Demonstration, and the dotted line graphs give counterfactual values without the SUD Demonstration.

Key findings:

Initiation of SUD/OUD treatment (Table 1):

- There is no significant effect of the SUD demonstration on the level of initiation of SUD and OUD treatment immediately after implementation of the first major Demonstration policy in July 2018.
- There is also no significant changes in the initiation of SUD and OUD treatment trend over the subsequent six quarters.
- The combined effect of both level and trend changes was also non-significant for initiation rates of both SUD and OUD treatment.
- By the last quarter of 2019 we estimate an increase in the probability of initiating SUD treatment (0.6 pp increase) and OUD treatment (1.8 pp increase) compared to what there would have been without the SUD demonstration. Both changes are not statistically significant.

Engagement in SUD/OUD treatment (Table 2):

- There is no significant effect of the SUD demonstration on the level of engagement in the SUD and OUD treatment immediately after implementation of the first major Demonstration policy in July 2018.
- There is also no significant changes in the engagement in SUD and OUD treatment trend over the subsequent six quarters.
- The combined effect of both level and trend changes was also non-significant for engagement rates in both SUD and OUD treatment.
- By the last quarter of 2019 there is a decrease in the probability of engagement in SUD treatment (-1.1 pp) and an increase in the probability of engagement in OUD treatment (1.0 pp) compared to what there would have been without the SUD demonstration. Both changes are not statistically significant.

Medication Assisted Treatment

Unadjusted

Figures 5-7 show quarterly percentages of Medicaid beneficiaries with SUD who used medication assisted treatment from 2016 through 2019.

Key observations:

- The percentage of Medicaid beneficiaries with OUD using MAT is approximately two times higher than the percentage of MAT among all beneficiaries with SUD (Figure 5).
- The use of MAT among beneficiaries with SUD, and the subset with OUD, has steadily increased over the study period. It is 8 percentage points (pp) higher by the last quarter of 2019 for beneficiaries with SUD overall, and 12 pp higher for beneficiaries with OUD, compared with the first quarter of 2016 (Figure 5).
- Age-stratified rates of MAT use among all beneficiaries with SUD show that the proportion using this service has increased for those ages 21-64 over the study period (+9 pp), but stayed nearly constant for younger and older beneficiaries (Figure 6).
- Age-stratified rates of MAT use among the subset of beneficiaries with OUD also show increases over 2016-2019 concentrated in the 21-64 age group (+12.8 pp) and a downward trend (-6 pp) among those ages 65 and above (Figure 7).

Adjusted

Table 3 reports the Segmented Regression Analysis-based effect of the SUD Demonstration on rates of MAT utilization for Medicaid beneficiaries with SUD. Figure 8 provides a graphical interpretation of the net changes reported in Table 3.

Key findings:

- There is no significant effect of the SUD Demonstration on the level of MAT use immediately following implementation of the first major Demonstration policy in July 2018.
- There is a statistically significant ($p<0.05$), but small, increase in the MAT utilization trend over the subsequent six quarters. The magnitude of this change is an increase of 0.14 pp in the proportion of beneficiaries with SUD using MAT per quarter.
- The combined effect of both the level and trend changes was also significant ($p<0.05$). By the last quarter of 2019 that amounted to a 0.9 pp increase in the percentage of beneficiaries with SUD using MAT than there would have been without the SUD Demonstration. Figure 8 shows this graphically.

Table 4 reports the adjusted effects based on the DD estimation comparing changes over time in MAT utilization for near-elderly adults with SUD who were subject to the IMD exclusion before

the Demonstration, relative to a comparison group of elderly adults whose access to treatment in an IMD was not affected by removal of the IMD exclusion under the Demonstration.

Key findings:

- The removal of the IMD exclusion is associated with an increase in the proportion of Medicaid beneficiaries with SUD age 55-64 utilizing MAT by 6.4 pp per quarter. This increase is statistically significant ($p<0.001$).
- Our test of pre-trends shows significant differences in pre-Demonstration trends of MAT utilization between beneficiaries age 55-64 with SUD and beneficiaries age 65-75 with SUD ($p<0.001$). The size of this trend difference is <0.5% of the DD impact coefficient and in the opposite direction and so our findings may be slightly underestimated.

Follow-up after Emergency Department Visit for Alcohol or Other Drug Use

Unadjusted

Figures 9-12 show annual unadjusted percentages of ED visits for alcohol/drug use by Medicaid beneficiaries which had a qualifying follow-up visit within 7 days and 30 days.

Key observations:

- Annual unadjusted rates of follow-up after ED visits among age 13-17 group are slightly lower than the rates among 18+ and decreased a little between 2016 and 2019 (-2.2 pp change in 7 days and -2.5 pp change in 30 days follow up rates). On the contrary, unadjusted rates of follow-up visits mildly increased among beneficiaries age 18 and above (1.5 pp change in 7 days and 3.0 pp in 30 days follow up visits). (Figure 9-10)
- Age-stratified unadjusted rates of follow up after ED visit for SUD show the highest rates of follow up visits among beneficiaries age 21-64. There is also a slight increase in annual unadjusted rates of follow up in both 7 days and 30 days among beneficiaries age 21-64 over 2016-2019. There is also a trivial increase in the rates among age 65+. Unadjusted follow up rates decreased among beneficiaries 20 years old and younger. (Figure 11-12)

Adjusted

Table 5 contains the Segmented Regression Analysis-based effect of the SUD Demonstration on rates of follow-up after ED visits for Medicaid beneficiaries with SUD. Figure 13 provides a graphical interpretation of the net changes reported in Table 5.

Key findings:

- There is no significant effect of SUD demonstration on the level or trend of 7-day follow up visits.

- There is a marginally statistically significant ($p< 0.1$) and small increase in the rates of 30-day follow up visits immediately following implementation of the demonstration policy in July 2018. However the effect was not significant on the trend over the subsequent six quarters after the policy implementation.
- The joint effect of both level and trend changes was not significant in 7-day and 30-day follow up rates. By the end of 2019, the net change in the rates of 7-day and 30-day follow up was 0.6 pp and 1.0 pp higher than there would have been without the SUD demonstration. Figure 13 demonstrates this graphically.

Table 6 reports the adjusted effects based on the DD estimation comparing changes over time in follow up visits for near-elderly adults with SUD who were subject to the IMD exclusion before the Demonstration, relative to a comparison group of elderly adults whose access to treatment in an IMD was not affected by removal of the IMD exclusion under the Demonstration.

Key findings:

- The removal of the IMD exclusion increased the proportion of beneficiaries age 55-64 with SUD who had a follow up visit after their ED visit for both 7-day (1.3 pp increase in quarter) and 30-day (2.4 pp increase in quarter). None of the effects are statistically significant.
- Our pre-trend test shows a non-significant difference in the trends of 7-day follow up rates between beneficiaries age 55-64 and those age 65-75. The size of this difference is 33% of the SUD demonstration effect coefficient and in the opposite direction.
- Our test of pre-demonstration trend shows there is a significant difference in trends of quarterly rates of 30-day follow up between beneficiaries age 55-64 and those age 65-75 ($P<0.05$). This difference coefficient is 37% of the SUD demonstration effect coefficient and in the opposite direction. This means we may be underestimating the effect of the SUD Demonstration on follow-up after ED visit for AOD rates.

Use of Opioids at High Dosage

Unadjusted

Figure 14 shows annual proportion of adults prescribed opioids who have high dose prescriptions over 2016-2019.

Key observations:

- Overall, the unadjusted proportion of adults prescribed opioids and using high doses of opioids shows a small decrease (-1.5 pp), in the years following the start of the SUD Demonstration.

- A t-test of differences in the unadjusted proportions of beneficiaries using high doses of opioids in year 2016-2017 compared to 2018-2019 showed that the decrease was statistically significant ($p<0.05$).

Inpatient Stays for OUD and SUD

Unadjusted

Figures 15-18 show the quarterly unadjusted rate of inpatient stays for SUD and OUD per 1,000 Medicaid beneficiaries between 2016 and 2019. We utilize binary outcomes indicating 1+ inpatient stays compared with no inpatient stays.

Key observations:

- The unadjusted rates of IP stays for SUD and OUD stayed nearly constant over the study time. The unadjusted rate of IP stays for SUD was almost twice the rate for OUD. (Figure 15-16)
- Age-stratified unadjusted rates of IP stays for SUD and OUD show the highest rate of IP stays among the age group 21-64. Unadjusted rates of IP stays were nearly constant in each non-elderly age group between 2016 and 2019, but went up slightly for ages 65+. (Figure 17-18)

Adjusted

Table 7 reports the Segmented Regression Analysis-based effect of the SUD Demonstration on rates on IP stays for SUD and OUD. Figure 19-20 provides a graphical interpretation of the net changes reported in Table 7.

Key findings:

Inpatient stays for SUD

- There is no significant effect of SUD demonstration program on the level of IP stays for SUD immediately after the implementation of the first major demonstration policy in July 2018.
- The minimal increase in the IP stays for SUD trend over the subsequent six quarters following the policy implementation was not significant.
- The joint effect of both level and trend changes was not significant for IP stays for SUD. Figure 19 shows the changes graphically.

Inpatient stays for OUD

- There was a small but significant decrease ($p<0.05$) in the level of IP stays for OUD immediately after the policy implementation (-0.007 pp in a quarter).
- There was no significant change in the IP stay trend in the six quarters following the policy implementation.

- The combined effect of level and trend changes was not significant for the IP stay for OUD rates. Figure 20 has a graphical demonstration of these changes.

Table 8 reports the adjusted effects based on the DD estimation comparing changes over time in IP stays for near-elderly adults who were subject to the IMD exclusion before the Demonstration, relative to a comparison group of elderly adults whose access to treatment in an IMD was not affected by removal of the IMD exclusion under the Demonstration. The effects were estimated for SUD- and OUD-related IP stays among all Medicaid beneficiaries.

Key findings:
Inpatient stays for SUD

- The removal of the IMD exclusion decreased the probability of SUD- related IP stays in Medicaid beneficiaries age 55-64 by 0.4 pp in quarter. However, this change is not statistically significant.
- Our test of pre-trends shows the differences in pre-Demonstration trends between beneficiaries age 55-64 and beneficiaries age 65-75 was not significant for SUD IP stays.

Inpatient stays for OUD

- The removal of the IMD exclusion triggered a trivial decrease in the probability of an OUD-related IP stay in Medicaid beneficiaries age 55-64 (-0.02 pp in quarter), but this decrease was not statistically significant.
- Our test of pre-demonstration trends was also non-significant for the OUD IP stay rate.

Emergency Department Visits for OUD and SUD

Unadjusted

Figures 21-24 show the quarterly unadjusted rate of ED visits for SUD and OUD per 1,000 Medicaid beneficiaries between 2016 and 2019. We utilize binary outcomes indicating 1+ ED visits compared with no ED visits.

Key observations:

- The unadjusted rates of ED visits for SUD and OUD stayed nearly constant over the study time. The unadjusted rate of ED visits for SUD was almost four times the rate of ED visits for OUD (Figure 21-22)
- Age-stratified unadjusted rates of SUD- and OUD- related ED visits show the highest rates of ED visits among the age group 21-64 years old. Unadjusted rates of ED visits were nearly constant in each age group between 2016 and 2019. (Figure 23-24)

Adjusted

Table 9 reports the Segmented Regression Analysis-based effect of the SUD Demonstration on rates on ED visits for SUD and OUD. Figure 25-26 provides a graphical interpretation of the net changes reported in Table 9.

Key findings:

Emergency department visits for SUD

- There is a significant effect of the SUD demonstration program on the level of SUD-related ED visits immediately after the implementation of the first major demonstration policy in July 2018. The size of this effect is a small decrease of 0.03 pp in the probability of an SUD-related ED visit per quarter ($p<0.01$).
- There is a very small and marginally significant increase in the SUD ED visits trend over the subsequent six quarters following the policy implementation.
- The joint effect of both level and trend changes was also statistically significant for SUD ED visits ($p<0.01$). By the end of 2019 that amounts to a cumulative, but not statistically significant, net change of 0.01 pp higher probability of an SUD-related ED visit than there would have been without the SUD demonstration. Figure 25 shows these changes graphically.

Emergency department visits for OUD

- There was a trivial and non-significant decrease in the level of OUD-related ED visits immediately after the policy implementation.
- There was no significant change in the OUD ED visits trend in the six quarters following the policy implementation.
- The combined effect of level and trend changes was not significant for the OUD ED visit rates. Figure 26 has a graphical demonstration of these changes.

Table 10 reports the adjusted effects based on the DD estimation comparing changes over time in SUD and OUD-related ED visits for near-elderly adults who were subject to the IMD exclusion before the Demonstration, relative to a comparison group of elderly adults whose access to treatment in an IMD was not affected by removal of the IMD exclusion under the Demonstration. The effects were estimated for SUD- and OUD-related ED visits among all Medicaid beneficiaries.

Key findings:

Emergency department visits for SUD

- The effect of removal of the IMD exclusion on the rate of SUD- related ED visit in Medicaid beneficiaries age 55-64 was not statistically significant (+ 0.07 pp per quarter).
- Our test of pre-trends shows the differences in pre-Demonstration trends between beneficiaries age 55-64 and beneficiaries age 65-75 was not significant for SUD ED visits.

Emergency department visits for OUD

- The removal of the IMD exclusion triggered a trivial decrease in the likelihood of OUD-related ED visits in Medicaid beneficiaries age 55-64 (-0.08 pp per quarter), but this decrease is not statistically significant.
- Our test of pre-demonstration trends was also non-significant for the OUD ED visit rates.

30-Day Readmissions

Unadjusted

Figures 27-29 demonstrate yearly unadjusted percentages of Medicaid beneficiaries with SUD, OUD, and behavioral health conditions (exclusive of SUD) who had a readmission within 30 days of an index admission from 2016 through 2019.

Key observations:

- Unadjusted readmission rates have been almost constant over 2016-2019 in all three groups of Medicaid beneficiaries, SUD, OUD, and non-SUD BH (Figure 27).
- Unadjusted readmission rates in beneficiaries with SUD and OUD groups are approximately two times higher than the rates in beneficiaries with a non-SUD BH condition over 2016-2019 (Figure 27).
- Age-stratified unadjusted rates of readmission among all beneficiaries with SUD show that the rates have been nearly unchanged for those ages 21-64, has increased for ages 65 and above (+5 pp) and has decreased among ages 18-20 (-9 pp) over the study period (Figure 28).
- Age-stratified unadjusted rates of readmission among the subset of beneficiaries with OUD also show a slight increase in the age group 21-64 (+ 0.6 pp) and 65+ age group (+ 3.5 pp) over 2016-2019 and a downward trend (-14.8 pp) among those ages 18-20 (Figure 29).

Adjusted

Table 11 reports the adjusted effects based on the matched DD estimation comparing changes over time in readmission rates for adults with SUD, relative to a comparison group of adults with BH disorder (exclusive of SUD).

Key findings:

- The SUD Demonstration slightly increased the 30-day readmission rate in Medicaid beneficiaries with SUD by 0.6 pp in quarter, but this increase is not statistically significant.
- Our test of pre-trends shows a significant difference in pre-Demonstration trends between beneficiaries with SUD and beneficiaries with BH ($p<0.01$). The size of this trend difference is 66% of the DD impact coefficient and in the opposite direction and so our findings may be underestimated.

Table 12 reports the adjusted effects based on the DD estimation comparing changes over time in readmission rates for near-elderly adults with SUD who were subject to the IMD exclusion before the Demonstration, relative to a comparison group of elderly adults whose access to treatment in an IMD was not affected by removal of the IMD exclusion under the Demonstration.

Key findings:

- The removal of the IMD exclusion increased the proportion of Medicaid beneficiaries with SUD age 55-64 who had a 30-day readmission by 1.5 pp. This increase is not statistically significant.
- The test of pre-trends shows the difference in pre-Demonstration trends between beneficiaries age 55-64 with SUD and beneficiaries age 65-75 with SUD is not significant (p=0.142). The size of this trend difference is 61% of the DD impact coefficient and in the opposite direction.

Avoidable Inpatient Hospitalizations

Unadjusted

Figure 30 shows quarterly unadjusted rates of avoidable hospitalizations per 1,000 Medicaid beneficiaries with SUD, OUD, or a non-SUD BH conditions age 6 years over 2016-2019.

Key observations:

- Avoidable hospital stays are higher among beneficiaries with SUD and OUD compared to those with BH (but not SUD) with the highest unadjusted rate of hospitalization among the group with OUD.
- The overall unadjusted trend of avoidable hospitalizations is slowly downward from Jan 2016 to Dec 2019 with a decline of 3.3 hospital stays per 1,000 in the OUD group, 1.3 stays in the SUD group, and 0.7 stays in the BH group. However, compared to December 2019, there are lower unadjusted rates of hospitalizations in SUD and OUD in the fourth quarter of 2016 and the second quarters of 2017 and 2018.

Adjusted

Table 13 reports the adjusted effect of the SUD demonstration program based on the DD estimation comparing changes in avoidable hospitalization rates for beneficiaries with SUD, relative to the comparison group of beneficiaries with a non-SUD BH condition.

Key findings:

- The SUD demonstration slightly decreased the rate of avoidable hospitalizations by 0.4 per 1,000 beneficiaries with SUD in quarter, however this decline is not statistically significant.
- The test of pre-demonstration trends shows a non-significant difference between beneficiaries with SUD and those with non-SUD BH in the comparison population. The magnitude of the difference is 12% of the SUD-demonstration impact coefficient and in the same direction.

Avoidable Emergency Department Visits

Unadjusted

Figure 31 shows quarterly rates of avoidable ED visits per 1,000 Medicaid beneficiaries age 6 years and older with OUD, SUD, or a non-SUD BH condition.

Key observations:

- Beneficiaries with SUD or OUD have higher unadjusted rates of avoidable ED visits relative to the beneficiaries with non-SUD BH conditions. Unadjusted avoidable ED visit rates are highest in the OUD group with >200 visits per 1,000 beneficiaries per quarter.
- Unadjusted avoidable ED visits rates slightly decreased over the study period, with a decrease of 33, 45, and 18 visits per 1,000 beneficiaries in the SUD, OUD, and non-SUD BH group, respectively.

Adjusted

Table 14 reports the adjusted effect of the SUD demonstration program on the changes in the number of avoidable ED visits per quarter comparing the beneficiaries with SUD to a propensity matched group of those with non-SUD BH conditions.

Key findings:

- The impact of the SUD demonstration program on the rate of avoidable ED visits was an increase of 9.8 avoidable ED visits per 1,000 beneficiaries per quarter. This change was statistically significant ($p<0.05$).
- Our test of pre-demonstration trends shows a statistically significant difference in trends between beneficiaries with SUD and those with non-SUD BH conditions ($p< 0.05$). The size of this trend difference was approximately 10% of the SUD impact coefficient and in the opposite direction which means our Demonstration effect may be underestimated.

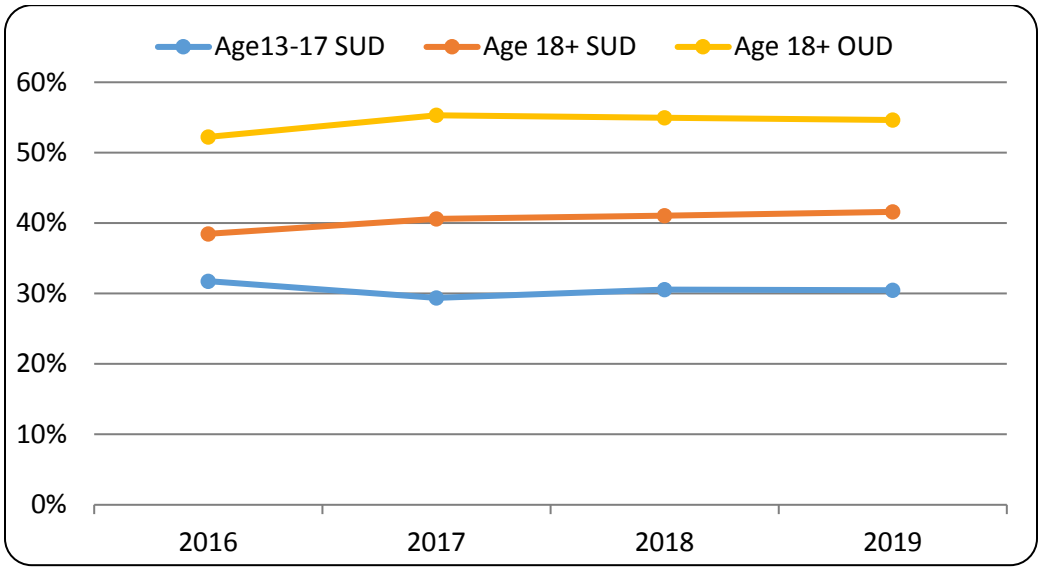
Overdose Deaths – NJ overall

Figure 32 shows overall drug overdose deaths and deaths involving prescription opioids, fentanyl, and fentanyl analogs (drugs similar to fentanyl in chemical structure) from 2016-2019 in NJ. Data for deaths involving prescription opioids was available only for 2018 and 2019 and included deaths involving natural (morphine, codeine), semi-synthetic (oxycodone, hydrocodone, hydromorphone, and oxymorphone), and synthetic opioids (methadone). These are not specific to the Medicaid populations and may not reflect policy effects.

Key observations (all numbers are unadjusted except where noted):

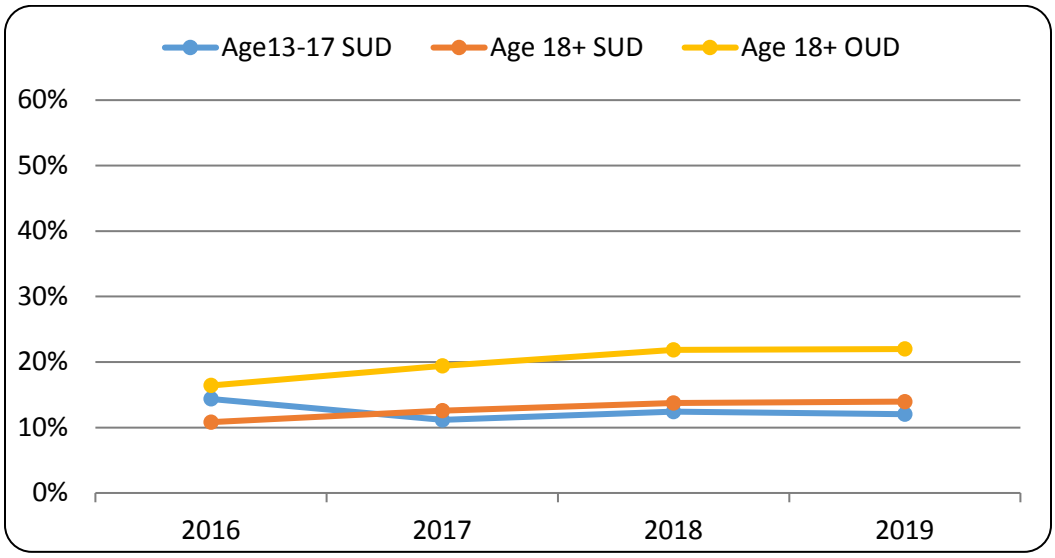
- Overall deaths involving opioids, stimulants, and psychoactive drugs increased 35.5% from 2016 to 2018. In 2019, there was a small decrease (-3.1%) in the overall deaths.
- The number of deaths involving prescription opioids in NJ decreased by 11.8% from 2018 to 2019. Moreover, the age-adjusted death rate per 100,000 population decreased by 13.8% from 2018 to 2019 and this decrease was statistically significant (data not shown in chart).
- Deaths involving fentanyl showed a very small increase from 2018 to 2019 (+1.0%) compared to increases from 2016 to 2017 (+74.7%) and from 2017 to 2018 (+55.7%).
- For deaths involving fentanyl analogs, there was a sharp increase from 2016 to 2017 (+267.1%) followed by a small increase (+12.8%) from 2017 to 2018. In 2019, the number of deaths involving fentanyl analogs decreased by 35.5%.

Figure 1. Age-stratified annual rates of initiation of treatment for alcohol and other drug use disorder overall (SUD) and for opioid use disorder (OUD) among the Medicaid population, 2016-2019



Source: Medicaid Fee-for-Service claims and Managed Care Encounter data, 2016-2019; Analysis by Rutgers Center for State Health Policy
Notes: SUD=Substance Use Disorder; OUD=Opioid Use Disorder
The vertical axis denotes the percent of beneficiaries that initiated SUD/OUD treatment
These rates have not been adjusted for any covariates and may not reflect policy effects

Figure 2. Age-stratified annual rates of engagement of treatment for alcohol and other drug use disorder overall (SUD) and for opioid use disorder (OUD) among the Medicaid population, 2016-2019



Source: Medicaid Fee-for-Service claims and Managed Care Encounter data, 2016-2019; Analysis by Rutgers Center for State Health Policy
Notes: SUD=Substance Use Disorder; OUD=Opioid Use Disorder
The vertical axis denotes the percent of beneficiaries with engagement in SUD/OUD treatment
These rates have not been adjusted for any covariates and may not reflect policy effects

Table 1: Adjusted impact of the SUD demonstration on initiation of treatment for SUD and OUD among Medicaid beneficiaries

SUD Demonstration Impact Estimates	Initiation of SUD treatment *(n=143,677)*	Initiation of OUD treatment *(n=34,698)*
policy_post	0.00468	-0.00643
	(0.00626)	(0.01492)
policy_quarter	0.00014	0.00400
	(0.00299)	(0.00649)
Overall statistical significance	n.s.	n.s.
Net change as of Dec. 2019	0.00549	0.01759

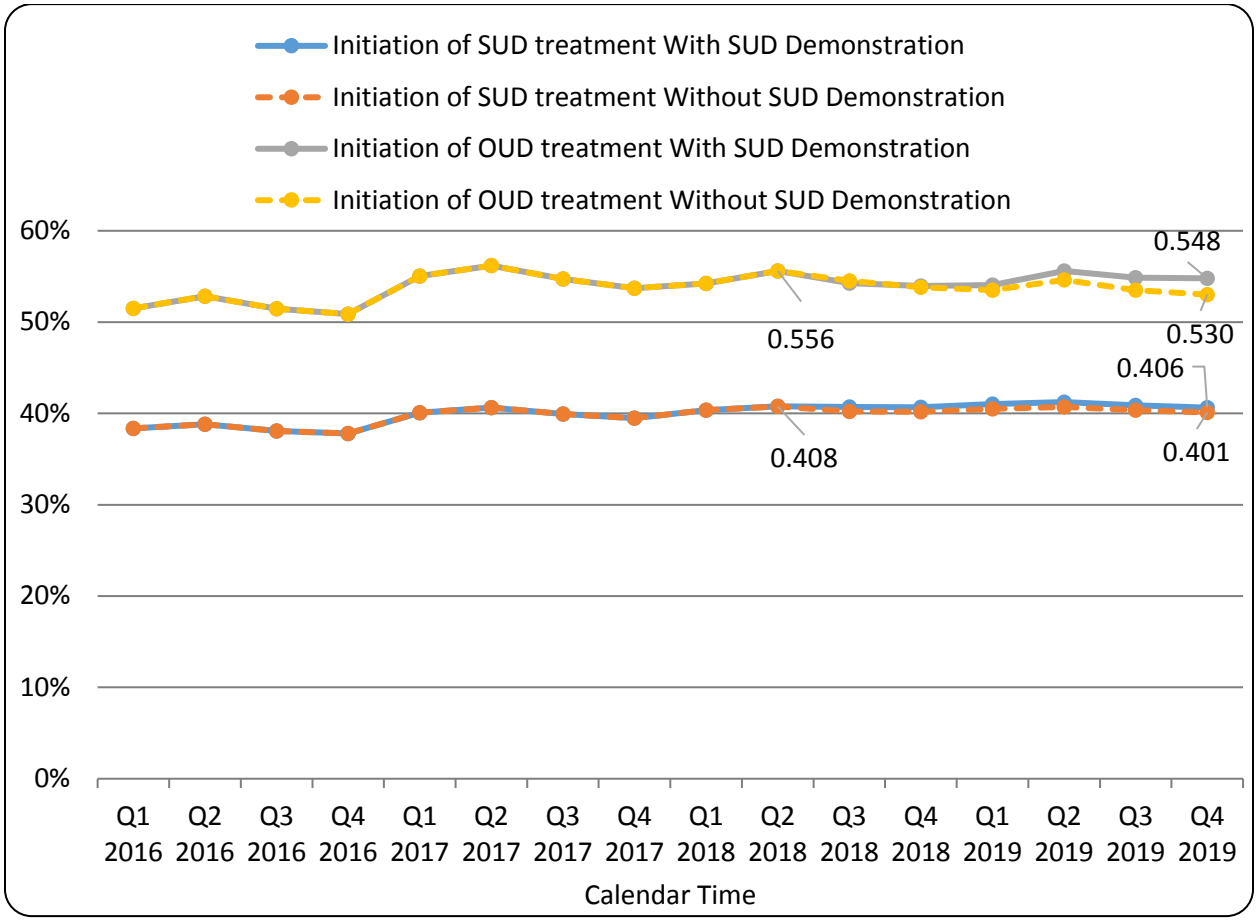
Source: Medicaid Fee-for-Service claims and Managed Care Encounter data, 2016-2019; Analysis by Rutgers Center for State Health Policy;
Notes: SUD=Substance Use Disorder, OUD=Opioid Use Disorder
Index episode-level segmented regression analysis with patient zip code fixed effects.
Models adjusted for sex, CDPS, race, number of comorbidities, dual status, eligibility category, mental health, enrollment days, year and quarter indicators, quarterly time trends, and clustering by patient zip code.
Robust standard errors in parentheses
Overall statistical significance is noted as n.s. (not significant) if the joint effect of policy_post and policy_quarter was not significant.
*** p<0.01, ** p<0.05, * p<0.1

Table 2: Adjusted impact of the SUD demonstration on engagement of treatment for SUD and OUD among Medicaid beneficiaries

SUD Demonstration Impact Estimates	Engagement in SUD treatment *(n=143,677)*	Engagement in OUD treatment *(n=34,698)*
policy_post	0.00652	0.01197
	(0.00427)	(0.01140)
policy_quarter	-0.00290	-0.00027
	(0.00206)	(0.00447)
Overall statistical significance	n.s.	n.s.
Net change as of Dec. 2019	-0.01086	0.01037

Source: Medicaid Fee-for-Service claims and Managed Care Encounter data, 2016-2019; Analysis by Rutgers Center for State Health Policy;
Notes: SUD=Substance Use Disorder, OUD=Opioid Use Disorder
Index episode-level segmented regression analysis with patient zip code fixed effects.
Models adjusted for sex, CDPS, race, number of comorbidities, dual status, eligibility category, mental health, enrollment days, year and quarter indicators, quarterly time trends, and clustering by patient zip code.
Robust standard errors in parentheses
Overall statistical significance is noted as n.s. (not significant) if the joint effect of policy_post and policy_quarter was not significant.
*** p<0.01, ** p<0.05, * p<0.1

Figure 3. Segmented regression-based rates of initiation of treatment for SUD/OUD with and without SUD demonstration among the Medicaid population, 2016-2019

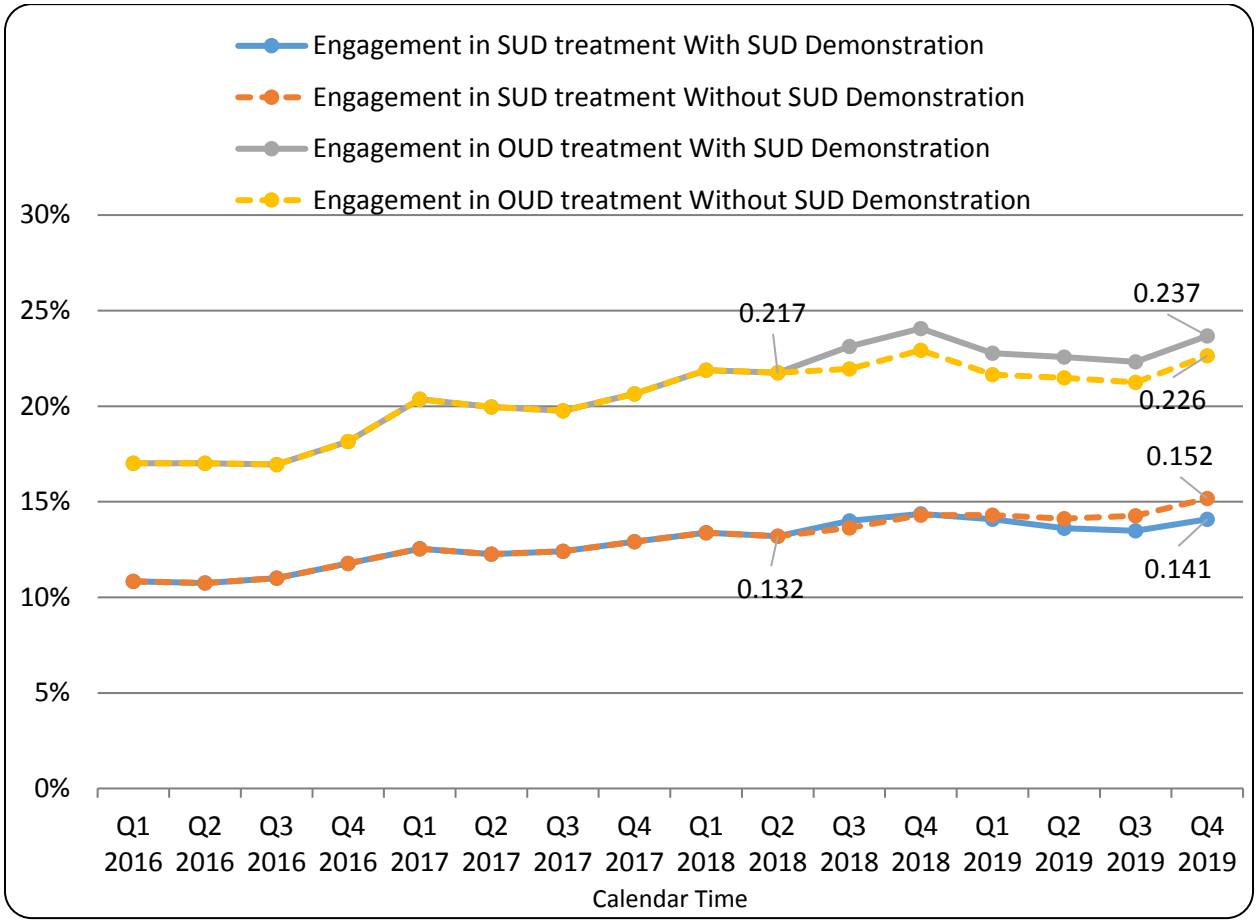


Source: Medicaid Fee-for-Service claims and Managed Care Encounter data, 2016-2019; Analysis by Rutgers Center for State Health Policy.

Notes: SUD=Substance Use Disorder; OUD=Opioid Use Disorder; Horizontal axis corresponds to calendar (not demonstration) years and quarters;

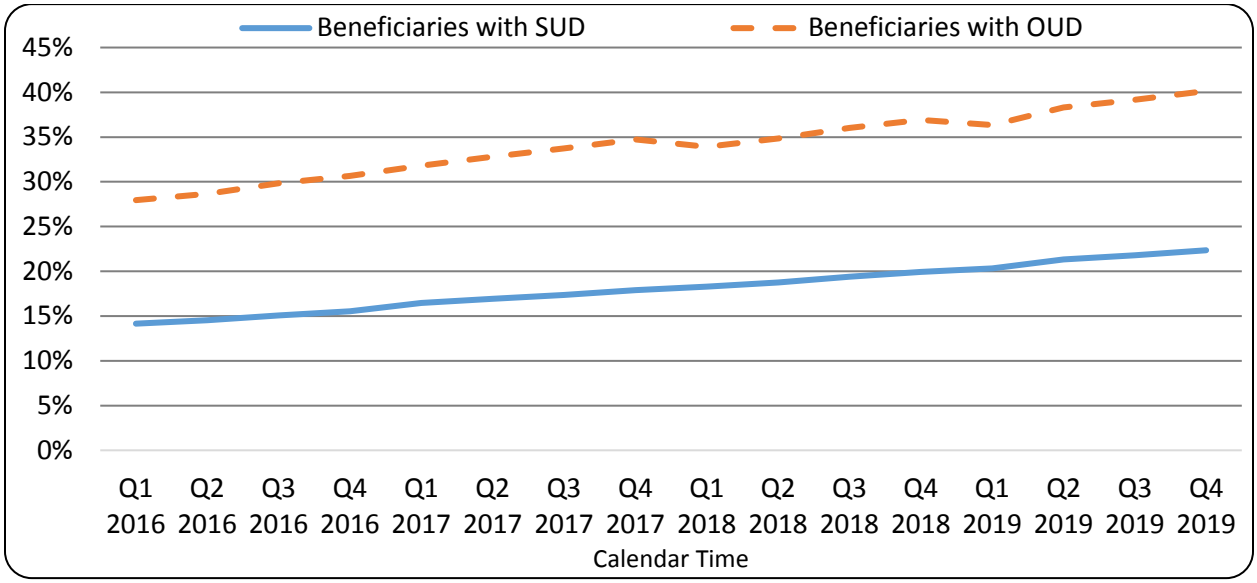
The vertical axis denotes the percent probability of initiation of treatment for SUD/OUD with and without SUD demonstration. Dotted lines demonstrate the rates of initiation as they would have been without SUD demonstration

Figure 4. Segmented regression-based rates of engagement of treatment for SUD/OUD with and without SUD demonstration among the Medicaid population, 2016-2019



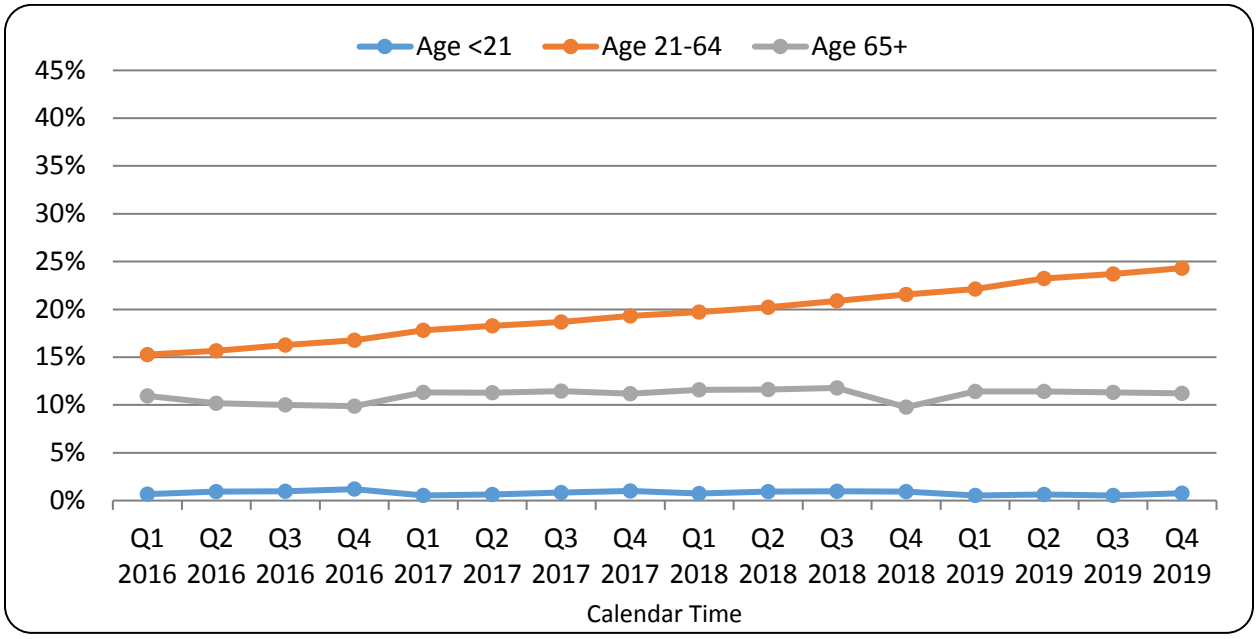
Source: Medicaid Fee-for-Service claims and Managed Care Encounter data, 2016-2019; Analysis by Rutgers Center for State Health Policy;
Notes: SUD=Substance Use Disorder; OUD=Opioid Use Disorder; Horizontal axis corresponds to calendar (not demonstration) years and quarters;
The vertical axis denotes the percent probability of engagement in treatment for SUD/OUD with and without SUD demonstration. Dotted lines demonstrate the rates of engagement as they would have been without SUD demonstration

Figure 5. Quarterly rates of utilization of Medication-Assisted Treatment (MAT) among the Medicaid population with SUD/OUD, 2016-2019



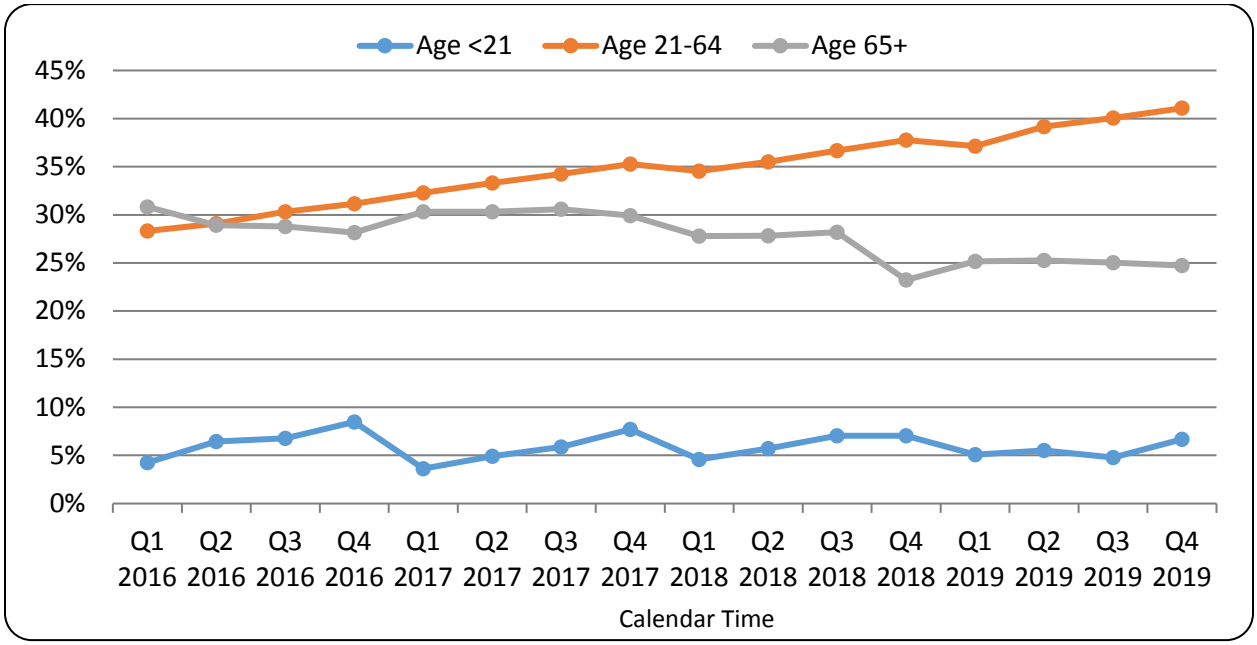
Source: Medicaid Fee-for-Service claims and Managed Care Encounter data, 2016-2019; Analysis by Rutgers Center for State Health Policy;
Notes: SUD=Substance Use Disorder; OUD=Opioid Use Disorder; MAT=Medication Assisted Treatment; Horizontal axis corresponds to calendar (not demonstration) years and quarters; The vertical axis denotes the percent of beneficiaries with SUD/OUD who utilized MAT. These rates have not been adjusted for any covariates and may not reflect policy effects.

Figure 6. Age-stratified quarterly rates of MAT utilization among the Medicaid population with SUD, 2016-2019



Source: Medicaid Fee-for-Service claims and Managed Care Encounter data, 2016-2019; Analysis by Rutgers Center for State Health Policy;
Notes: SUD=Substance Use Disorder; MAT=Medication Assisted Treatment; Horizontal axis corresponds to calendar (not demonstration) years and quarters. The vertical axis denotes the percent of beneficiaries with SUD who utilized MAT. These rates have not been adjusted for any covariates and may not reflect policy effects

Figure 7. Age-stratified quarterly rates of MAT utilization among the Medicaid population with OUD, 2016-2019



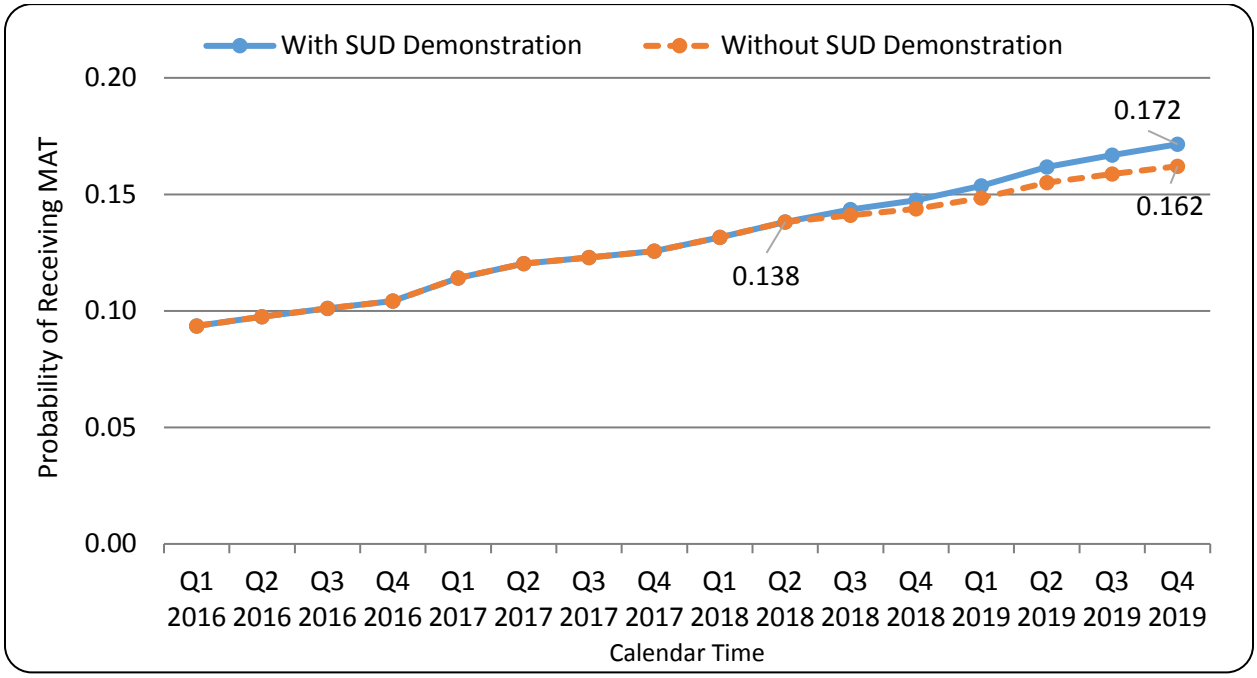
Source: Medicaid Fee-for-Service claims and Managed Care Encounter data, 2016-2019; Analysis by Rutgers Center for State Health Policy;
Notes: OUD=Opioid Use Disorder; MAT=Medication Assisted Treatment; Horizontal axis corresponds to calendar (not demonstration) years and quarters. The vertical axis denotes the percent of beneficiaries with OUD who utilized MAT These rates have not been adjusted for any covariates and may not reflect policy effects

Table 3: Adjusted impact of the SUD demonstration on MAT utilization among Medicaid beneficiaries with SUD

SUD Demonstration Impact Estimates *(n=1,642,035)*	**Utilization of MAT for SUD**
policy_post	0.00096
	(0.00119)
policy_quarter	0.00141**
	(0.00058)
Overall statistical significance	**
Net change as of Dec. 2019	0.00945***

Source: Medicaid Fee-for-Service claims and Managed Care Encounter data, 2016-2019; Analysis by Rutgers Center for State Health Policy
Notes: SUD=Substance Use Disorder; MAT=Medication Assisted Treatment;
Person-quarter level segmented regression analysis with patient zip code fixed effects;
Models adjusted for sex, race, CDPS, number of comorbidities, dual, enrollment days, eligibility category, and mental health status
Robust standard errors in parentheses
Overall statistical significance is noted as n.s. (not significant) if the joint effect of policy_post and policy_quarter was not significant.
*** p<0.01, ** p<0.05, * p<0.1

Figure 8. Segmented regression-based quarterly rates of MAT utilization with and without SUD demonstration among the Medicaid population with SUD, 2016-2019



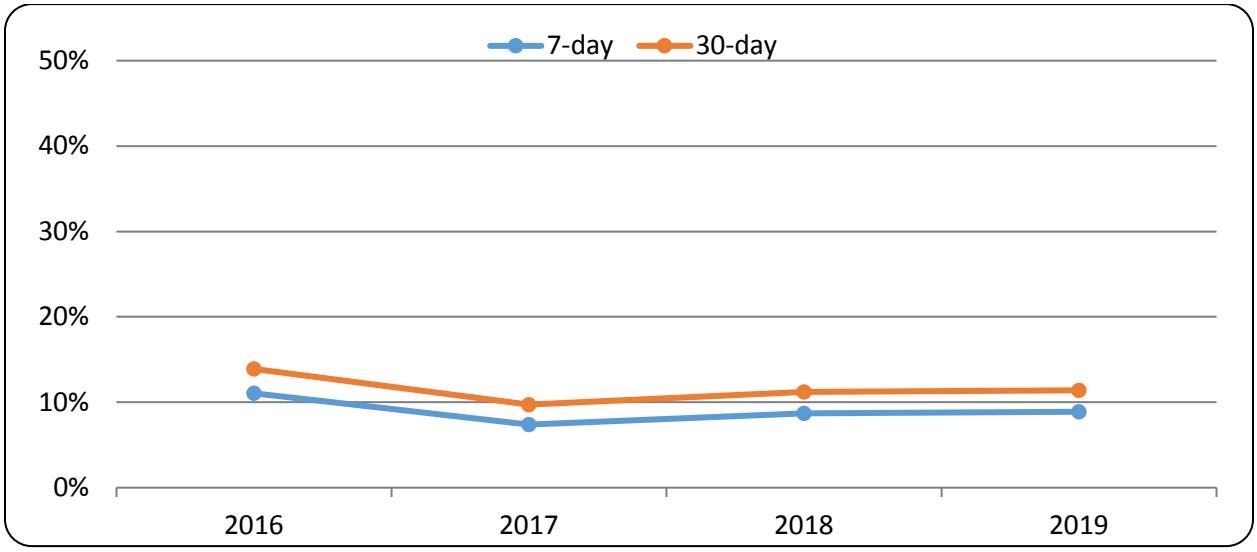
Source: Medicaid Fee-for-Service claims and Managed Care Encounter data, 2016-2019; Analysis by Rutgers Center for State Health Policy;
Notes: SUD=Substance Use Disorder; MAT=Medication Assisted Treatment; Horizontal axis corresponds to calendar (not demonstration) years and quarters. The vertical axis denotes the probability of MAT utilization with and without the SUD demonstration. It ranges between 0 and a maximum of 1 denoting 100% probability. Here the probability of MAT utilization is less than 20% in every quarter. The dotted line demonstrates the rate of MAT utilization as there would have been without the SUD demonstration.

Table 4: Adjusted impact of removal of the IMD exclusion on MAT utilization among Medicaid beneficiaries with SUD age 55-64

SUD Demonstration Impact Estimate (*n=315,607)*	**Utilization of MAT for SUD**
Ages 55-64* Post-Policy	0.06390***

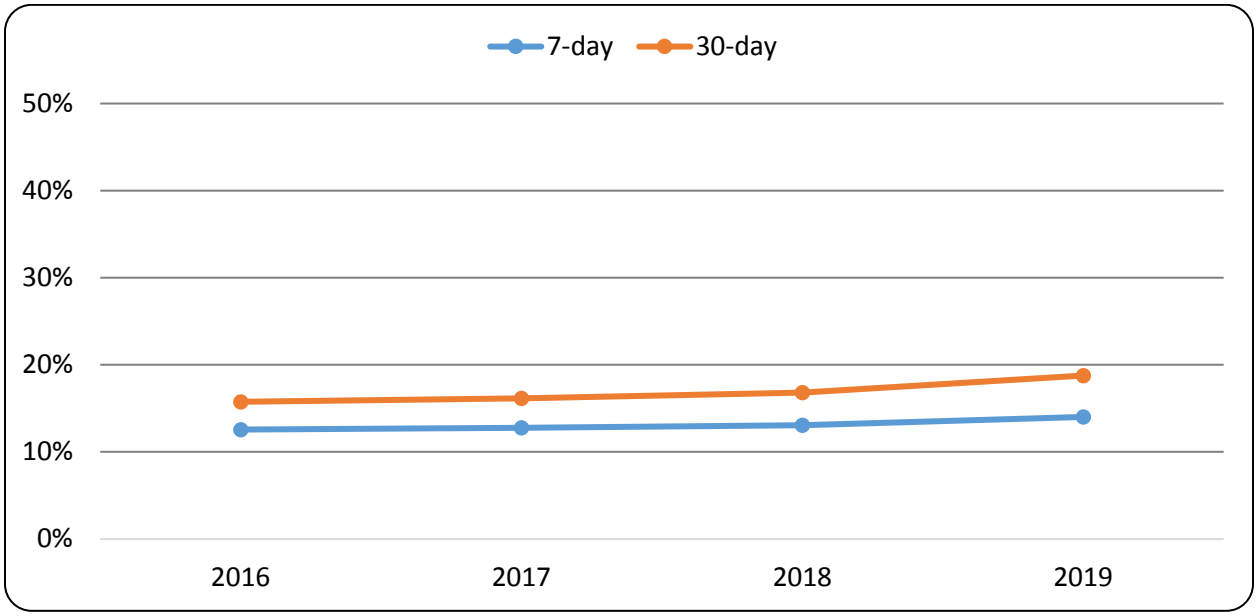
Source: Medicaid Fee-for-Service claims and Managed Care Encounter data, 2016-2019; Analysis by Rutgers Center for State Health Policy;
Notes: SUD=Substance Use Disorder, IMD=Institution for Mental Disease; MAT=Medication Assisted Treatment;
Person-quarter level propensity-matched difference-in-differences regression analysis
Model adjusted for age, sex, CDPS, race, number of comorbidities, mental health status, dual eligibility, and clustering by patient zip code
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Figure 9. Annual rate of 7-day and 30-day follow-up after ED visit for AOD abuse or dependence among the Medicaid population age 13-17, 2016-2019



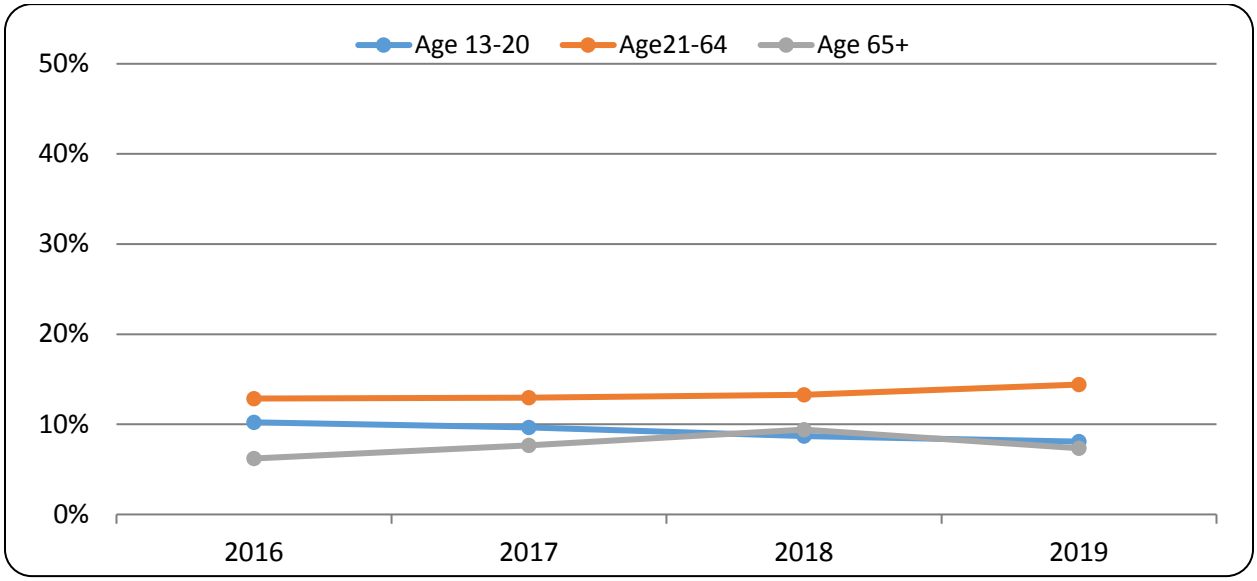
Source: Medicaid Fee-for-Service claims and Managed Care Encounter data, 2016-2019; Analysis by Rutgers Center for State Health Policy;
Notes: ED=Emergency Department; AOD=Alcohol or other drug
The vertical axis denotes the percent of ED visits for AOD abuse or dependence with follow-up visits
These rates have not been adjusted for any covariates and may not reflect policy effects

Figure 10. Annual rate of 7-day and 30-day follow-up after ED visit for AOD abuse or dependence among the Medicaid population age 18+, 2016-2019



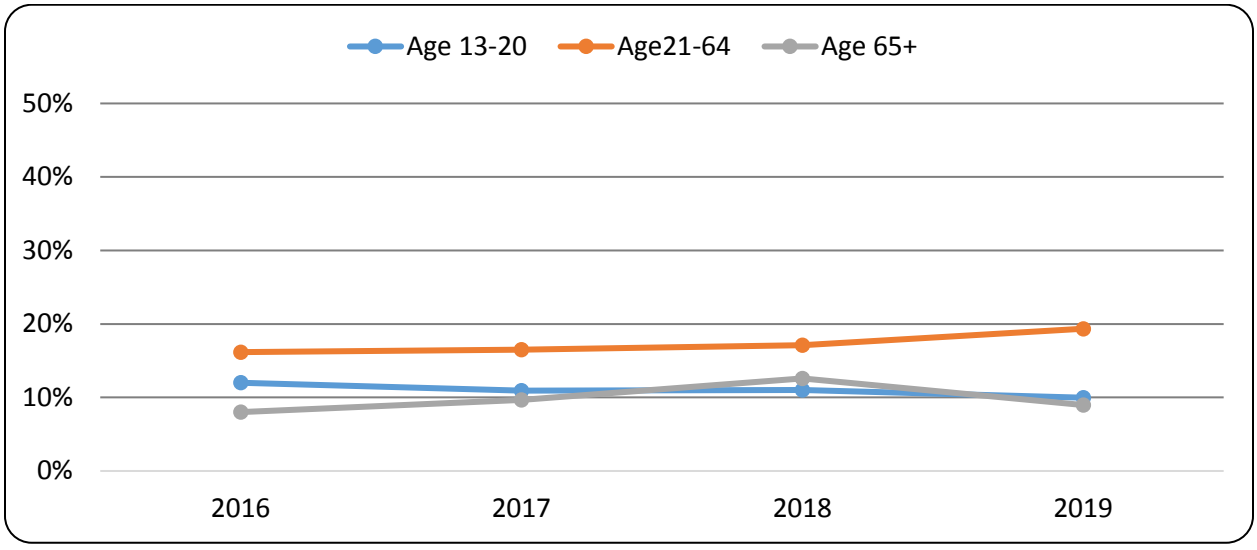
Source: Medicaid Fee-for-Service claims and Managed Care Encounter data, 2016-2019; Analysis by Rutgers Center for State Health Policy;
Notes: ED=Emergency Department; AOD=Alcohol or other drug
The vertical axis denotes the percent of ED visits for AOD abuse or dependence with follow-up visits
These rates have not been adjusted for any covariates and may not reflect policy effects

Figure 11. Age-stratified annual rate of 7-day follow-up after ED visit for AOD abuse or dependence among the Medicaid population, 2016-2019



Source: Medicaid Fee-for-Service claims and Managed Care Encounter data, 2016-2019; Analysis by Rutgers Center for State Health Policy;
Notes: ED=Emergency Department; AOD=Alcohol or other drug
The vertical axis denotes the percent of ED visits for AOD abuse or dependence with a follow-up visit within 7 days
These rates have not been adjusted for any covariates and may not reflect policy effects

Figure 12. Age-stratified annual rate of 30-day follow-up after ED visit for AOD abuse or dependence among the Medicaid population, 2016-2019



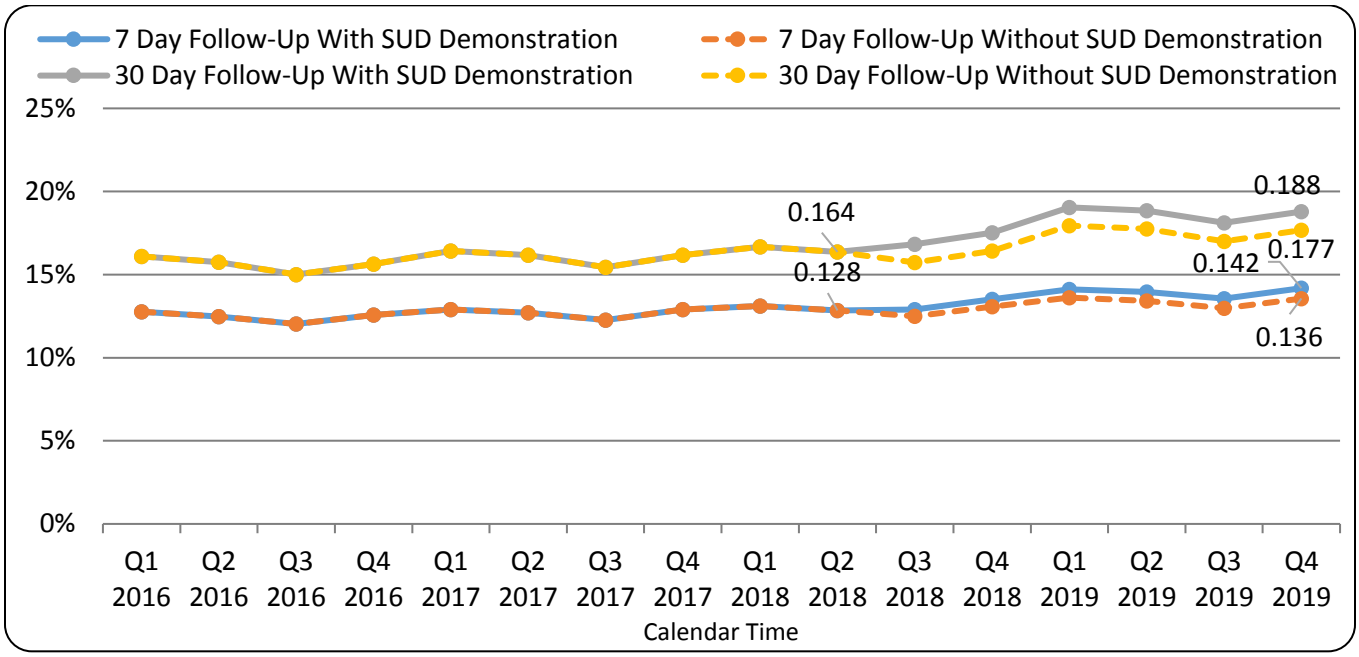
Source: Medicaid Fee-for-Service claims and Managed Care Encounter data, 2016-2019; Analysis by Rutgers Center for State Health Policy;
Notes: ED=Emergency Department; AOD=Alcohol or other drug
The vertical axis denotes the percent of ED visits for AOD abuse or dependence with a follow-up visit within 30 days
These rates have not been adjusted for any covariates and may not reflect policy effects

Table 5: Adjusted impact of the SUD demonstration on 7-day and 30-day rates of follow-up after ED visits for AOD abuse or dependence among Medicaid beneficiaries age 13+

SUD Demonstration Impact Estimates *(n=96,506)*	Follow-up within 7 days	Follow-up within 30 days
policy_post	0.00366	0.01082*
	(0.00539)	(0.00602)
policy_quarter	0.00042	0.00005
	(0.00324)	(0.00347)
Overall statistical significance	n.s.	n.s.
Net change as of Dec. 2019	0.00619	0.01113

Source: Medicaid Fee-for-Service claims and Managed Care Encounter data, 2016-2019; Analysis by Rutgers Center for State Health Policy;
Notes: SUD=Substance Use Disorder;
Person-quarter level segmented regression analysis with patient zip code as fixed effect;
Models adjusted for sex, CDPS, race, number of comorbidities, dual eligibility, eligibility category, mental health status, year and quarter indicators, quarterly time trends, and clustering by provider number;
Robust standard errors in parentheses
Overall statistical significance is noted as n.s. (not significant) if the joint effect of policy_post and policy_quarter was not significant.
*** p<0.01, ** p<0.05, * p<0.1

Figure 13. Segmented regression-based quarterly rates of follow-up after ED visit for AOD abuse or dependence with and without the SUD demonstration among the Medicaid population age 13+, 2016-2019



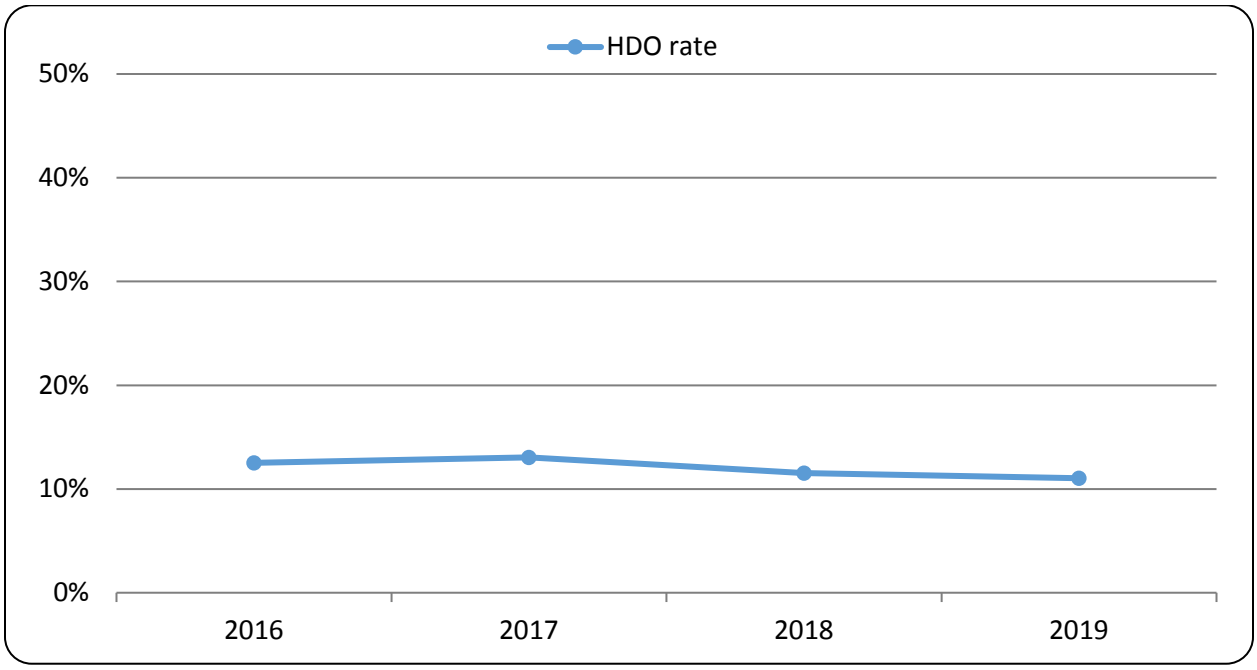
Source: Medicaid Fee-for-Service claims and Managed Care Encounter data, 2016-2019; Analysis by Rutgers Center for State Health Policy;
Notes: ED=Emergency Department; AOD=Alcohol or other drug; SUD=Substance Use Disorder
Horizontal axis corresponds to calendar (not demonstration) years and quarters. The vertical axis denotes percent of follow-up after ED visit with and without SUD demonstration. It ranges between 0 and a max of 100% probability.

Table 6: Adjusted impact of removal of the IMD exclusion on 7-day and 30-day rates of follow-up after ED visits for AOD abuse or dependence among Medicaid beneficiaries age 55-64

SUD Demonstration Impact Estimate *(n=17,706)*	Follow-up within 7 days	Follow-up within 30 days
Ages 55-64* Post-Policy	0.01337	0.02442
	(0.02135)	(0.02306)

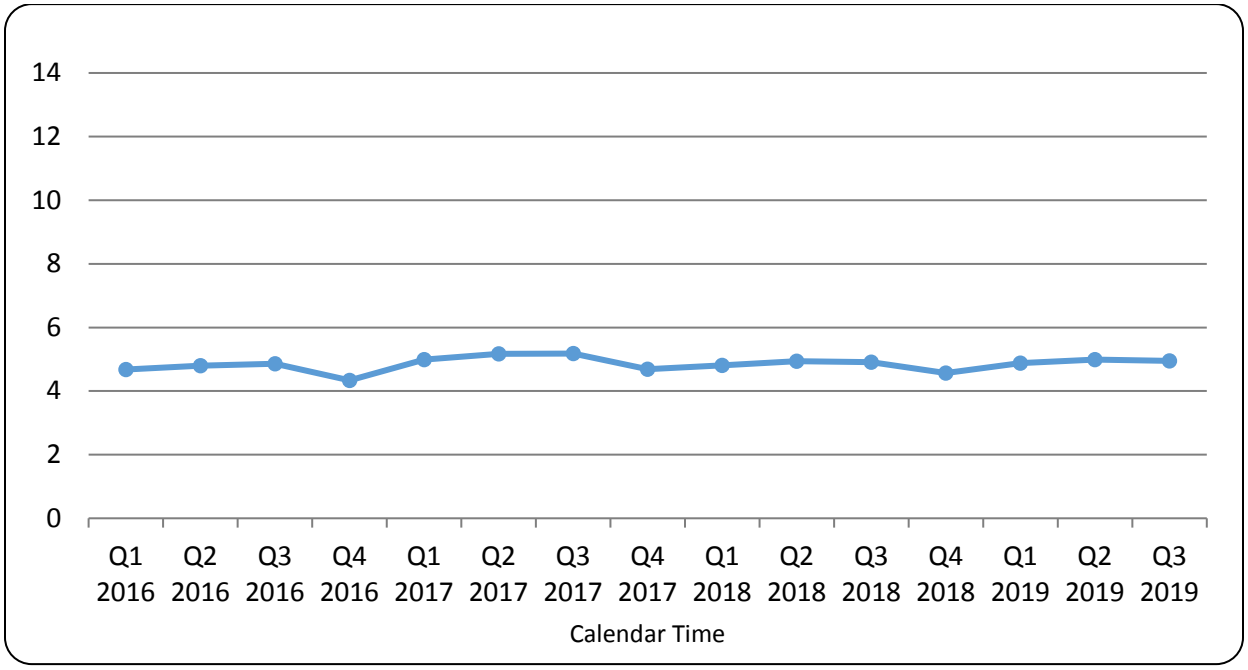
Source: Medicaid Fee-for-Service claims and Managed Care Encounter data, 2016-2019; Analysis by Rutgers Center for State Health Policy;
Notes: ED=Emergency Department; AOD=Alcohol or other drug; SUD=Substance Use Disorder
Index event-level propensity-matched difference-in difference regression analysis;
Models adjusted for age, sex, race, CDPS, number of comorbidities, dual status, quarterly time trends, demonstration initiation, year and quarter indicators, mental health status, and clustering by provider;
Robust standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

Figure 14. Annual proportion of Medicaid beneficiaries age 18+ prescribed opioids who have high dose prescriptions, 2016-2019



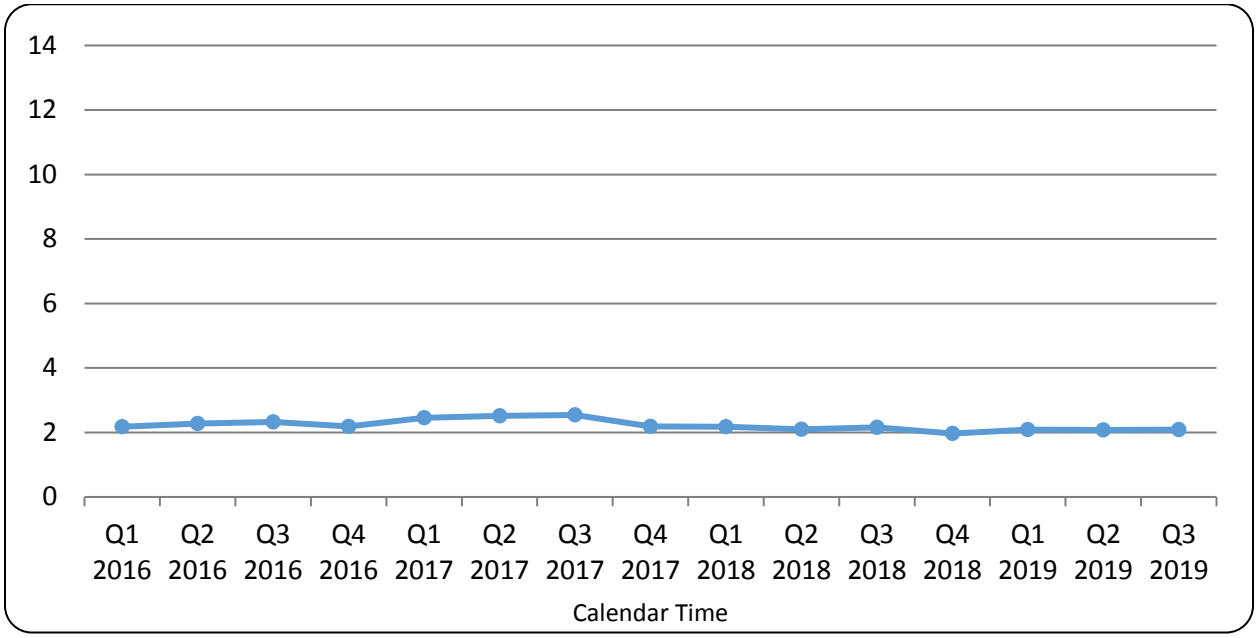
Source: Medicaid Fee-for-Service claims and Managed Care Encounter data, 2016-2019; Analysis by Rutgers Center for State Health Policy;
Notes: HDO=High Dose Opioid
The vertical axis denotes the proportion of Medicaid population age 18+ with high dose opioid usage
This has not been adjusted for any covariates and may not reflect policy effects

Figure 15. Quarterly number of Medicaid beneficiaries per 1,000 with an inpatient stay for SUD, 2016-2019



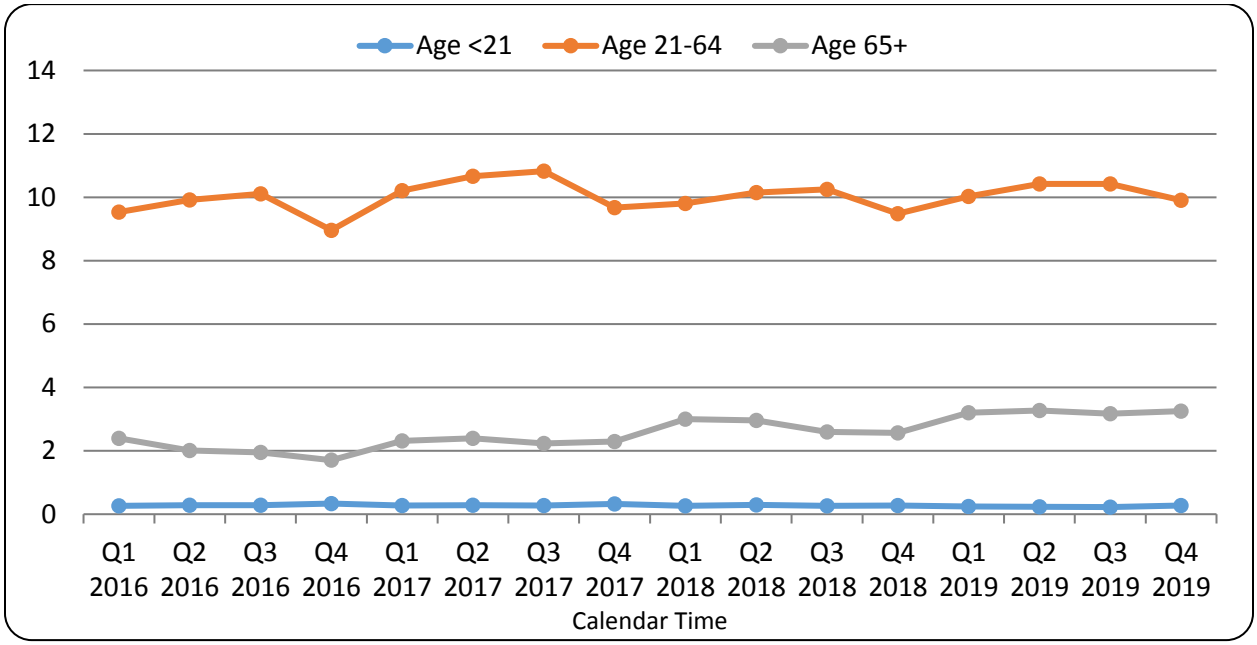
Source: Medicaid Fee-for-Service claims and Managed Care Encounter data, 2016-2019; Analysis by Rutgers Center for State Health Policy;
Notes: SUD=Substance Use Disorder; Horizontal axis corresponds to calendar (not demonstration) years and quarters.
The vertical axis denotes the number of Medicaid beneficiaries per 1,000 with an inpatient stay for SUD
This has not been adjusted for any covariates and may not reflect policy effects

Figure 16. Quarterly number of Medicaid beneficiaries per 1,000 with an inpatient stay for OUD, 2016-2019



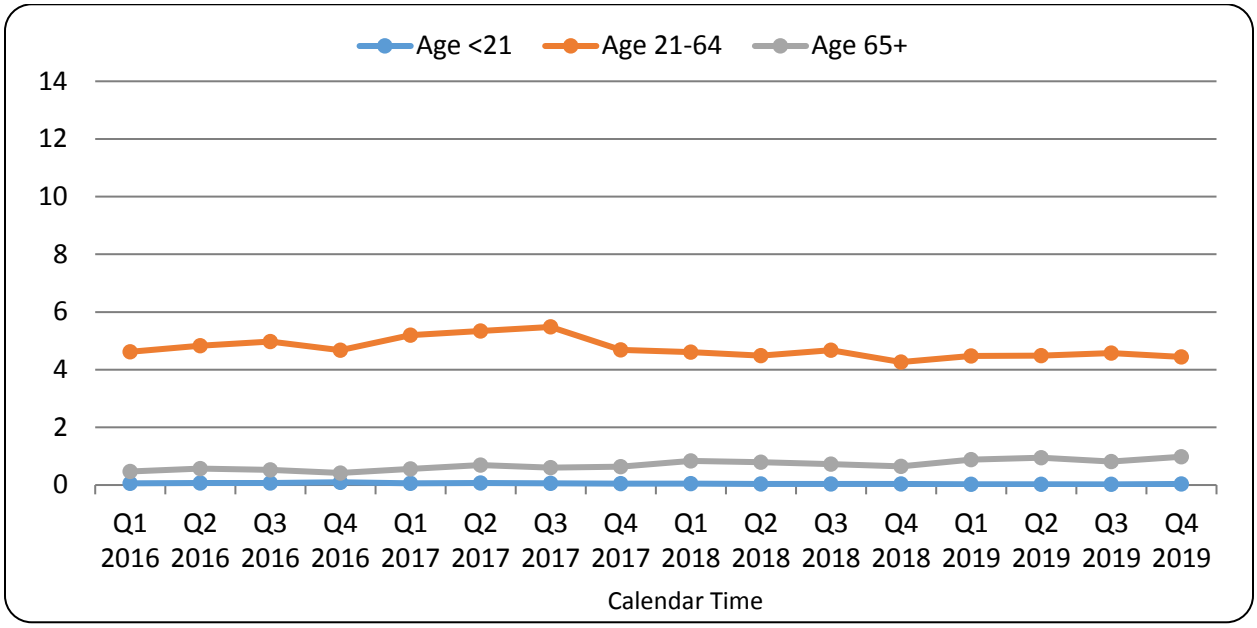
Source: Medicaid Fee-for-Service claims and Managed Care Encounter data, 2016-2019; Analysis by Rutgers Center for State Health Policy;
Notes: OUD=Opioid Use Disorder; Horizontal axis corresponds to calendar (not demonstration) years and quarters.
The vertical axis denotes the number of Medicaid beneficiaries per 1,000 with an inpatient stay for OUD
This has not been adjusted for any covariates and may not reflect policy effects

Figure 17. Age-stratified quarterly number of Medicaid beneficiaries per 1,000 with an inpatient stay for SUD, 2016-2019



Source: Medicaid Fee-for-Service claims and Managed Care Encounter data, 2016-2019; Analysis by Rutgers Center for State Health Policy;
Notes: SUD=Substance Use Disorder; Horizontal axis corresponds to calendar (not demonstration) years and quarters.
The vertical axis denotes the number of Medicaid beneficiaries per 1,000 with an inpatient stay for SUD
This has not been adjusted for any covariates and may not reflect policy effects

Figure 18. Age-stratified quarterly number of Medicaid beneficiaries per 1,000 with an inpatient stay for OUD, 2016-2019



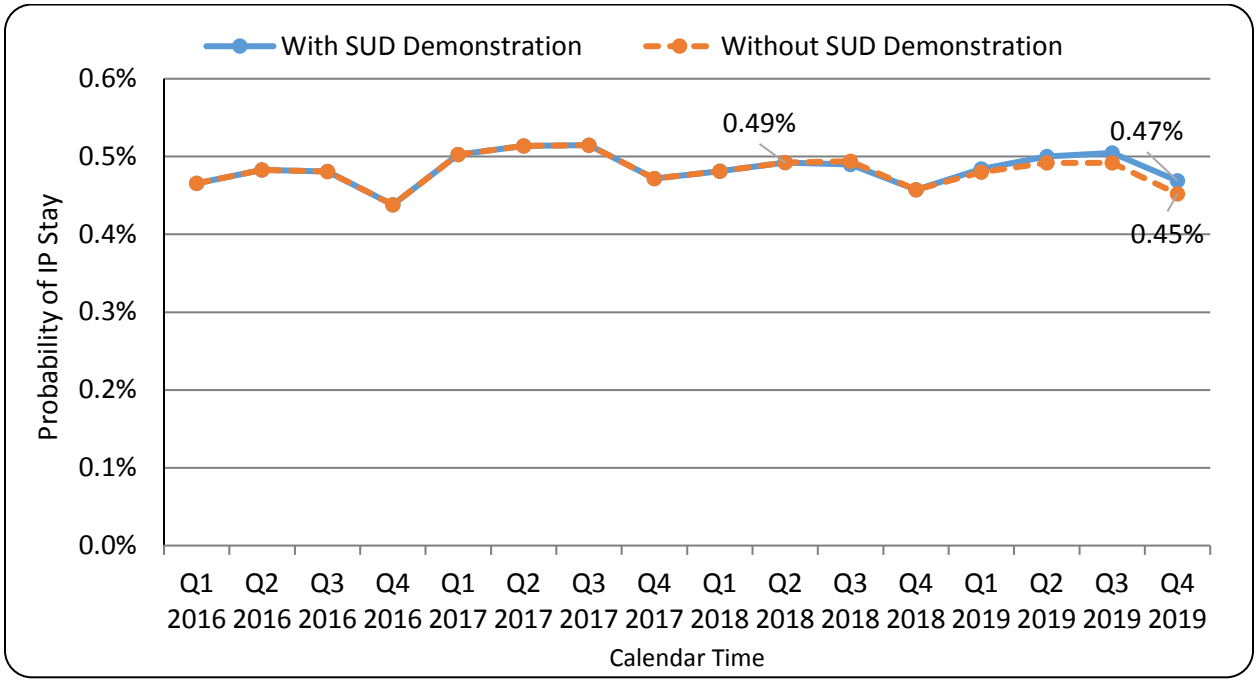
Source: Medicaid Fee-for-Service claims and Managed Care Encounter data, 2016-2019; Analysis by Rutgers Center for State Health Policy;
Notes: OUD=Opioid Use Disorder; Horizontal axis corresponds to calendar (not demonstration) years and quarters.
The vertical axis denotes the number of Medicaid beneficiaries per 1,000 with an inpatient stay for OUD.
This has not been adjusted for any covariates and may not reflect policy effects

Table 7: Adjusted impact of the SUD demonstration on inpatient stays for SUD and OUD among Medicaid beneficiaries

SUD Demonstration Impact Estimates *(n=30,065,668)*	IP stays for SUD	IP stays for OUD
policy_post	-0.00008	-0.00007**
	(0.00006)	(0.00004)
policy_quarter	0.00004	0.00002
	(0.00003)	(0.00002)
Overall statistical significance	n.s.	n.s.
Net change as of Dec. 2019	0.00017	0.00006

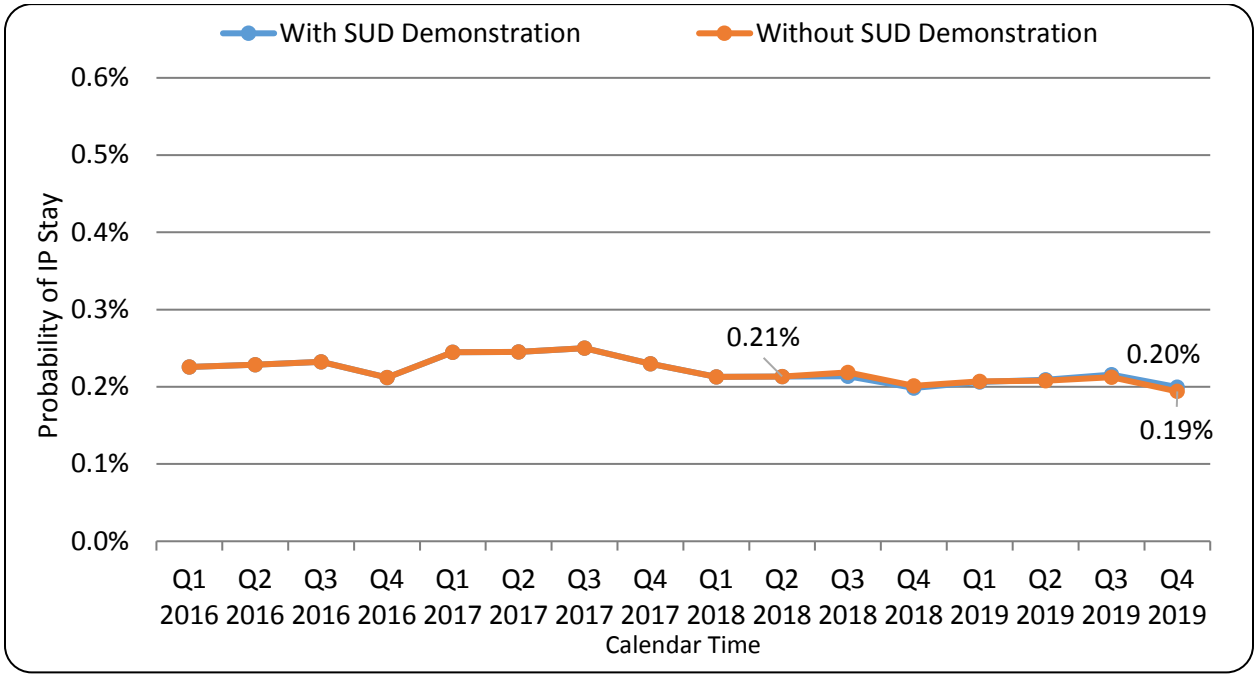
Source: Medicaid Fee-for-Service claims and Managed Care Encounter data, 2016-2019; Analysis by Rutgers Center for State Health Policy
Notes: SUD=Substance Use Disorder; OUD=Opioid Use Disorder; IP=Inpatient;
Person-quarter level segmented regression analysis with patient zip code fixed effects;
Models adjusted for sex, race, CDPS, number of comorbidities, dual status, enrollment days, eligibility category, mental health status, quarterly time trends, year and quarter indicators, and clustering by patient zip code
Robust standard errors in parentheses
Overall statistical significance is noted as n.s. (not significant) if the joint effect of policy_post and policy_quarter was not significant.
*** p<0.01, ** p<0.05, * p<0.1

Figure 19. Segmented regression-based quarterly probability of IP stays for SUD with and without the SUD demonstration among the Medicaid population, 2016-2019



Source: Medicaid Fee-for-Service claims and Managed Care Encounter data, 2016-2019; Analysis by Rutgers Center for State Health Policy;
Notes: IP=Inpatient; SUD=Substance Use Disorder
Horizontal axis corresponds to calendar (not demonstration) years and quarters.
The vertical axis denotes probability of an IP stay for SUD

Figure 20. Segmented regression-based quarterly probability of IP stays for OUD with and without the SUD demonstration among the Medicaid population, 2016-2019



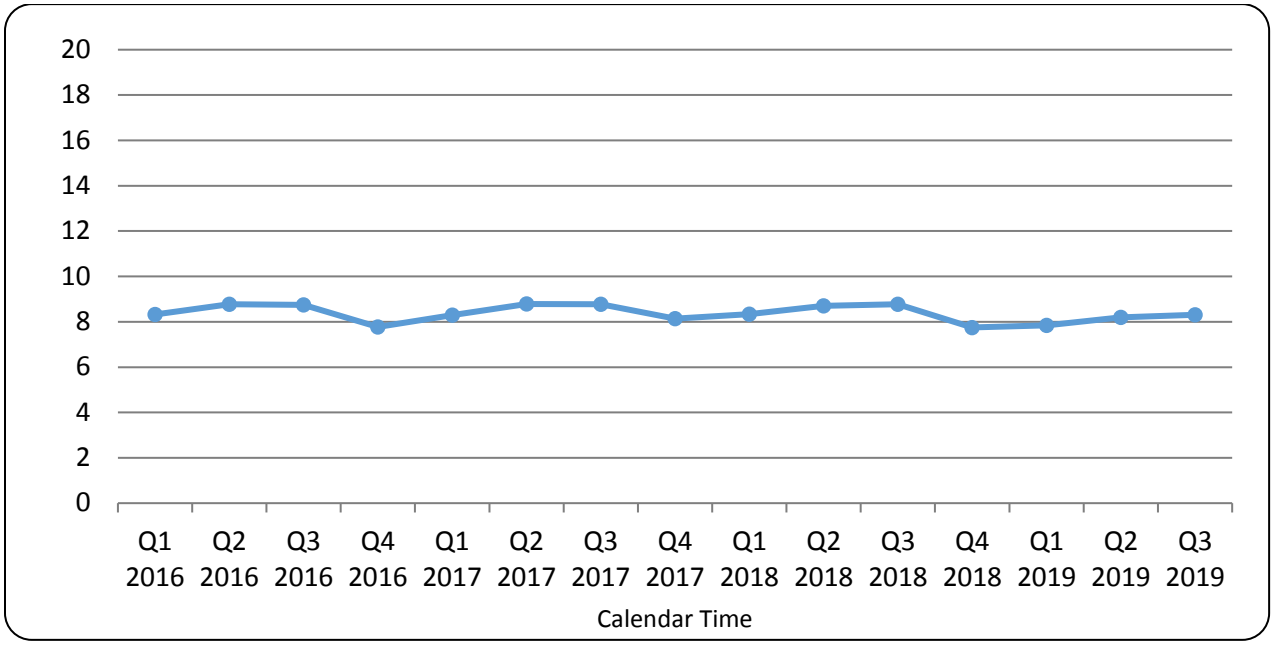
Source: Medicaid Fee-for-Service claims and Managed Care Encounter data, 2016-2019; Analysis by Rutgers Center for State Health Policy;
Notes: IP=Inpatient; OUD=Opioid Use Disorder
Horizontal axis corresponds to calendar (not demonstration) years and quarters.
The vertical axis denotes probability of an IP stay for OUD

Table 8: Adjusted impact of removal of the IMD exclusion on IP stays for SUD and OUD among Medicaid beneficiaries age 55-64

SUD Demonstration Impact Estimates (*n=5,136,008)*	**IP stays for SUD**	**IP stays for OUD**
Ages 55-64* Post-Policy	-0.00371	-0.00019

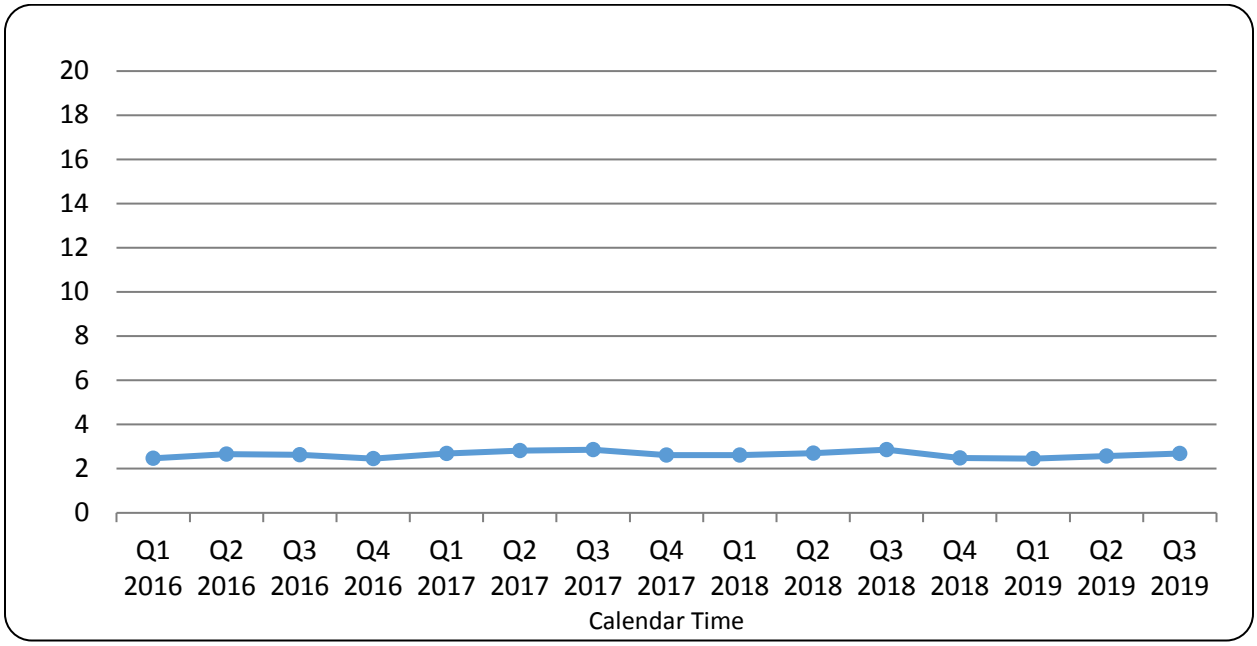
Source: Medicaid Fee-for-Service claims and Managed Care Encounter data, 2016-2019; Analysis by Rutgers Center for State Health Policy;
Notes: SUD=Substance Use Disorder, OUD=Opioid Use Disorder, IP stay=Inpatient stay; IMD=Institution for Mental Disease
Person-quarter level propensity-matched difference-in difference regression analysis
Models adjusted for age, sex, race, CDPS, number of comorbidities, dual status, enrollment days, eligibility category, mental health status, quarterly time trends, demonstration initiation, year and quarter indicators, and clustering by patient zip code
Robust standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

Figure 21. Quarterly number of Medicaid beneficiaries per 1,000 with an ED visit for SUD, 2016-2019



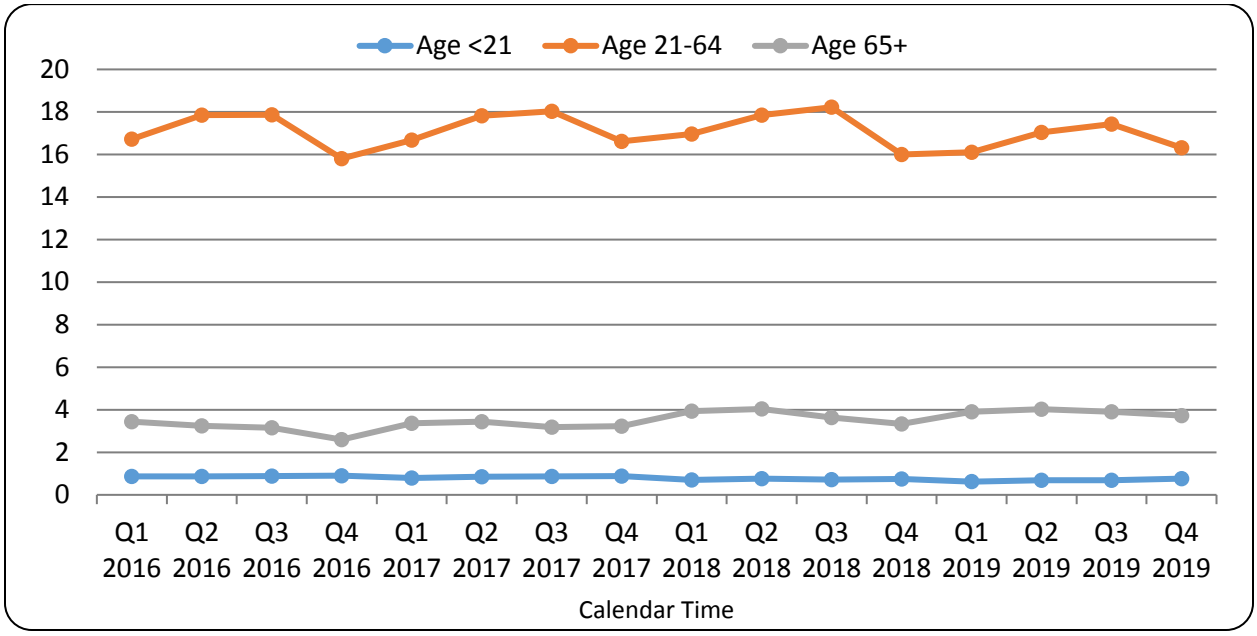
Source: Medicaid Fee-for-Service claims and Managed Care Encounter data, 2016-2019; Analysis by Rutgers Center for State Health Policy; Notes: ED=Emergency Department; SUD=Substance Use Disorder; Horizontal axis corresponds to calendar (not demonstration) years and quarters. The vertical axis denotes the average number of Medicaid beneficiaries per 1,000 with an ED visit for SUD.
This has not been adjusted for any covariates and may not reflect policy effects

Figure 22. Quarterly number of Medicaid beneficiaries per 1,000 with an ED visit for OUD, 2016-2019



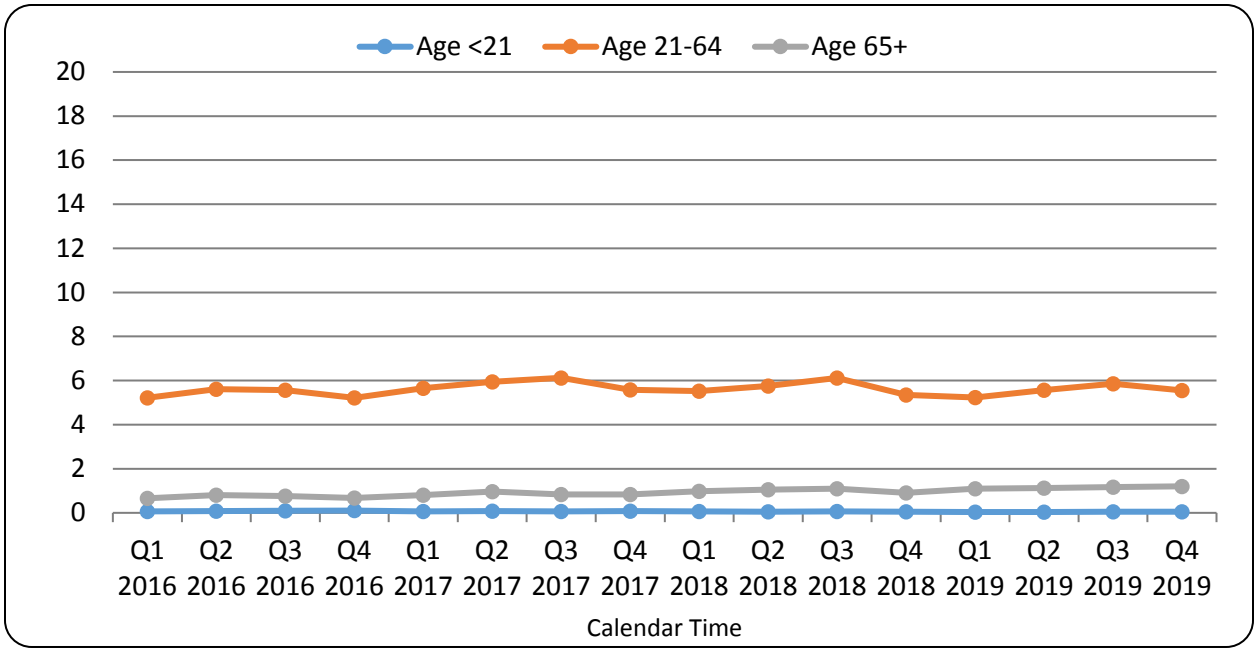
Source: Medicaid Fee-for-Service claims and Managed Care Encounter data, 2016-2019; Analysis by Rutgers Center for State Health Policy; Notes: ED=Emergency Department; OUD=Opioid Use Disorder; Horizontal axis corresponds to calendar (not demonstration) years and quarters. The vertical axis denotes the number of Medicaid beneficiaries per 1,000 with an ED visit for OUD
This has not been adjusted for any covariates and may not reflect policy effects

Figure 23. Age-stratified quarterly number of Medicaid beneficiaries per 1,000 with an ED visit for SUD, 2016-2019



Source: Medicaid Fee-for-Service claims and Managed Care Encounter data, 2016-2019; Analysis by Rutgers Center for State Health Policy;
Notes: ED=Emergency Department; SUD=Substance Use Disorder; Horizontal axis corresponds to calendar (not demonstration) years and quarters. The vertical axis denotes the number of Medicaid beneficiaries per 1,000 with an ED visit for SUD
This has not been adjusted for any covariates and may not reflect policy effects

Figure 24. Age-stratified quarterly number of Medicaid beneficiaries per 1,000 with an ED visit for OUD, 2016-2019



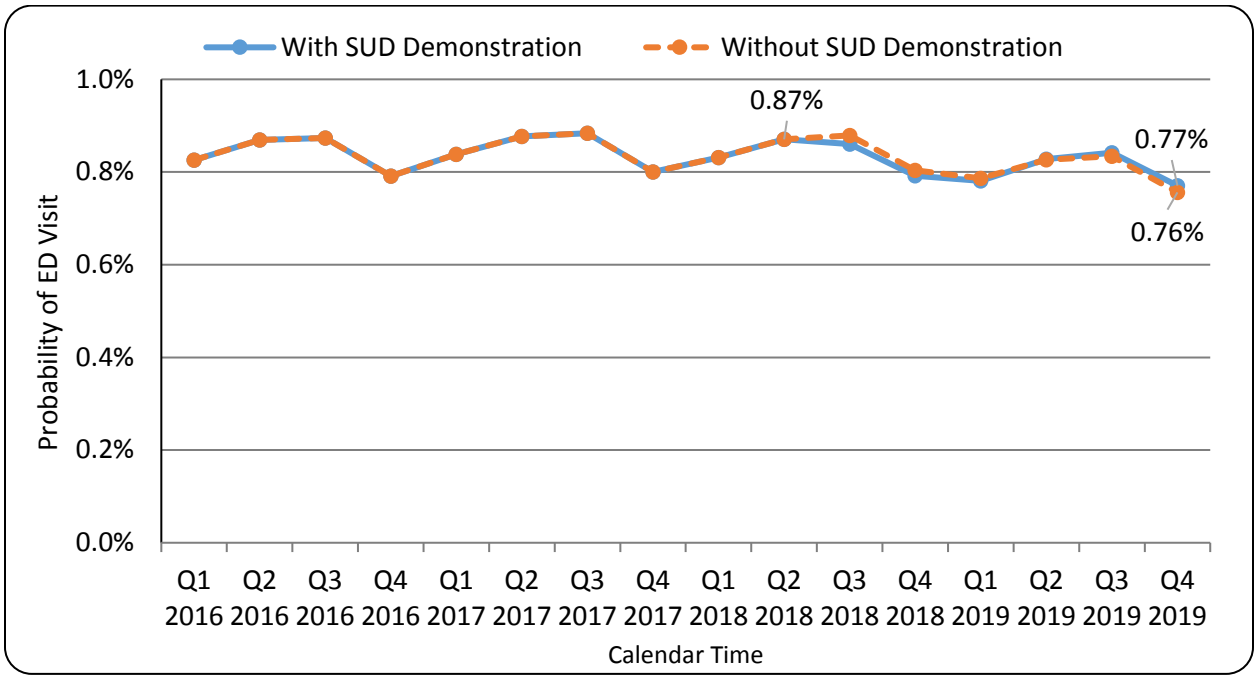
Source: Medicaid Fee-for-Service claims and Managed Care Encounter data, 2016-2019; Analysis by Rutgers Center for State Health Policy;
Notes: ED=Emergency Department; OUD=Opioid Use Disorder; Horizontal axis corresponds to calendar (not demonstration) years and quarters. The vertical axis denotes the number of Medicaid beneficiaries per 1,000 with an ED visit for OUD.
This has not been adjusted for any covariates and may not reflect policy effects.

Table 9: Adjusted impact of the SUD demonstration on ED visits for SUD and OUD among Medicaid beneficiaries

SUD Demonstration Impact Estimates *(n=30,065,668)*	ED visits for SUD	ED visits for OUD
policy_post	-0.00025***	-0.00005
	(0.00008)	(0.00005)
policy_quarter	0.00007*	0.00003
	(0.00004)	(0.00002)
Overall statistical significance	***	n.s.
Net change as of Dec. 2019	0.00014	0.00015

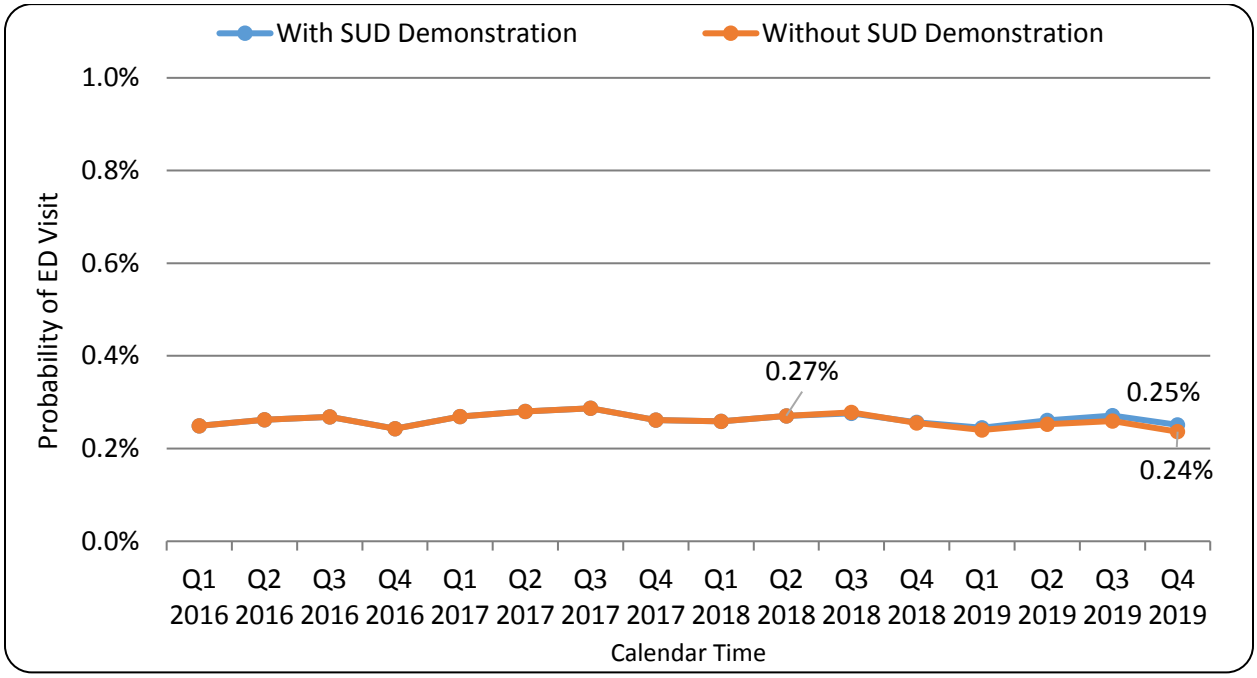
Source: Medicaid Fee-for-Service claims and Managed Care Encounter data, 2016-2019; Analysis by Rutgers Center for State Health Policy
Notes: SUD=Substance Use Disorder; OUD=Opioid Use Disorder; ED=Emergency Department
Person-quarter level segmented regression analysis with patient zip code fixed effects;
Models adjusted for sex, race, CDPS, number of comorbidities, dual status, enrollment days, eligibility category, mental health status, quarterly time trends, year and quarter indicators, and clustering by patient zip code
Robust standard errors in parentheses
Overall statistical significance is noted as n.s. (not significant) if the joint effect of policy_post and policy_quarter was not significant.
*** p<0.01, ** p<0.05, * p<0.1

Figure 25. Segmented regression-based quarterly probability of an ED visit for SUD with and without the SUD demonstration among the Medicaid population, 2016-2019



Source: Medicaid Fee-for-Service claims and Managed Care Encounter data, 2016-2019; Analysis by Rutgers Center for State Health Policy;
Notes: ED=Emergency Department; SUD=Substance Use Disorder
Horizontal axis corresponds to calendar (not demonstration) years and quarters. The vertical axis denotes probability of an ED visit for SUD.

Figure 26. Segmented regression-based quarterly probability of an ED visit for OUD with and without the SUD demonstration among the Medicaid population, 2016-2019



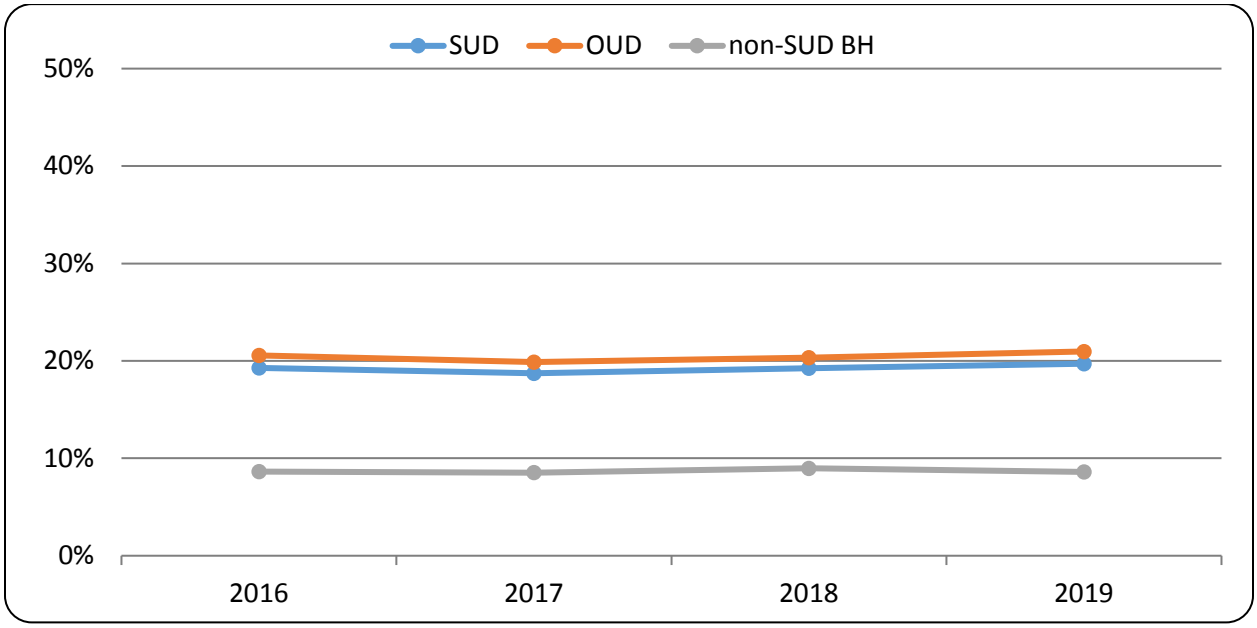
Source: Medicaid Fee-for-Service claims and Managed Care Encounter data, 2016-2019; Analysis by Rutgers Center for State Health Policy;
Notes: ED=Emergency Department; OUD=Opioid Use Disorder
Horizontal axis corresponds to calendar (not demonstration) years and quarters. The vertical axis denotes probability of an ED visit for OUD

Table 10: Adjusted impact of removal of the IMD exclusion on ED visits for SUD and OUD among Medicaid beneficiaries age 55-64

SUD Demonstration Impact Estimates (*n=5,136,008)*	**ED visits for SUD**	**ED visits for OUD**
Ages 55-64* Post-Policy	0.00069	-0.00075

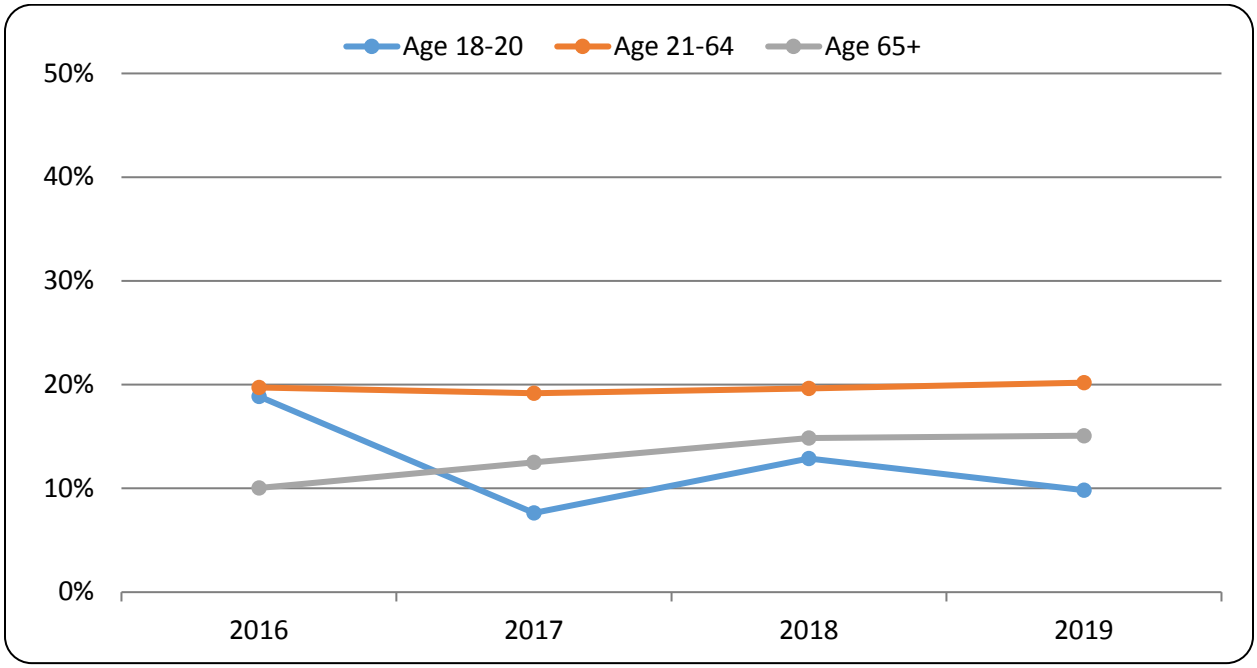
Source: Medicaid Fee-for-Service claims and Managed Care Encounter data, 2016-2019; Analysis by Rutgers Center for State Health Policy;
Notes: SUD=Substance Use Disorder, OUD=Opioid Use Disorder, IP stay=Inpatient stay; IMD=Institution for Mental Disease
Person-quarter level propensity-matched difference-in difference regression analysis
Models adjusted for age, sex, race, CDPS, number of comorbidities, dual status, enrollment days, eligibility category, mental health status, quarterly time trends, demonstration initiation, year and quarter indicators, and clustering by patient zip code
Robust standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

Figure 27. Annual rates of 30-day readmissions among Medicaid beneficiaries age 18+ with SUD, OUD, and a comparison population, 2016-2019



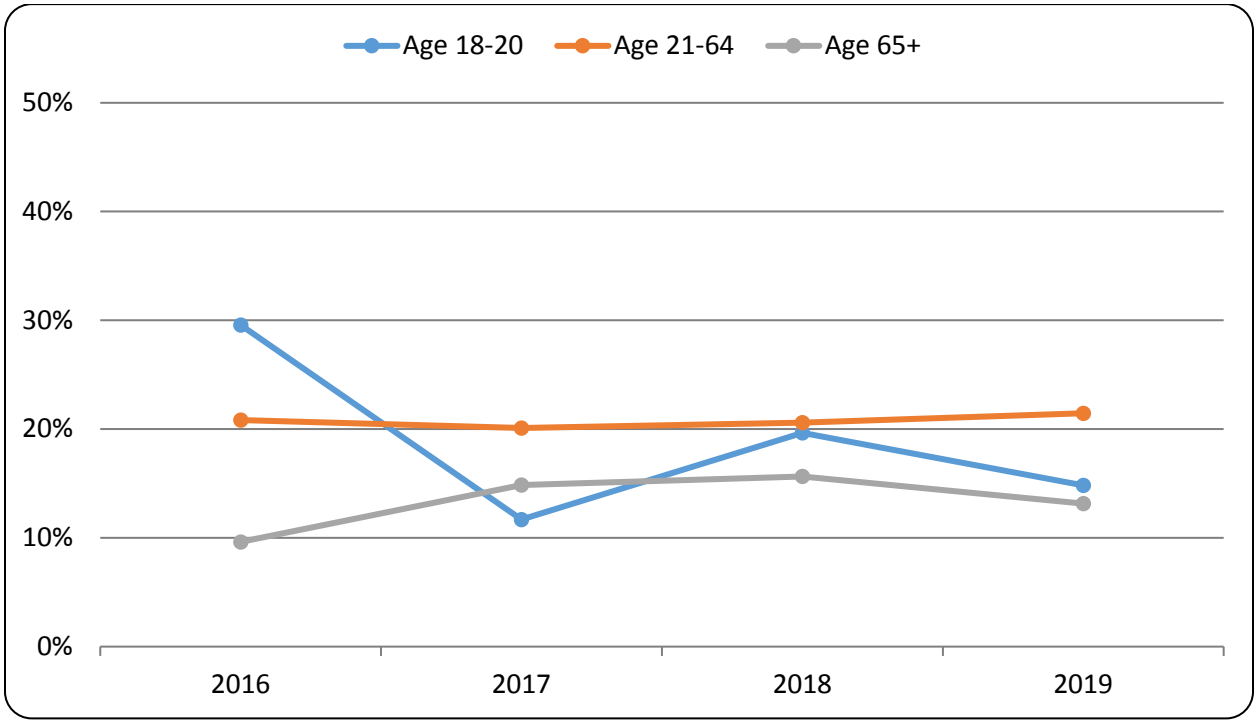
Source: Medicaid Fee-for-Service claims and Managed Care Encounter data, 2016-2019; Analysis by Rutgers Center for State Health Policy;
Notes: SUD=Substance Use Disorder; OUD=Opioid Use Disorder; BH=Behavioral Health
The vertical axis denotes percent of index hospitalizations resulting in a readmission within 30 days.
This has not been adjusted for any covariates and may not reflect policy effects

Figure 28. Age-stratified annual rates of 30-day readmissions among Medicaid beneficiaries with SUD, 2016-2019



Source: Medicaid Fee-for-Service claims and Managed Care Encounter data, 2016-2019; Analysis by Rutgers Center for State Health Policy;
Notes: SUD=Substance Use Disorder
The vertical axis denotes percent of index hospitalizations resulting in a readmission within 30 days.
This has not been adjusted for any covariates and may not reflect policy effects

Figure 29. Age-stratified annual rates of 30-day readmissions among Medicaid beneficiaries with OUD, 2016-2019



Source: Medicaid Fee-for-Service claims and Managed Care Encounter data, 2016-2019; Analysis by Rutgers Center for State Health Policy;
Notes: OUD=Opioid Use Disorder
The vertical axis denotes percent of index hospitalizations resulting in a readmission within 30 days.
This has not been adjusted for any covariates and may not reflect policy effects

Table 11: Adjusted impact of the SUD demonstration on 30-day readmission rates among Medicaid beneficiaries age 18+ with SUD

SUD Demonstration Impact Estimate *(n=211,665)*	**30-day Readmission**
SUD* Post-Policy	0.00555
	(0.00645)

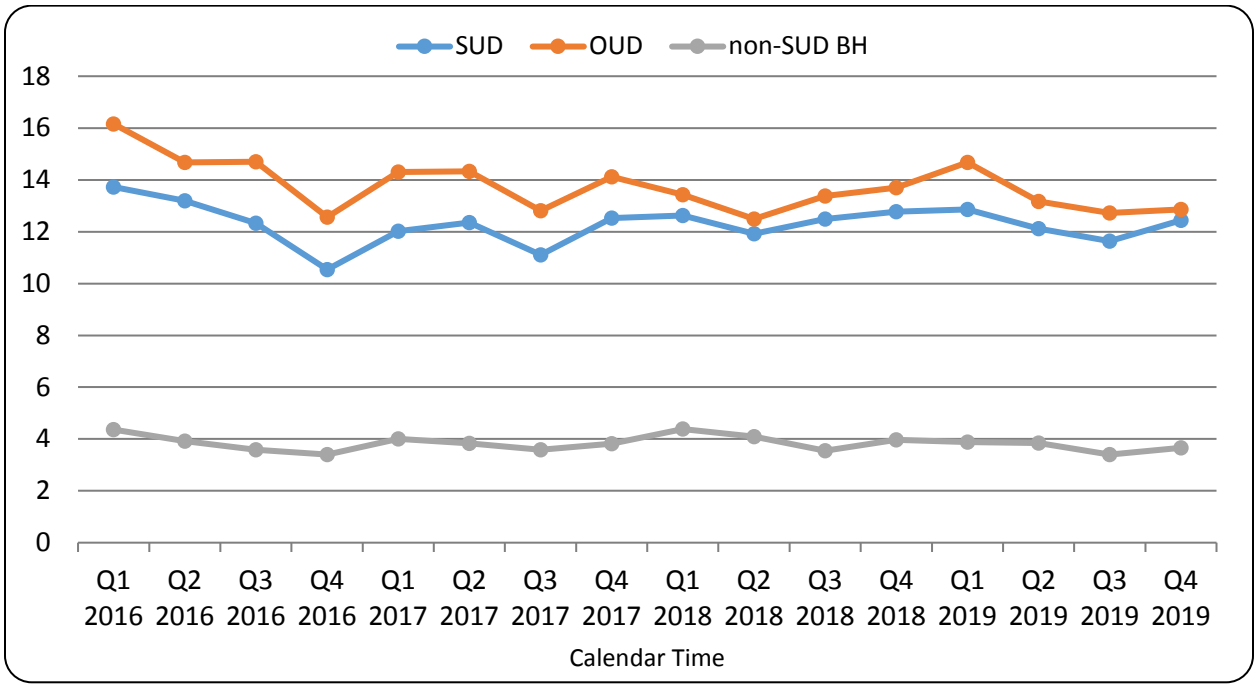
Source: Medicaid Fee-for-Service claims and Managed Care Encounter data, 2016-2019; Analysis by Rutgers Center for State Health Policy;
Notes: SUD=Substance Use Disorder
Index-event level propensity-matched difference-in difference regression analysis
Models adjusted for age, sex, race, readmission risk factors shown in Appendix E, dual status, eligibility category, quarterly time trends, demonstration initiation, year and quarter indicators, and clustering by provider
Robust standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

Table 12: Adjusted impact of the removal of the IMD exclusion on 30-day readmission rates among Medicaid beneficiaries age 18+ with SUD

SUD Demonstration Impact Estimate *(n=29,882)*	30-day Readmission
Ages 55-64* Post-Policy	0.01482
	(0.02865)

Source: Medicaid Fee-for-Service claims and Managed Care Encounter data, 2016-2019; Analysis by Rutgers Center for State Health Policy;
Notes: SUD=Substance Use Disorder; IMD=Institution for Mental Disease
Index-event level propensity-matched difference-in difference regression analysis
Models adjusted for age, sex, race, readmission risk factors shown in Appendix E, dual status, quarterly time trends, demonstration initiation, year and quarter indicators, mental health status, and clustering by provider
Robust standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

Figure 30. Quarterly rates of avoidable hospitalizations per 1,000 Medicaid beneficiaries age 6+ with SUD, OUD, and a comparison population, 2016-2019



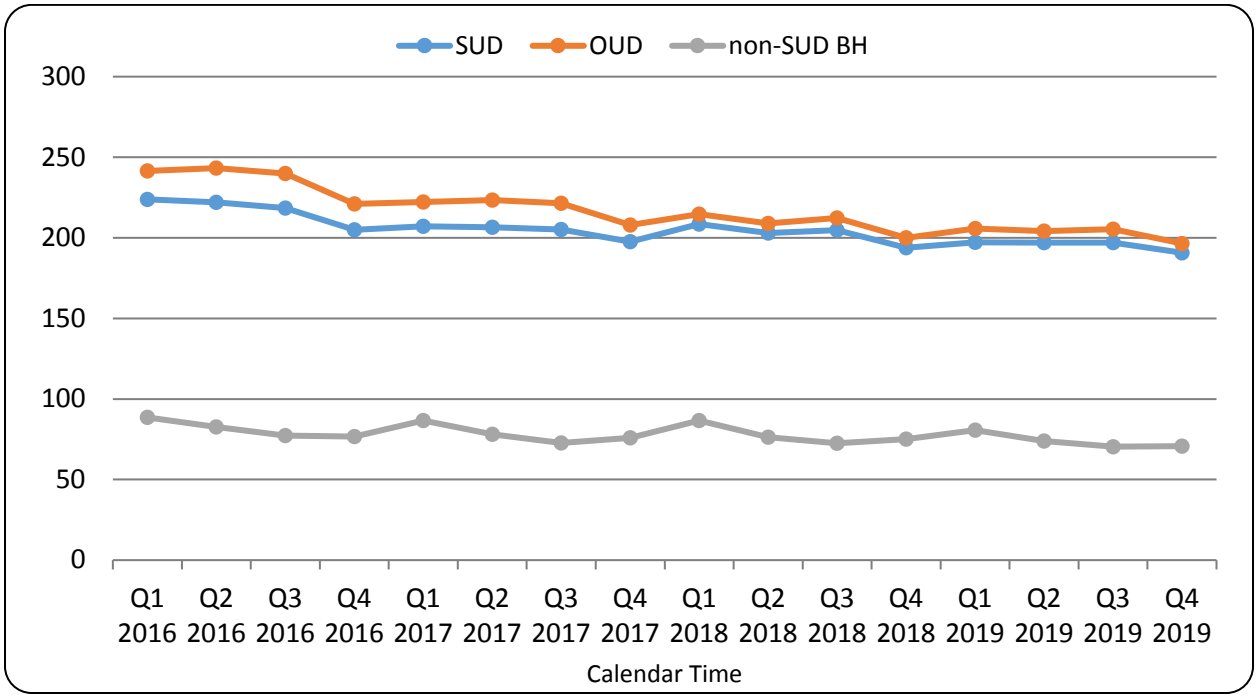
Source: Medicaid Fee-for-Service claims and Managed Care Encounter data, 2016-2019; Analysis by Rutgers Center for State Health Policy;
Notes: SUD=Substance Use Disorder; OUD=Opioid Use Disorder; BH=Behavioral Health
Horizontal axis corresponds to calendar (not demonstration) years and quarters. The vertical axis denotes the number of avoidable hospitalizations per 1,000 beneficiaries. This has not been adjusted for any covariates and may not reflect policy effects

Table 13: Adjusted impact of the SUD demonstration on avoidable hospitalizations among Medicaid beneficiaries age 6+ with SUD

SUD Demonstration Impact Estimate (*n= 2,078,497)*	**Avoidable Hospitalization**
Post-Policy* SUD	-0.00040
	(0.00078)

Source: Medicaid Fee-for-Service claims and Managed Care Encounter data, 2016-2019; Analysis by Rutgers Center for State Health Policy;
Notes: SUD=Substance Use Disorder
Person-quarter level propensity-matched difference-in difference regression analysis
Models adjusted for age, sex, race, CDPS, number of comorbidities, dual status, enrollment days, eligibility category, quarterly time trends, demonstration initiation, year and quarter indicators, and clustering by patient zip code
Robust standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

Figure 31. Quarterly rates of avoidable ED visits per 1,000 Medicaid beneficiaries age 6+ with SUD, OUD, and a comparison population, 2016-2019



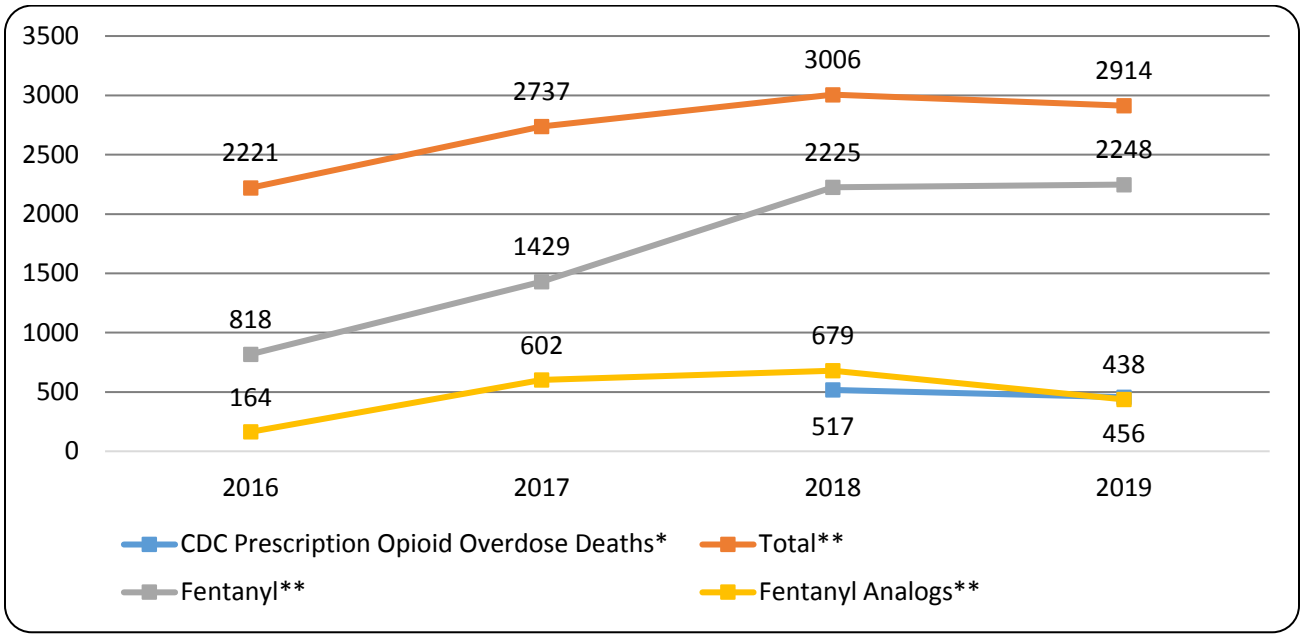
Source: Medicaid Fee-for-Service claims and Managed Care Encounter data, 2016-2019; Analysis by Rutgers Center for State Health Policy;
Notes: SUD=Substance Use Disorder; OUD=Opioid Use Disorder; BH=Behavioral Health
Horizontal axis corresponds to calendar (not demonstration) years and quarters.
The vertical axis denotes the number of avoidable hospitalizations per 1,000 beneficiaries.

Table 14: Adjusted impact of the SUD Demonstration on avoidable ED visits among Medicaid beneficiaries age 6+ with SUD

SUD Demonstration Impact Estimate (*n= 2,078,497)*	Avoidable ED visits
Post-Policy* SUD	0.00976**
	(0.00400)

Source: Medicaid Fee-for-Service claims and Managed Care Encounter data, 2016-2019; Analysis by Rutgers Center for State Health Policy;
Notes: ED=Emergency Department; SUD=Substance Use Disorder
Person-quarter level propensity-matched difference-in difference regression analysis
Models adjusted for age, sex, race, CDPS, number of comorbidities, dual status, enrollment days, eligibility category, quarterly time trends, demonstration initiation, year and quarter indicators, and clustering by patient zip code
Robust standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

Figure 32. New Jersey drug overdose deaths, overall and involving prescription opioids, fentanyl, and fentanyl analogs, 2016-2019



Sources: CDC/NCHS, National Vital Statistics System, Mortality: Changes in drug overdose death rates involving prescription opioids by select states, United States, 2018 to 2019 (https://www.cdc.gov/drugoverdose/data/prescribing/overdose/2018-2019-prescription-opioid-overdose-data.html) and the New Jersey Coordinator of Addiction Response and Enforcement Strategies ("NJ CARES"): drug related deaths (https://www.njoag.gov/programs/nj-cares/nj-cares-suspected-overdose-deaths/). Analysis by Rutgers Center for State Health Policy.
*CDC prescription opioid overdose deaths includes deaths due to natural (morphine, codeine), semi-synthetic (oxycodone, hydrocodone, hydromorphone, and oxymorphone), and synthetic opioids (methadone).
**NJ CARES 2016: drugs included heroin, morphine, cocaine, fentanyl, fentanyl analog, oxycodone, and methadone
** NJ CARES 2017: drugs included heroin, fentanyl, fentanyl analog, morphine, cocaine, oxycodone, and methadone
**NJ CARES 2018: drugs included benzodiazepine, cocaine, fentanyl, fentanyl analog, heroin, methadone, methamphetamine, morphine, and oxycodone
**NJ CARES 2019: drugs included heroin, fentanyl, fentanyl analog, morphine, oxycodone, methadone, cocaine, methamphetamine, benzodiazepine, and ethanol

Cost Analysis

Figures 33-36 show average quarterly per-person costs from a number of sources in the pre and post-Demonstration periods. These costs have been inflation-adjusted. Beneficiaries with SUD are the treatment group. Beneficiaries with a BH condition exclusive of substance abuse are the comparison population. For these descriptive tables, the comparison population has not been propensity matched (described below as non-matched). Appendix F has a table of the numbers used to generate these charts.

Unadjusted

Figure 33 shows total costs and total federal costs for beneficiaries with SUD and the comparison population. Figure 34 shows SUD cost drivers for beneficiaries with SUD.

Key observations:

- Total costs and total federal costs increase among beneficiaries with SUD from 2016-2019 (by an average quarterly amount of $421 and $210 per beneficiary, respectively), but remain relatively constant in the non-matched comparison group of beneficiaries with a non-SUD BH condition (small decreases of $39 and $19 per beneficiary, respectively, all shown in Figure 33).
- Costs related to IMDs increase starting in Q3 of 2018 when the IMD exclusion was lifted for beneficiaries with SUD from a combined quarterly average of $4 per beneficiary from early 2016 to mid-2018 to $46 in Q3 of 2018, continuing up to $123 in Q4 2019 (Figure 34).
- Other (non-IMD) SUD costs for this group increase slowly from $919 per beneficiary at the start of the pre-Demonstration period to their highest in Q3 of 2018 at $1089, but then come down a little to $1057. Average quarterly costs not related to SUD treatment and utilization increase a small amount over this period (from $2,706 to $2,869 per beneficiary), with the highest observed value in Q4 of 2019 (Figure 34).

Five sources of care cost drivers are shown in Figures 35-37 for the population with SUD (treatment group) and a non-matched comparison group of individuals with non-SUD BH conditions.

Key observations for care cost drivers:

- There are clear changes in outpatient cost patterns starting in Q4 of 2018 (Figure 35). For both the population with SUD and the comparison population, ED visit costs drop in Q4 of 2018 and then rise sharply. The complementary outpatient, non-ED costs have a corresponding rise in Q4 of 2018 and then drop to their lowest point in Q4 of 2019. Both

types of outpatient costs are higher for the population with SUD than the comparison population.

- Figure 36 shows that inpatient per-person quarterly costs among those with SUD drop in early 2019 and then increase substantially in the last quarter of 2019, similar to the outpatient ED cost pattern over this time period. The trend in the comparison population is similar but less pronounced. Inpatient costs are for utilization related to any health condition. IMD costs are not included. We are working with the State to further analyze the causes of these increases.
- Long-term care costs are higher overall for the non-matched comparison population, but end 2019 lower than they were at the start of 2016 ($757 per beneficiary in Q4 2019 compared with $800 in Q1 2016). However, for the treatment population with SUD, long-term care costs rise over the study period from $155 to $224 per beneficiary (Figure 37).
- Average quarterly per-person pharmacy costs decline for both the treatment and comparison populations over the study period.

Adjusted

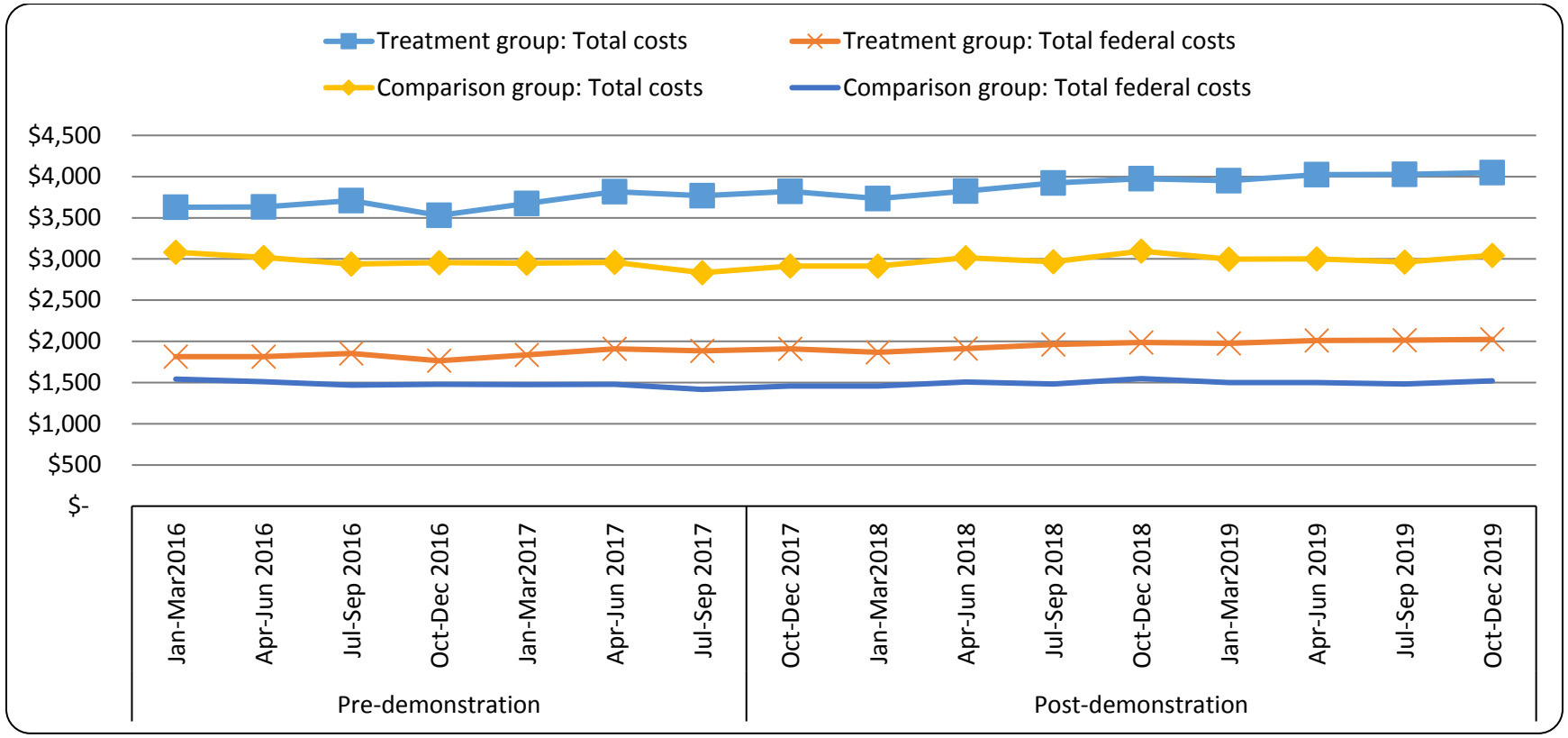
Table 15 shows the average marginal effects per person per quarter for each of the cost types as estimated using DD and SRA models. DD models are used for non-SUD specific costs and use a propensity-matched comparison group from the population of beneficiaries with a non-SUD BH condition. SUD-specific costs are modeled using SRA. All models control for age, sex, dual eligibility status, CDPS risk score category, number of chronic conditions, race, enrollment days, year, quarter, and adjust for clustering by zip code. We use inflation-adjusted costs in all models.

Key findings:

- There is a decline in average quarterly total costs per person (-$57.90) and total federal costs (-$28.95) associated with the SUD Demonstration, but the declines are not statistically significant.
- Effects of the Demonstration on outpatient costs are significant. We estimate a marginally significant decline in non-ED outpatient costs of $188.53 ($p<0.1$) per person, per quarter, and a statistically significant decline of $16.83 in ED costs ($p<0.05$).
- The adjusted effect of the SUD Demonstration on inpatient costs is a quarterly decline of $88.05 for the population with SUD. However, this is not statistically significant.
- We estimate an increase of $30.37 in pharmacy costs and a decrease of $973.85 in long-term care costs per quarter for beneficiaries with SUD associated with the Demonstration, but neither change is statistically significant.
- SRA models estimate that IMD costs increased as a result of the Demonstration by $36.73 per person per quarter, and this increase is statistically significant ($p<0.05$).

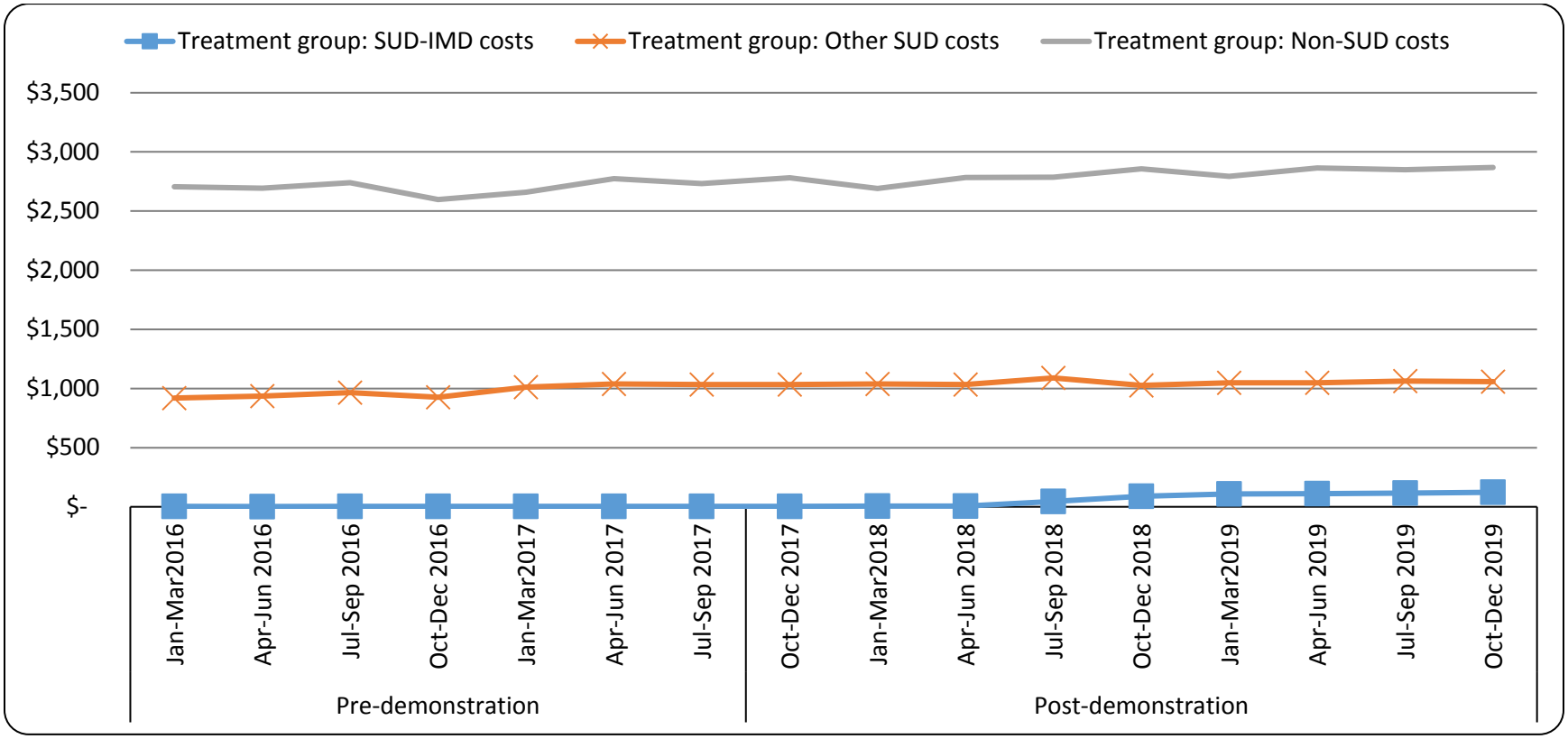
- Other SUD costs declined significantly due to the Demonstration, by about $18.39 per person quarter ($p<0.05$).
- There was no statistically significant impact of the Demonstration on all non-SUD costs for the population with SUD, though the effect estimate was an increase of $8.13 per person per quarter.

Figure 33: Mean quarterly unadjusted per-person total and total federal Medicaid cost estimates for the population with SUD and a comparison population, 2016-2019



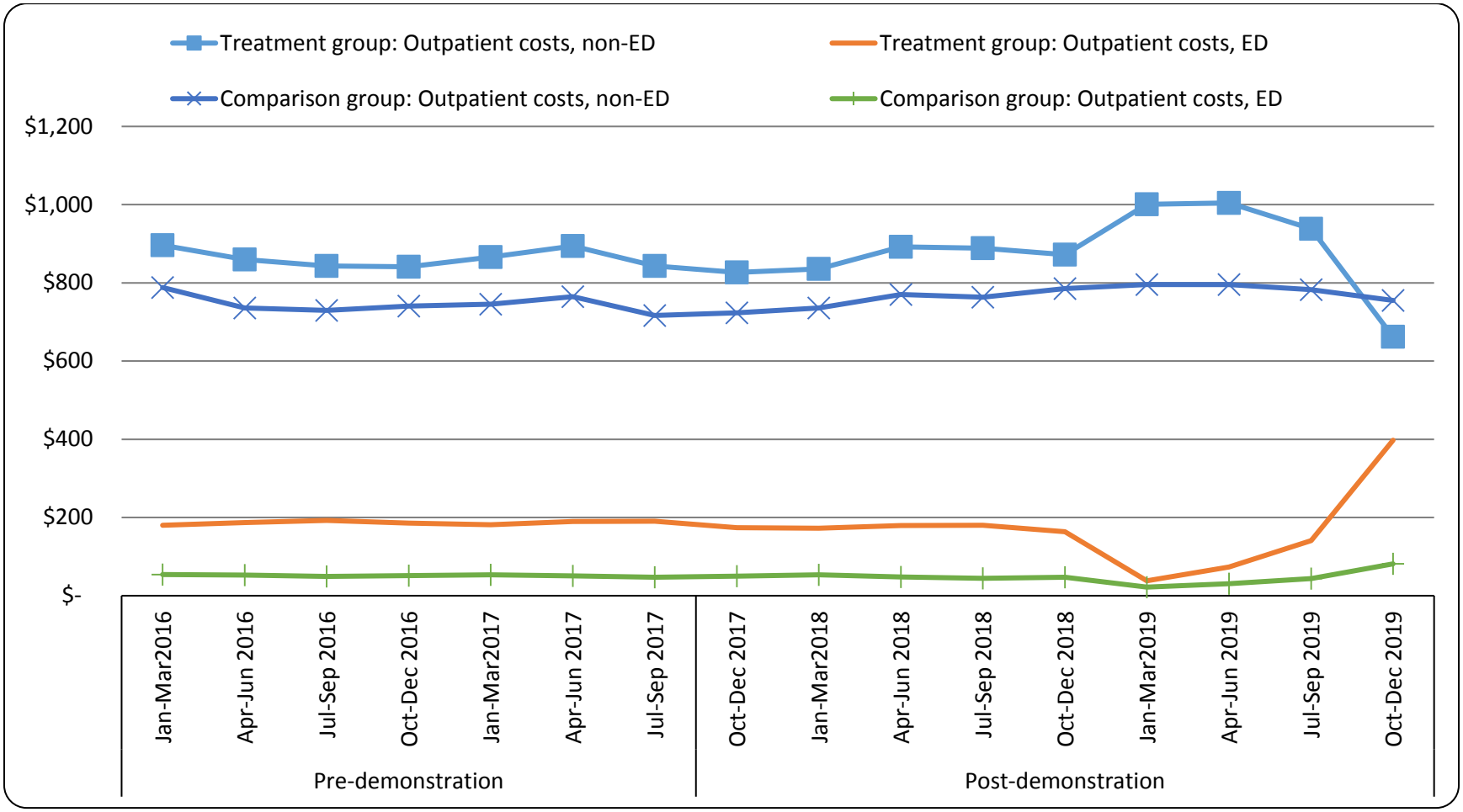
Source: Medicaid Fee-for-Service Claims & Managed Care Encounter Data, 2016-2019; Analysis by Rutgers Center for State Health Policy.
Notes: SUD=Substance Use Disorder
"Treatment" group is the population with SUD. The "Comparison" group is the population with a behavioral health condition, but not SUD.
These rates have not been adjusted for any covariates and may not reflect policy effects.
All costs are inflation-adjusted. See Appendix F for source data.

Figure 34: Mean quarterly unadjusted per-person estimates of SUD cost driver components for the population with SUD, 2016-2019



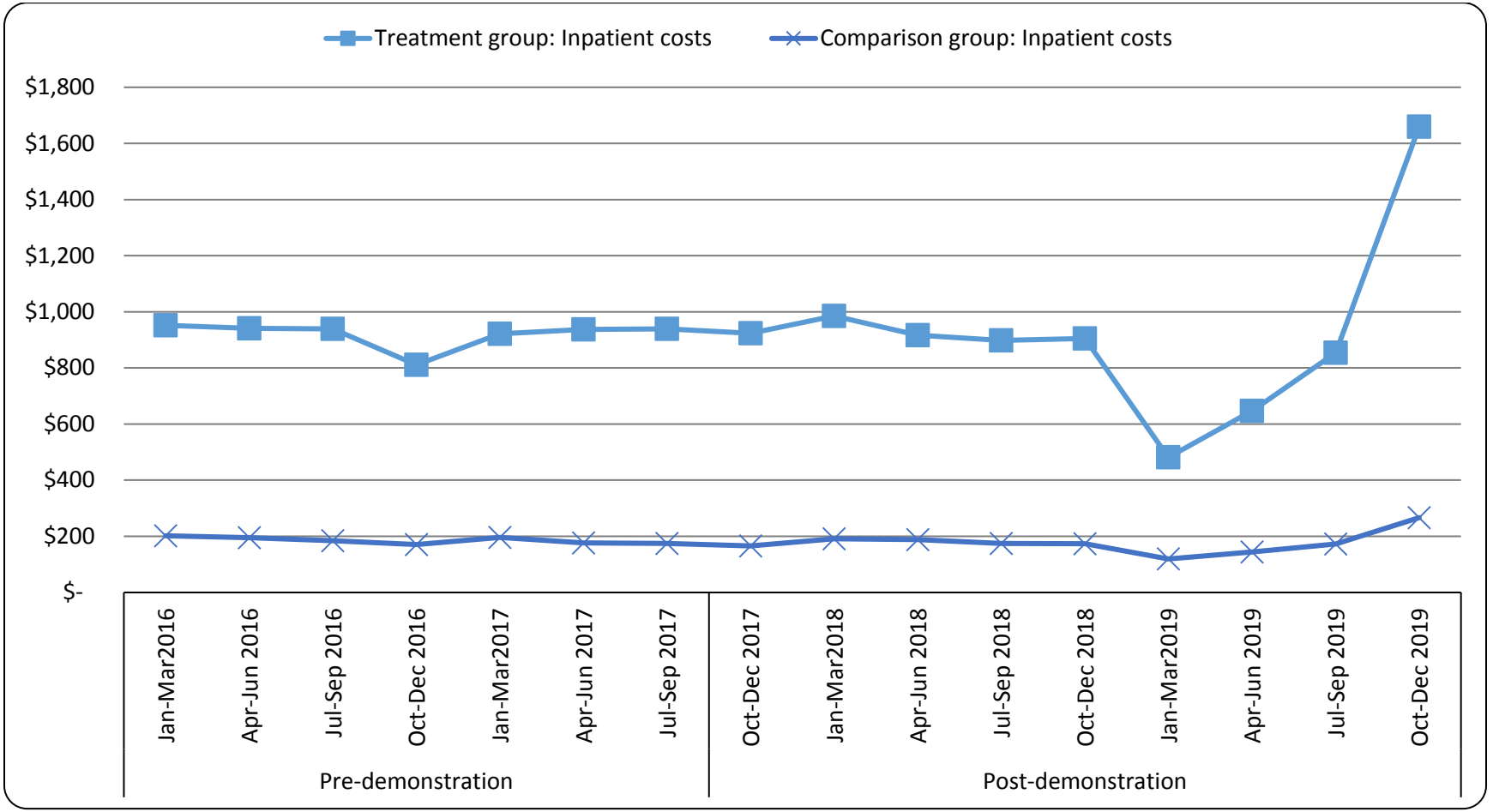
Source: Medicaid Fee-for-Service Claims & Managed Care Encounter Data, 2016-2019; Analysis by Rutgers Center for State Health Policy.
Notes: SUD=Substance Use Disorder; IMD=Institution for Mental Disease
"Treatment" group is the population with SUD.
These rates have not been adjusted for any covariates and may not reflect policy effects.
All costs are inflation-adjusted. See Appendix F for source data.

Figure 35: Mean quarterly unadjusted per-person estimates of outpatient care cost driver components for the population with SUD and a comparison population, 2016-2019



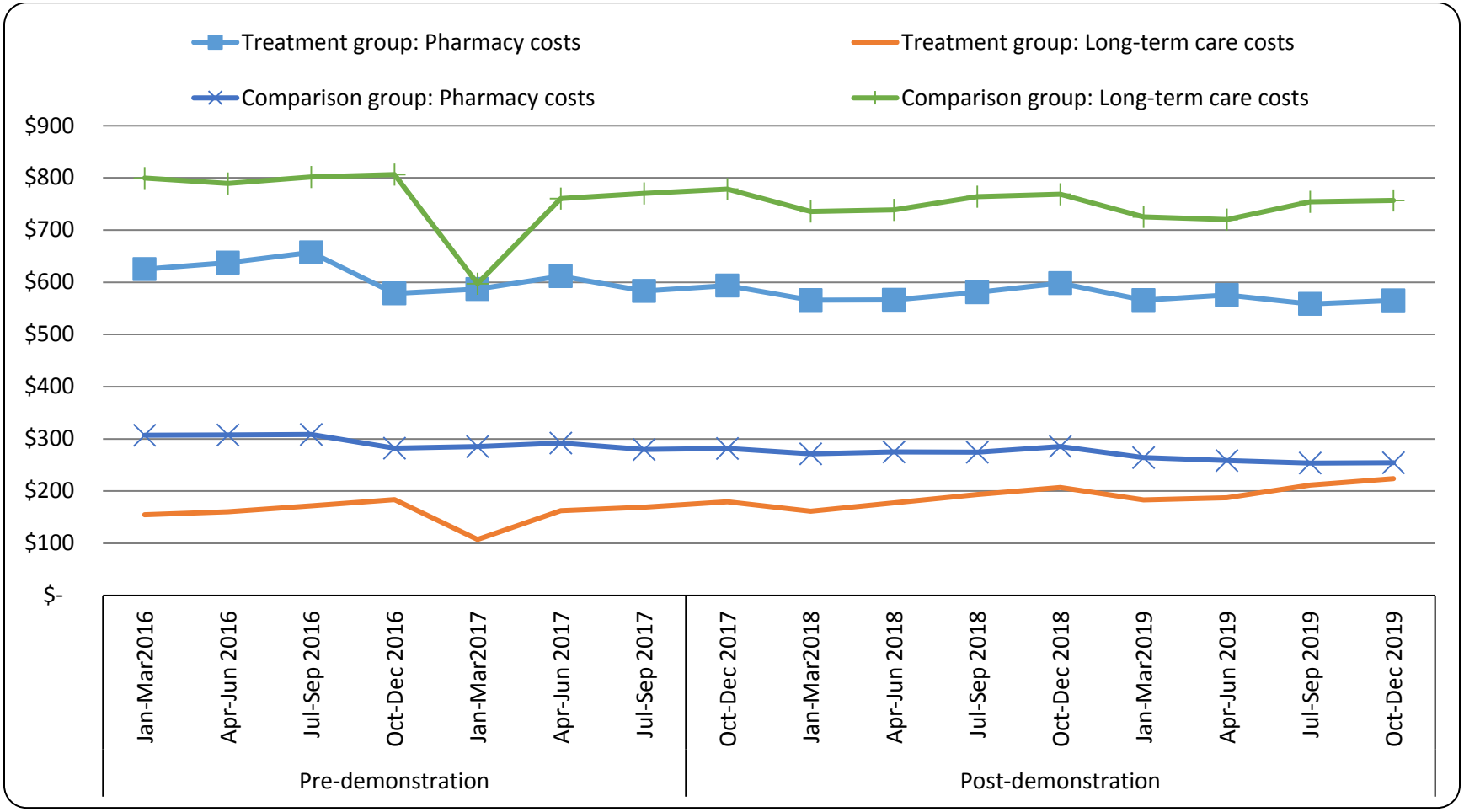
Source: Medicaid Fee-for-Service Claims & Managed Care Encounter Data, 2016-2019; Analysis by Rutgers Center for State Health Policy.
Notes: SUD=Substance Use Disorder
"Treatment" group is the population with SUD. The "Comparison" group is the population with a behavioral health condition, but not SUD.
These rates have not been adjusted for any covariates and may not reflect policy effects.
All costs are inflation-adjusted. See Appendix F for source data.

Figure 36: Mean quarterly unadjusted per-person estimates of inpatient care costs for the population with SUD and a comparison population, 2016-2019



Source: Medicaid Fee-for-Service Claims & Managed Care Encounter Data, 2016-2019; Analysis by Rutgers Center for State Health Policy.
Notes: SUD=Substance Use Disorder
"Treatment" group is the population with SUD. The "Comparison" group is the population with a behavioral health condition, but not SUD. Inpatient costs are for all acute care hospital utilization for any health condition by these populations. IMD costs are not included.
These rates have not been adjusted for any covariates and may not reflect policy effects.
All costs are inflation-adjusted. See Appendix F for source data.

Figure 37: Mean quarterly unadjusted per-person estimates of pharmacy and long-term care costs for the population with SUD and a comparison population, 2016-2019



Source: Medicaid Fee-for-Service Claims & Managed Care Encounter Data, 2016-2019; Analysis by Rutgers Center for State Health Policy.
Notes: SUD=Substance Use Disorder
"Treatment" group is the population with SUD. The "Comparison" group is the population with a behavioral health condition, but not SUD.
These rates have not been adjusted for any covariates and may not reflect policy effects.
All costs are inflation-adjusted. See Appendix F for source data.

Table 15: Average marginal effects (AME) per person-quarter from regression analyses of cost of care components

Propensity-matched difference-in-difference models														
	Total Costs $		Total Federal Costs $		Outpatient Costs, Non-ED $		Outpatient Costs, ED $		Inpatient Costs $		Pharmacy Costs $		Long-term care Costs $	
	AME	SE	AME	SE	AME	SE	AME	SE	AME	SE	AME	SE	AME	SE
Treatment Group	15.32	277.77	7.66	138.88	-349.25***	61.36	97.24***	5.60	984.10***	159.83	-11.60	70.14	472.06	1628.50
Demonstration Period	703.41	453.62	351.70	226.81	345.64*	178.12	-216.90***	35.71	-547.87	408.60	185.74	126.68	854.41	1054.96
Treatment Group x Demonstration Period	-57.90	29.84	-28.95	252.98	-188.53*	113.56	-16.83**	7.70	-88.05	126.28	30.37	96.24	-973.85	1525.11

Segmented regression analysis/Interrupted time series models						
	SUD-IMD Costs $		Other SUD Costs $		Non-SUD Costs $	
	AME	SE	AME	SE	AME	SE
Demonstration Period	281.31***	51.24	8.14	29.27	44.35	28.06
Time (continuous)	28.06**	12.38	20.20***	3.71	16.71**	6.70
Demonstration Period x Time (continuous)	36.73**	18.66	-18.39**	7.78	8.13	10.64

Source: Medicaid Fee-for-Service Claims & Managed Care Encounter Data, 2016-2019; Analysis by Rutgers Center for State Health Policy.
Notes: SE=Standard Error
All models control for age, sex, dual eligibility status, CDPS risk score category, number of chronic conditions, race, enrollment days, year, quarter, and adjust for clustering by zip code.
All costs are inflation-adjusted
*** p<0.01, ** p<0.05, *p<0.1

Limitations

There are some limitations in our modeling approach which we have noted in our evaluation plan. The DD specification, which uses a near- age comparison group, could include individuals in the intervention group who may have actually received SUD services in smaller residential facilities not subject to the IMD exclusion, or under state-only funding. This would introduce a conservative bias into our estimate of the policy effect. The comparison group of elderly adults age 65-75 is also more likely than the younger Medicaid beneficiaries in our intervention population to be Medicaid-Medicare dual eligibles. This requires consideration of the completeness of utilization reporting in the Medicaid claims data for services where Medicare is the primary payer. An undercount of utilization for dual eligibles could only impact our difference-in-differences estimates if there was a reporting/policy change between the pre- and post-periods, for example, changes in Medicare coverage of SUD treatment services. We are not aware of this happening during the years examined in this interim report, but in January 2020, Medicare began coverage of comprehensive MAT services provided in certified Opioid Treatment Programs (OTPs)[3] which could cause a decrease in Medicaid claims for MAT by dual eligibles. Since this does not align directly with the SUD Demonstration years, we can account for this period in models. Similarly, dual eligibles could be exclusively subject to other concurrent policy changes that would reduce their utility as a comparison group. This latter consideration is often relevant to many comparison groups, and we will continue to examine and account for any policy changes that may differentially impact the comparison group.

We propose alternative modeling specifications as a sensitivity check on findings in our final evaluation plan which will help address the limitations of any one model. As a sensitivity test on our DD models that use a near-age comparison group for addressing RQ(b), we can additionally conduct segmented regression analysis to examine effects on the full intervention group between ages 21 and 64 as well as regression discontinuity models. For examining RQa, we can also conduct stratified analysis by age groups, 13-20, 21-64, and 65+ (when sample size permits) to account for differences in service provisions between individuals belonging to these three groups. This could help determine whether other components of the OUD/SUD program, besides the change in the policy for IMDs, contribute significantly to the overall demonstration effects we observe here. Triangulating results from our main specification with those from alternative specifications will help create a more robust evaluation of the Demonstration.

Finally, our method for identifying beneficiaries with OUD/SUD using contemporaneous claims may exclude beneficiaries with only a past diagnosis, for whom examination of MAT utilization and SUD costs is relevant. If these beneficiaries still have OUD/SUD (while not recording a claims-

[3] https://crsreports.congress.gov/product/pdf/IF/IF10875

based diagnosis in the current period) and are in need of treatment, they would be the target of Demonstration policies to increase access. Therefore, our findings with respect to these measures may not fully capture the Demonstration's impact. We will explore identifying beneficiaries with OUD/SUD using a look-back window of claims in our final report.

Summary

Table C summarizes the direction and statistical significance of computed effects of the OUD/SUD Demonstration based on all of the treatment and utilization measures analyzed in this report. A "+" means the direction of the estimated impact indicates an improvement, while "-" means the direction of the estimated impact indicates a worsening. This representation of results organized by each research question and hypothesis, helps determine the presence or absence of evidence available as of this interim report in support of each hypothesis over the Demonstration implementation period ending in December 2019. There were no cases where a significant pre-trend difference existed of a magnitude and direction likely to change our estimate of an improvement or deterioration of any of these outcomes.

Table C: Summary of Treatment and Utilization Measure Regression Results

Measure	RQ(a)		RQ(b)
	Level	Trend	
Hypothesis 1: Rates of identification, initiation and engagement in treatment for OUD and other SUDs will increase as a result of the OUD/SUD program.			
Initiation of SUD Treatment	+	+	n/a
Engagement in SUD Treatment	+	-	n/a
Initiation of OUD Treatment	-	+	n/a
Engagement in OUD Treatment	+	-	n/a
Hypothesis 2: Rates of adherence to, and retention in treatment for OUD and other SUDs, overall and for individuals aged 21-64, will increase as a result of the OUD/SUD program.			
Use of Medication Assisted Treatment	+	+	+
7-day Follow-up After ED Visit for AOD	+	+	+
30-day Follow-up After ED Visit for AOD	+	+	+
Hypothesis 3: Overdose deaths, particularly those due to opioids, will decline overall and for individuals aged 21-64 as a result of the OUD/SUD program.			
Use of Opioids at High Dosage	+		n/a
Death[1]	+		data not available yet
Hypothesis 4: Utilization of emergency departments and inpatient hospital settings for OUD and other SUD treatment where the utilization is preventable or medically inappropriate through improved access to other continuum of care services will decline overall (including individuals aged 21-64) as a result of the OUD/SUD program.			
Inpatient Stays for SUD	+	-	+
Inpatient Stays for OUD	+	-	+
ED Visits for SUD	+	-	-
ED Visits for OUD	+	-	+

Hypothesis 5: Readmissions to the same or higher level of care where readmission is preventable or medically inappropriate for individuals with OUD and other SUD will decline overall (including individuals aged 21-64) as a result of the OUD/SUD program.		
30-day Hospital Readmissions	-	-
Hypothesis 6: Access to care for physical health conditions among beneficiaries with OUD or other SUDs will improve as a result of the OUD/SUD program.		
Avoidable Inpatient Hospitalizations	+	n/a
Avoidable ED Visits	-	n/a

Notes: RQ=Research Question; Research Question: (a) What is the impact of providing substance use disorder services to Medicaid beneficiaries? (b) Including paying for services rendered in an institution for mental disease (IMD)?
"+" means direction of the estimated impact indicates either no effect or an improvement; "-" means direction of the estimated impact indicates a worsening; p<0.1; p<0.05 Lack of any shading indicates there was no statistical significance.
[1]Available data are for NJ overall, and not specifically for Medicaid beneficiaries.
[2]Significance of the result is based on a t-test for the difference in proportion of the beneficiaries with high-dose opioid prescriptions pre- and post- policy implementation (2016-17 vs 2018-19).

Similarly, Table D summarizes the direction and statistical significance of computed effects of the OUD/SUD Demonstration on each of the cost drivers analyzed in this report. A "↑" means costs increased, while "↓ " means costs decreased.

Table D: Summary of Cost Measure Regression Results

Cost Measures	Direction of Change
Total	↓
Total federal	↓
SUD Cost Drivers	
SUD-IMD	↑
SUD-Other	↓
Non-SUD	↑
Source of Care Cost Drivers	
Outpatient, non-ED	↓
Outpatient, ED	↓
Inpatient	↓
Pharmacy	↑
Long-term care	↓

"↑" means increase in costs; "↓" means decrease in costs; p<0.1; p<0.05 Lack of any shading indicates there was no statistical significance.

Discussion

In this draft interim evaluation report, we present quantitative findings to date from analysis of utilization, quality, and cost measures intended to measure the State's progress towards the goals of the 1115 SUD Demonstration. Using difference-in-differences models with propensity matching and interrupted time series models, we examine changes in outcomes from the pre-Demonstration period (2016-2017) through the first two years of the Demonstration (2018-2019) when various policy changes were implemented to enhance treatment for beneficiaries with OUD/SUD. The claims-based measures prepared thus far include initiation and engagement in treatment for alcohol and other drug abuse (AOD) disorders, use of medication-assisted treatment, follow-up after ED visits for AOD, inpatient and ED utilization for OUD/SUD, use of opioids at high dosages, and various SUD and non-SUD related cost drivers. We also examine hospital readmissions which can reflect issues with care coordination, and avoidable inpatient hospitalizations and ED visits, which are known to be driven by inadequate ambulatory or primary care in the community. Finally, we examine trends in overdose deaths for NJ overall using published data from other sources, because the data proposed in our evaluation plan was not yet available as of this interim report.

We will distill the many results presented in this report down to the key points relevant for addressing the evaluation hypotheses and overarching research questions, with the understanding that **these are early effects that will be subject to change as we add more years of data in the Demonstration period**. We will discuss limitations of the current analyses and plans for the final evaluation report, in general and with respect to new considerations posed for our evaluation by the COVID-19 pandemic.

Hypothesis 1: Rates of identification, initiation and engagement in treatment for OUD and other SUDs will increase as a result of the OUD/SUD program.

We did not observe statistically significant changes in initiation or engagement in alcohol or other drug treatment overall, or specifically for OUD, as a result of the OUD/SUD demonstration. Looking at descriptive rates, we observe increases in rates of initiation and engagement in AOD treatment among adult beneficiaries, and the regression-estimated net effect on OUD/SUD treatment initiation and engagement rates as of December 2019 is positive as well. **These observations are suggestive that this outcome is moving in the right direction to support this hypothesis.**

Hypothesis 2: Rates of adherence to, and retention in treatment for OUD and other SUDs, overall and for individuals aged 21-64, will increase as a result of the OUD/SUD program.

Use of MAT for SUD has increased under the Demonstration overall and specifically for the population impacted by lifting the IMD exclusion. These effects are statistically significant. Rates of 7-day and 30-day follow-up after ED visits for AOD treatment show increases during the Demonstration period for the overall population with SUD as well as a subset impacted by the lifting the IMD exclusion, but these changes are generally not statistically significant. The exception is **the rate of 30-day follow-up visits which shows a small and marginally significant increasing trend. Findings for both of these outcomes support the hypothesis**.

Hypothesis 3: Overdose deaths, particularly those due to opioids, will decline overall and for individuals aged 21-64 as a result of the OUD/SUD program.

We have limited data as of this interim report to address this hypothesis. The unadjusted trends show a small decline in the proportion of adults prescribed opioids at high doses in the first years of the OUD/SUD program compared to the baseline years, and this decline is statistically significant. According to data from the CDC, the death rate in NJ involving prescription opioids exhibited a statistically significant decline between 2018 and 2019 and NJCARES data show a decline in 2019 in the number of deaths involving fentanyl analogs. **While trends for both these outcomes are in a direction supportive of this hypothesis, these findings are descriptive only and the death data are not specific to the Medicaid population.**

Hypothesis 4: Utilization of emergency departments and inpatient hospital settings for OUD and other SUD treatment where the utilization is preventable or medically inappropriate through improved access to other continuum of care services will decline overall (including individuals aged 21-64) as a result of the OUD/SUD program.

Inpatient hospitalizations for SUD and OUD showed very small declines subsequent to the start of the Demonstration policy period, and only the declines in inpatient stays for OUD were statistically significant. However, the trend increased such that there was no significant net change in inpatient hospitalizations for SUD or OUD attributable to the Demonstration by the end of 2019. The estimated effect specifically for the subpopulation impacted by lifting the IMD exclusion also shows small declines on average over the policy period, but the effects are not statistically significant.

Emergency department visits for SUD and OUD among the Medicaid population had mixed results, with a decreasing level, but increasing trend in visits for SUD starting in July 2018. **The**

net impact was a statistically significant increase in SUD-related ED visits, but of a trivial magnitude. OUD-related ED visits did not change significantly as a result of the Demonstration. When examining ED visit rates for OUD or SUD for an age group directly impacted by lifting the IMD exclusion, adjusted estimates show a negative impact (i.e. an increase) for SUD-related visits and a positive impact (i.e. a decrease) for OUD-related visits, but these changes were very small and not significant.

Thus, the evidence neither supports nor refutes this hypothesis. The statistically significant findings, both positive and negative, are of a very small magnitude.

Hypothesis 5: Readmissions to the same or higher level of care where readmission is preventable or medically inappropriate for individuals with OUD and other SUD will decline overall (including individuals aged 21-64) as a result of the OUD/SUD program.

The measure we used to evaluate this hypothesis is 30-day hospital-wide readmissions among individuals with OUD/SUD. **We find increases in readmissions for beneficiaries with SUD and those in the age category impacted by lifting the IMD exclusion associated with the Demonstration, but neither effect was statistically significant. A readmission measure more specific to OUD/SUD care would be a more sensitive outcome. Therefore, we do not find evidence in support of this hypothesis yet.**

Hypothesis 6: Access to care for physical health conditions among beneficiaries with OUD or other SUDs will improve as a result of the OUD/SUD program.

We estimate the Demonstration is associated with a small, but not statistically significant decline in avoidable inpatient hospitalizations. We also estimate a statistically significant negative impact of the Demonstration on avoidable ED visits, with beneficiaries experiencing SUD having increased avoidable ED visits. **This finding does not support the hypothesis, but we have only six months of data during which policies intending to address physical health care coordination were in effect.**

Cost of Care Drivers

Cost of care under the SUD Demonstration exhibited some statistically significant changes in regression models. Costs related to treatment in an IMD increased, while costs for other SUD treatment decreased. Outpatient costs, both for ED and non-ED components, also show decreases as a result of the Demonstration through the end of 2019.

Implications of COVID-19 for Final 1115 SUD Demonstration Evaluation

The years when we expected to observe the full effects of the demonstration policies will coincide with the COVID-19 pandemic, posing significant challenges in disentangling demonstration effects from pandemic effects. CMS is aware of these challenges and has provided some helpful guidance for evaluators (CMS 2021b). We have some preliminary strategies for approaching these challenges in the final evaluation.

First, we employ difference-in-differences and regression discontinuity models, which are more robust than trends and time series designs in adjusting for changes brought about by the pandemic. However, there are cases when the segmented regression analysis (SRA) is our only option or when it can serve as a sensitivity check due to other limitations of the DD model with respect to the comparison group. We can test putting in period controls and time trend controls starting in March 2020 until the point when utilization was no longer impacted to a large degree by the pandemic. A potential area of concern is whether we would have a sufficient period of data beyond that point to help estimate demonstration effects.

Medicaid automatic disenrollment in New Jersey was suspended during the pandemic, leading to higher enrollment than usual during the pandemic period. This underscores the importance of enrollment adjustment, which we already do in all our modeling. We also will consider whether lack of disenrollment coupled with low utilization could affect our ability to accurately characterize the risk profile of the Medicaid population for the pandemic period, which relies on a diagnosis history in the claims.

We are also aware that a larger proportion of services will have been delivered via telehealth, which could impact outcomes like *Initiation and Engagement of Alcohol or Other Drug Treatment* or *Follow-up after ED visits for AOD*. In order to ensure continuity in billing and payment, New Jersey did not require any billing modifiers for services delivered via telehealth during the pandemic. Therefore, we do not anticipate having to modify any of the codes used in our metric calculations for the pandemic period. However, we are aware that codes may eventually require modifiers if telehealth becomes a more permanent option in SUD treatment delivery. Also, changes in aspects of care such as prescription durations could necessitate changes in the logic of quality metrics. We will follow the guidance of measure stewards such as NCQA, which has already provided telehealth updates to a number of their quality measures for measurement years 2020 and 2021, as well as work closely with the State as they adapt SUD Demonstration monitoring metrics based on CMS guidance.

Finally, the qualitative component of our evaluation will be the focus of our forthcoming efforts, and we can use that as an opportunity to provide relevant context surrounding the effects of the pandemic. Subject to IRB approval, we can adapt our interview guide to gather feedback from key stakeholders on the impacts of the pandemic in New Jersey on SUD treatment, particularly changes in patterns of utilization relevant to our selected outcome measures. We are aware of work already on this topic specific to New Jersey (Treitler et al. 2021), as well as the efforts of New Jersey's Centers of Excellence which, for instance, conducted a survey of OBAT providers to understand the availability of services during the pandemic.

Conclusions and Limitations

The analyses in this report provide preliminary evidence regarding the effects of New Jersey's 1115 SUD Demonstration. The majority of statistically significant findings under Research Question (a) are in a direction consistent with the Demonstration goals and support the conclusion that there are positive outcomes of the policy changes implemented under the SUD Demonstration. The one notable exception is avoidable ED visits for non-SUD related reasons which show an increase among the population with SUD; however, this outcome aligns with the longer-term Demonstration goal of integration of physical and behavioral healthcare (see Table A) which was not the focus of policy changes in the time period examined in this interim report.

When specifically examining the impact of lifting the IMD exclusion on outcomes for the non-elderly adult population, most findings, though not statistically significant, support the positive impact of this change. We do find statistically significant increases in use of MAT as a result of this Demonstration policy.

There are a number of notable limitations in our analyses, consistent with the interim nature of this report, primarily the short post period following implementation of Demonstration policies. **A sufficient follow up period is essential to comprehensively capture policy impacts on outcomes, and the short follow up period does not allow us to exploit the full potential of our statistical and econometric strategies.** Alternative modeling specifications (such as regression discontinuity) which will serve as sensitivity checks on findings, adjustments of DD impact estimates for significant differences in pre-Demonstration trends in outcomes where applicable, as well as ongoing validations of claims-based metrics in consultation with State experts, are a few of the methodological updates planned for the final evaluation. We also anticipate refinements to our cost analysis with the incorporation of administrative costs and a qualitative assessment of pre-Demonstration non-Medicaid costs. Finally, stakeholder interviews will help contextualize our findings, an even more important component given that subsequent Demonstration years covered in the final report will reflect the impacts of the COVID-19 pandemic.

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Appendix A: Description of Measures

Initiation and Engagement of Alcohol and Other Drug Abuse or Dependence Treatment: Treatment of alcohol or other drug (AOD) dependence using medication-assisted treatment (MAT) in combination with counseling and other therapies has been shown to reduce morbidity and mortality due to substance use disorder and improve productivity and social outcomes for those afflicted (NIDA 2018; SAMSHA 2020). This measure determines the percentage of individuals with a new episode of AOD dependence who receive: 1) initiation of AOD treatment through an inpatient AOD admission, outpatient visit, intensive outpatient encounter or partial hospitalization, telehealth or MAT within 14 days of diagnosis, and 2) engagement of AOD treatment defined as two or more additional AOD services or MAT within 34 days of the initiation visit. We followed the National Committee of Quality Assurance's (NCQA) Healthcare Effectiveness Data and Information Set (HEDIS) specifications for the calculation of this metric using 2018 value sets and definitions for years 2016-2017 and 2020 value sets and definitions for 2018-2019 (NCQA 2018; 2020). There were no trending breaks or cautions for this measure between specification versions.

We modified this measure from the specifications in two ways in consultation with the Business Intelligence Unit of the Division of Medical Assistance and Health Services (DMAHS) and other State subject matter experts. First, we included additional state-specific MAT codes (H0018HFU1, H0018HFU2, H0019HFU1, H0019HFU2, Z2006, and Z3357) in the AOD Medication Treatment Value Set. Second, the Place of Service (POS) variable in our claims database is not as detailed as the federal POS variable referenced in HEDIS specifications. We used an approved translation of the POS variable provided to us by DMAHS subsequent to discussions with CMS. Finally, we extend our Intake Period for identifying an index episode of AOD abuse or dependence through December 31 of the calendar year (instead of November 13th) and use claims from the following year to assess initiation and engagement in order to support adjustments for continuous time trends in regression analyses.

Ambulatory Care Sensitive (ACS) Inpatient Hospitalizations and Avoidable/Preventable Emergency Department Visits: We calculate rates of ACS inpatient (IP) hospitalizations and avoidable treat-and-release ED visits that may occur due to inadequate ambulatory/primary care within communities. Avoidable hospitalizations have been widely used in previous research to measure access to primary care, and disparities in health outcomes (Basu, Friedman, and Burstin 2004; Billings et al. 1993; Bindman et al. 1995; Howard et al. 2007).

The federal Agency for Healthcare Research and Quality (AHRQ) provides validated programming algorithms to calculate rates of avoidable ACS hospitalizations. These are known as the Prevention Quality Indicators (PQI) for adults (ages 18 and above) and Pediatric Quality Indicators for children (ages 6-17). The latest version (version 6.0) of the software accommodates ICD-10 codes and was used for calculating PQIs and PDIs for years 2016 through 2019 (AHRQ 2016a; 2016b). Updates and enhancements made to the version 6.0 software included the exclusion of one very low prevalence component indicator. Appendix B gives a list of ACS conditions that constitute a composite index that measures the overall rate of avoidable IP hospitalizations per unit of population which is the index used in the analyses in this chapter.

We also calculate avoidable treat-and-release ED visits based on the methodology provided by the New York University, Center for Health and Public Service Research (Billings, Parikh, and Mijanovich 2000), which are part of AHRQ's Safety Net Monitoring Toolkit. These comprise three categories of avoidable ED visits that could have been treated in an outpatient primary care setting or could have been prevented with timely access to primary care. Detailed definitions of these classifications are provided with examples in Appendix C. ICD-10 versions of diagnosis codes for this metric were provided on the New York University website.[4]

Our preparation of these metrics considers utilization at any general acute care hospital, inside or outside NJ.

Readmissions: Because hospital readmissions can result from poor quality of care or inadequate transitional care, 30-day readmissions metrics are used to broadly measure the quality of care delivered by hospitals (Benbassat and Taragin 2000; Jencks, Williams, and Coleman 2009). Such 'potentially preventable' readmissions are defined as readmission for any cause within 30 days of the discharge date for the index hospitalization, excluding a specified set of planned readmissions. While readmissions rates have been most heavily utilized to assess quality for the Medicare population, calculating these measures among the Medicaid population has received growing attention (Trudnak et al. 2014). The readmissions metrics we calculate are endorsed by the National Quality Forum (NQF) and are adapted for the Medicaid claims data from the Centers for Medicare and Medicaid Services methodology available at QualityNet.[5] For hospital-wide readmissions, we use version 6.0 for 2016, version 7.0 for 2017, version 8.0 for 2018, and version 9.0 for 2019. We also modified the metric slightly by identifying readmissions for hospital discharges through December 31 of the calendar year (instead of through December 1) in order to support adjustments for continuous time trends in regression analyses.

[4] http://wagner.nyu.edu/faculty/billings/nyued-background.
[5] https://www.qualitynet.org.

We consider index admissions and readmissions at any general acute care hospital, inside or outside NJ. In accordance with specifications for all Centers for Medicare and Medicaid Services (CMS) readmissions metrics, we required that the beneficiary be enrolled for 12 months prior to the index hospitalization (ignoring gaps of 45 days or less) to allow for sufficient claims history for risk-adjustment.

Follow-up after Emergency Department Visit for Alcohol and Other Drug Abuse or Dependence*:* ED use is high among the population with substance use disorder. It is recommended that timely follow up after an ED visit for Alcohol and Other drug (AOD) abuse can reduce substance use and also can prevent future ED visits and hospitalization. This measure is developed to assess the percentage of ED visits for alcohol or other drug abuse or dependence in members 13 years and older, who received a follow up care within 7 days and 30 days from their index ED visit.

We followed the National Committee of Quality Assurance's technical specifications for the calculation of this metric using value sets from the 2020 specifications (NCQA 2020) for years 2016-2019. We also used the *1115 Substance Use Disorder Demonstrations: Technical Specifications for Monitoring Metrics Version 3.0* shared with us by DMAHS. In our data preparation, we only considered ED visits when members were enrolled for 30 days after the visit date (therefore being enrolled to receive a follow up visit within 30 days). We included ED visits from January first to December first of each year. Finally, we excluded ED visits where the beneficiaries were not enrolled for 30 days prior to the index ED visit.

We modified this measure from the specifications in consultation with the Business Intelligence Unit of the Division of Medical Assistance and Health Services (DMAHS) and other State subject matter experts. The Place of Service (POS) variable in our claims database is not as detailed as the federal POS variable referenced in HEDIS specifications. We used an approved translation of the POS variable provided to us by DMAHS subsequent to discussions with CMS. This modification translated the federal POS variable into provider-type and specialty-code in our data.

Medication Assisted Treatment: This measure is used to assess the percentage of Medicaid beneficiaries who have a claim for Medication Assisted Treatment (MAT) for SUD overall and for OUD specifically during the measurement period. We followed the *1115 Substance Use Disorder Demonstrations: Technical Specifications for Monitoring Metrics Version 3.0* to prepare this metric. We used NCQA's Healthcare Effectiveness Data and Information Set (HEDIS) value sets (NCQA 2020) and medication list directory for calculation of this metric for years 2016-2019.

We modified this measure by including additional state-specific MAT codes (H0018HFU1, H0018HFU2, H0019HFU1, H0019HFU2, Z2006, and Z3357) in the AOD Medication Treatment

Value Set. This modification was based on information from the Business Intelligence Unit of the Division of Medical Assistance and Health Services (DMAHS) and other State subject matter experts.

SUD Spending: This measure is used to calculate the total Medicaid SUD spending among all beneficiaries who enrolled in Medicaid for at least one month (30 consecutive days) during the measurement period. We followed the *1115 Substance Use Disorder Demonstrations: Technical Specifications for Monitoring Metrics Version 3.0* to prepare this metric. We used NCQA's HEDIS value sets (NCQA 2020) and medication list directory for calculation of this metric for years 2016-2019.

We modified this measure from the specifications in two ways based on information from DMAHS's Business Intelligence Unit and other State subject matter experts. First, we included additional state-specific MAT codes (H0018HFU1, H0018HFU2, H0019HFU1, H0019HFU2, Z2006, and Z3357) in the AOD Medication Treatment Value Set. Second, the Place of Service (POS) variable in our claims database is not as detailed as the federal POS variable referenced in HEDIS specifications. We used an approved translation of the POS variable provided to us by DMAHS subsequent to discussions with CMS. This modification translated the federal POS variable into provider-type and specialty-code in our data.

SUD Spending within IMDs: This measure is used to calculate the total Medicaid SUD spending on inpatient/residential treatment within IMDs among all beneficiaries who enrolled in Medicaid for at least one month (30 consecutive days) during the measurement period. We followed the *1115 Substance Use Disorder Demonstrations: Technical Specifications for Monitoring Metrics Version 3.0* to prepare this metric. We used NCQA's HEDIS value sets (NCQA 2020) and medication list directory for calculation of this metric for years 2016-2019. We did not exclude room and board costs.

We modified this measure from the specifications in three ways based on information from DMAHS's Business Intelligence Unit and other State subject matter experts. First, we included additional HCPC codes in identifying claims for residential treatment (Z3334, Z33335, and Z3337). Second, the Place of Service (POS) variable in our claims database is not as detailed as the federal POS variable referenced in HEDIS specifications. We used an approved translation of the POS variable provided to us by DMAHS subsequent to discussions with CMS. This modification translated federal POS variable into provider-type and specialty-code in our data. Finally, we used a list of 25 provider ID numbers provided to us by DMAHS's Business Intelligence Unit to identify claims from IMDs.

Use of Opioids at High Dosage: This measure is used to calculate to proportion of members 18 years and older who received prescription opioids at a high dosage which is defined as average morphine milligram equivalent (MME) >=90 for 15 days or more during the measurement year.

We followed the National Committee of Quality Assurance's technical specifications for the calculation of this metric using value sets and the medication list directory from the 2020 specifications (NCQA 2020) for years 2016-2019. We also used the *1115 Substance Use Disorder Demonstrations: Technical Specifications for Monitoring Metrics Version 3.0* which references the 2019 PQA Opioid Core Measure Set to help clarify specifications.

Appendix B: AHRQ Prevention Quality Indicators and Pediatric Quality Indicators – Composites and Constituents

Overall Composite (PQI #90)	
PQI #01 Diabetes Short-Term Complications Admission Rate	PQI #11 Bacterial Pneumonia Admission Rate
PQI #03 Diabetes Long-Term Complications Admission Rate	PQI #12 Urinary Tract Infection Admission Rate
PQI #05 Chronic Obstructive Pulmonary Disease (COPD) or Asthma in Older Adults Admission Rate	PQI #13 Angina without Procedure Admission Rate[6]
PQI #07 Hypertension Admission Rate	PQI #14 Uncontrolled Diabetes Admission Rate
PQI #08 Congestive Heart Failure (CHF) Admission Rate	PQI #15 Asthma in Younger Adults Admission Rate
PQI #10 Dehydration Admission Rate	PQI #16 Rate of Lower-Extremity Amputation Among Patients With Diabetes
Acute Composite (PQI #91)	
PQI #10 Dehydration Admission Rate	PQI #12 Urinary Tract Infection Admission Rate
PQI #11 Bacterial Pneumonia Admission Rate	
Chronic Composite (PQI #92)	
PQI #01 Diabetes Short-Term Complications Admission Rate	PQI #13 Angina without Procedure Admission Rate[13]
PQI #03 Diabetes Long-Term Complications Admission Rate	PQI #14 Uncontrolled Diabetes Admission Rate
PQI #05 Chronic Obstructive Pulmonary Disease (COPD) or Asthma in Older Adults Admission Rate	PQI #15 Asthma in Younger Adults Admission Rate
PQI #07 Hypertension Admission Rate	PQI #16 Rate of Lower-Extremity Amputation Among Patients With Diabetes
PQI #08 Congestive Heart Failure (CHF) Admission Rate	

Source: Prevention Quality Indicators Technical Specifications - Version 6.0, September 2016; http://www.qualityindicators.ahrq.gov/Modules/PQI_TechSpec.aspx.

[6] This component was retired in Version 6.0 of the PQI software which accommodated ICD-10 coding. This software version was used for generating the overall composite indicator beginning in October 2015.

Overall Composite (PDI #90)
PDI #14 Asthma Admission Rate
PDI #15 Diabetes Short-Term Complications Admission Rate
PDI #16 Gastroenteritis Admission Rate
PDI #18 Urinary Tract Infection Admission Rate

Source: Pediatric Quality Indicators Technical Specifications - Version 6.0, September 2016; https://www.qualityindicators.ahrq.gov/Archive/PQI_TechSpec_ICD10_v60.aspx.

Appendix C: Classification of Emergency Department Visits

Type Description	Diagnoses
Non-Emergent: The patient's initial complaint, presenting symptoms, vital signs, medical history, and age indicated that immediate medical care was not required within 12 hours.	Headache, Dental disorder, Types of migraine
Emergent, Primary Care Treatable: Conditions for which treatment was required within 12 hours, but care could have been provided effectively and safely in a primary care setting. The complaint did not require continuous observation, and no procedures were performed or resources used that are not available in a primary care setting (e.g., CAT scan or certain lab tests)	Acute bronchitis, Painful respiration, etc.
Emergent, ED Care Needed, Preventable/Avoidable: Emergency department care was required based on the complaint or procedures performed/resources used, but the emergent nature of the condition was potentially preventable/avoidable if timely and effective ambulatory care had been received during the episode of illness	Flare-ups of asthma, diabetes, congestive heart failure, etc.
Emergent, ED Care Needed, Not Preventable/Avoidable: Emergency department care was required and ambulatory care treatment could not have prevented the condition	Trauma, appendicitis, myocardial infarction

The first three categories are considered to be avoidable/preventable.
Type descriptions taken from http://wagner.nyu.edu/faculty/billings/nyued-background.php.

Appendix D: Definition of Mental Health and Substance Abuse

We use the Agency for Health Care Research and Quality (AHRQ) Clinical Classifications Software Refined (CCSR). The software aggregates more than 70,000 diagnosis codes from the International Classification of Diseases, 10th Revision, Clinical Modification/Procedure Coding System (ICD-10-CM/PCS) codes into a number of clinically meaningful categories across 21 body systems. The CCSR balances the retention of the clinical concepts included in the CCS categories under ICD-9-CM and capitalizes on the specificity of ICD-10-CM diagnoses by creating new clinical categories. In addition, the CCSR allows ICD-10-CM diagnosis codes to be cross classified into more than one category because individual codes can be used to document multiple conditions or a condition and a common symptom/manifestation. Using the CCSR version 2020.2 software we identified mental health conditions and substance abuse disorder from three of the twenty-one body system categories, (MBD) Mental, behavioral and neurodevelopmental disorders, (FAC) Factors influencing health status and contact with health services, and (SYM) Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified. Mental health conditions fall under body systems MBD and FAC and include mood disorders, schizophrenia, anxiety disorder, delirium, and dementia among other related conditions. Substance abuse is primarily a subcategory of mental health conditions identified under body system MBD but also body system SYM and includes alcohol and substance-related disorders. For a complete list of what is included in the definition of mental health (MH) and substance abuse (SA) indicators please refer to the first table below. It lists the AHRQ CCSR category codes used for MH and SA. A complete listing of all CCSR categories and their associated descriptions can be found in the version specific CCSR Reference File that is packaged with the software user guide and program on the AHRQ website.[7] These codes can then be cross-referenced to determine exactly which ICD-10 diagnoses comprise the MH and SA designations.

We also identify patients who are severely mentally ill based on findings from the national comorbidity survey – replication (Kessler et al. 2005) and subsequent work by Coffey et al. (2011) at AHRQ. These patients experienced functional and social impairment and had a diagnosis of psychoses, bipolar disorder, drug dependence, obsessive compulsive disorder, dysthymia (chronic depression), or related diagnoses. The severe mental illness indicator (SMI) utilizes diagnoses which cross CCSR categories. See the second table below for the ICD-10 codes used to create the SMI indicator. To identify SMI in ICD-10 claims, we applied the General Equivalence

[7] https://www.hcup-us.ahrq.gov/toolssoftware/ccsr/ccsr_archive.jsp#ccspcs (At the time of this document we used version 2020.2.)

Mappings[8] available from the Centers for Medicare & Medicaid Services to the ICD-9 SMI diagnoses, coupled with manual review and input from clinical consultation.

Also, it is important to note that anyone with an SMI diagnosis was also coded into the MH or SA indicators, even if their diagnosis did not put them in one of the CCSR categories that define MH or SA. Thus, the full logic for our creation of these indicators is as follows:

- SA is defined by any claim mapped into the CCSR category under BH Flag "Substance Abuse"
- MH is defined by any claim mapped into the CCSR category under BH Flag "Mental Health"
- SMI is defined by any claim having an SMI diagnosis.
- Back code into MH or SA categories based on SMI.
- BH is defined by any claim designated as either MH or SA after completing steps above.

[8] https://www.cms.gov/Medicare/Coding/ICD10/2017-ICD-10-CM-and-GEMs.html

CCSR Category	CCSR Category Description	BH Flag
FAC002	Encounter for mental health services related to abuse	Mental Health
FAC007	Encounter for mental health conditions	Mental Health
FAC008	Neoplasm-related encounters	Mental Health
MBD001	Schizophrenia spectrum and other psychotic disorders	Mental Health
MBD002	Depressive disorders	Mental Health
MBD003	Bipolar and related disorders	Mental Health
MBD004	Other specified and unspecified mood disorders	Mental Health
MBD005	Anxiety and fear-related disorders	Mental Health
MBD006	Obsessive-compulsive and related disorders	Mental Health
MBD007	Trauma- and stressor-related disorders	Mental Health
MBD008	Disruptive, impulse-control and conduct disorders	Mental Health
MBD009	Personality disorders	Mental Health
MBD010	Feeding and eating disorders	Mental Health
MBD011	Somatic disorders	Mental Health
MBD012	Suicidal ideation/attempt/intentional self-harm	Mental Health
MBD013	Miscellaneous mental and behavioral disorders/conditions	Mental Health
MBD014	Neurodevelopmental disorders	Mental Health
MBD017	Alcohol-related disorders	Substance Abuse
MBD018	Opioid-related disorders	Substance Abuse
MBD019	Cannabis-related disorders	Substance Abuse
MBD020	Sedative-related disorders	Substance Abuse
MBD021	Stimulant-related disorders	Substance Abuse
MBD022	Hallucinogen-related disorders	Substance Abuse
MBD023	Inhalant-related disorders	Substance Abuse
MBD024	Tobacco-related disorders	Substance Abuse
MBD025	Other specified substance-related disorders	Substance Abuse
MBD026	Mental and substance use disorders in remission	Mental Health
MBD027	Suicide attempt/intentional self-harm; subsequent encounter	Mental Health
MBD028	Opioid-related disorders; subsequent encounter	Substance Abuse
MBD029	Stimulant-related disorders; subsequent encounter	Substance Abuse
MBD030	Cannabis-related disorders; subsequent encounter	Substance Abuse
MBD031	Hallucinogen-related disorders; subsequent encounter	Substance Abuse
MBD032	Sedative-related disorders; subsequent encounter	Substance Abuse
MBD033	Inhalant-related disorders; subsequent encounter	Substance Abuse
MBD034	Mental and substance use disorders; sequela	Mental Health
SYM008	Symptoms of mental and substance use conditions	Substance Abuse
SYM009	Abnormal findings related to substance use	Substance Abuse

Mental and Substance Use (M/SU) Related Functional Severity: Classification of severe, moderate, and mild M/SU functional severity, based on percent of survey respondents with specific diagnosis categories who had serious personal or social consequences in the National Comorbidity Survey Replication (NCS-R)

Categories of M/SU disorders	ICD-10-CM Diagnosis Codes by Category and Severity Level
	Severe
Psychoses (not in NCS-R)	'F200', 'F201', 'F202', 'F205', 'F2081', 'F2089', 'F209', 'F22', 'F23', 'F24', 'F259', 'F250', 'F251', 'F258', 'F28', 'F29', 'F323', 'F333', 'F4489'
Bipolar I and II conditions	'F3010', 'F3011', 'F3012', 'F3013', 'F302', 'F303', 'F304', 'F308', 'F3110', 'F3111', 'F3112', 'F3113', 'F312', 'F3130', 'F3131', 'F3132', 'F314', 'F315', 'F3160', 'F3161', 'F3162', 'F3163', 'F3164', 'F3173', 'F3174', 'F3175', 'F3176', 'F3177', 'F3178', 'F3181', 'F319', 'F328', 'F3289', 'F348', 'F3481', 'F3489', 'F39'
Drug dependence	'F1120', 'F1121', 'F1220', 'F1221', 'F1320', 'F1321', 'F1420', 'F1421', 'F1520', 'F1521', 'F1620', 'F1621', 'F1920', 'F1921', 'O355XX0', 'O99320', 'O99321', 'O99322', 'O99323', 'O99324', 'O99325', 'T400X1A', 'T400X2A', 'T400X3A', 'T400X4A', 'T401X1A', 'T401X2A', 'T401X3A', 'T401X4A', 'T402X1A', 'T402X2A', 'T402X3A', 'T402X4A', 'T403X1A', 'T403X2A', 'T403X3A', 'T403X4A', 'T404X1A', 'T404X2A', 'T404X3A', 'T404X4A', 'T40601A', 'T40602A', 'T40603A', 'T40604A', 'T40691A', 'T40692A', 'T40693A', 'T40694A', 'P0441', 'P0449', 'P0440', 'P0442', 'P961', 'P962'
Obsessive-compulsive disorder	'F42', 'F422', 'F423', 'F424', 'F428', 'F429'
Dysthymia (chronic depression)	'F341', 'F6089'
Borderline Personality disorder	'F603'
Oppositional defiant disorder	'F913'
Related ICD-10-CM codes "severe"	'F322', 'F323', 'F329', 'F332', 'F333', 'F339', 'F601', 'F911', 'F912', 'F918', 'Z658'

Source: https://www.hcup-us.ahrq.gov/reports/SOI.jsp#appa

Appendix E: Risk-Adjustment Variables for Readmissions

For the 30-day readmission metrics, control variables for health status come from a full year of data prior to the index admission date and encompass clinically relevant comorbidities (not complications) that have strong relationships with readmission for the specific condition being analyzed.

Hospital-Wide Readmissions

• Age • Metastatic cancer/acute leukemia • Severe Cancer • Other Cancers • Severe Hematological Disorders • Coagulation Defects and Other Specified Hematological Disorders • Iron Deficiency or Other Unspecified Anemia and Blood Disease • End-stage Liver Disease • Pancreatic Disease • Dialysis Status • Acute Renal Failure • Transplants • Severe Infection • Other Infectious Diseases and Pneumonias • Septicemia/Shock • Congestive Heart Failure • Polyneuropathy • Congestive Heart Failure • Chronic Atherosclerosis or Angina, Cerebrovascular Disease	• Specified Arrhythmias • Cardio-respiratory Failure or Cardio-respiratory Shock • Chronic Obstructive Pulmonary Disease • Fibrosis of Lung or Other Chronic Lung Disorders • Protein-calorie Malnutrition • Disorders of Fluid, Electrolyte, Acid-Base • Rheumatoid Arthritis and Inflammatory Connective Tissue Disease • Diabetes Mellitus • Decubitus Ulcer or Chronic Skin Ulcer • Hemiplegia, Paraplegia, Paralysis, Functional Disability • Seizure Disorders and Convulsions • Respirator Dependence/Tracheostomy Status • Drug and Alcohol Disorders • Psychiatric Comorbidity • Hip Fracture/Dislocation

Appendix F: Detailed Source Data for Descriptive Cost Tables

Unadjusted means of Medicaid quarterly per-person cost estimates for individuals participating in the section 1115 demonstration, by type of cost, period, and treatment/comparison group

		Pre-demonstration						
	Type of cost	**Jan-Mar2016**	**Apr-Jun 2016**	**Jul-Sep 2016**	**Oct-Dec 2016**	**Jan-Mar2017**	**Apr-Jun 2017**	**Jul-Sep 2017**
Treatment group costs								
	N	97,612	100,226	100,846	99,475	104,979	107,242	107,506
Total costs	Total costs	3627.76	3631.42	3708.29	3528.66	3673.81	3817.00	3768.73
	Total federal costs	1813.88	1815.71	1854.14	1764.33	1836.91	1908.50	1884.36
SUD cost drivers	SUD-IMD costs	2.60	2.31	2.82	4.19	4.13	3.46	3.58
	Other SUD costs	919.43	935.24	965.12	927.00	1011.33	1039.47	1032.57
	Non-SUD costs	2705.73	2693.87	2740.35	2597.46	2658.35	2774.07	2732.58
Type of source of care cost drivers	Outpatient costs, non-ED	895.96	860.02	843.31	841.41	865.91	894.14	843.48
	Outpatient costs, ED	180.28	187.32	192.22	185.36	181.32	189.68	190.16
	Inpatient costs	951.87	940.84	938.83	810.75	921.54	937.04	938.82
	Pharmacy costs	625.06	637.41	657.25	578.75	586.92	611.77	583.37
	Long-term care costs	154.89	160.45	171.79	183.74	107.37	162.67	168.92
Comparison group costs								
	N	396,094	401,974	401,647	394,549	412,225	416,909	415,830
Total costs	Total costs	3081.90	3017.59	2937.11	2954.34	2948.02	2960.03	2833.13
	Total federal costs	1540.95	1508.80	1468.56	1477.17	1474.01	1480.02	1416.57
Type of source of care cost drivers	Outpatient costs, non-ED	788.14	736.11	729.61	740.68	745.53	764.45	716.66
	Outpatient costs, ED	54.41	52.67	48.99	51.69	53.25	50.43	47.38
	Inpatient costs	202.12	195.26	184.59	170.73	196.13	176.26	175.02
	Pharmacy costs	307.05	307.45	308.48	282.47	285.35	292.09	279.45
	Long-term care costs	799.72	789.44	801.73	806.38	597.48	760.36	770.50

		Post-demonstration								
	Type of cost	Oct-Dec 2017	Jan-Mar2018	Apr-Jun 2018	Jul-Sep 2018	Oct-Dec 2018	Jan-Mar2019	Apr-Jun 2019	Jul-Sep 2019	Oct-Dec 2019
Treatment group costs										
	N	105,555	107,470	109,861	110,297	107,604	107,639	109,435	109,824	108,193
Total costs	Total costs	3818.80	3734.05	3822.42	3920.72	3973.88	3951.69	4024.09	4028.39	4048.72
	Total federal costs	1909.40	1867.02	1911.21	1960.36	1986.94	1975.85	2012.04	2014.20	2024.36
SUD cost drivers	SUD-IMD costs	3.97	5.10	6.21	46.27	90.18	109.82	111.85	116.02	122.70
	Other SUD costs	1033.57	1037.90	1033.36	1089.29	1026.42	1048.20	1049.06	1063.59	1057.43
	Non-SUD costs	2781.27	2691.05	2782.86	2785.16	2857.28	2793.67	2863.18	2848.78	2868.59
Type of source of care cost drivers	Outpatient costs, non-ED	826.35	835.74	892.45	888.66	872.39	1001.07	1004.44	938.54	661.88
	Outpatient costs, ED	174.13	172.57	179.52	180.39	163.90	38.11	73.17	140.75	397.61
	Inpatient costs	923.32	984.99	917.15	898.25	905.21	481.34	646.75	854.49	1659.46
	Pharmacy costs	593.74	565.78	566.21	580.61	598.55	565.78	575.53	558.47	565.49
	Long-term care costs	179.39	161.56	177.37	193.22	206.66	183.31	187.28	211.41	223.84
Comparison group costs										
	N	407,948	430,281	436,330	435,634	426,035	448,786	454,307	453,232	444,196
Total costs	Total costs	2914.77	2913.71	3015.34	2966.38	3095.63	2997.90	3000.62	2964.49	3043.02
	Total federal costs	1457.39	1456.86	1507.67	1483.19	1547.82	1498.95	1500.31	1482.25	1521.51
Type of source of care cost drivers	Outpatient costs, non-ED	723.43	735.82	770.49	763.64	785.10	795.43	795.58	782.57	754.74
	Outpatient costs, ED	49.88	53.09	48.21	44.28	46.98	21.98	30.93	43.63	81.43
	Inpatient costs	165.66	191.13	188.42	174.80	173.86	119.39	144.76	173.04	266.54
	Pharmacy costs	281.82	271.64	275.05	274.38	285.21	264.09	258.68	253.62	254.61
	Long-term care costs	778.46	735.67	738.81	763.99	768.77	725.33	720.30	754.52	757.00

Source: Medicaid Fee-for-Service Claims & Managed Care Encounter Data, 2016-2019; Analysis by Rutgers Center for State Health Policy.

Appendix G: Covariate Balance Tables Before and After Propensity Matching

The tables below show the covariate balance statistics before and after matching for each of the models in this report utilizing propensity score matching to select a comparison (control) population. Preceding each table, we note the table(s) of regression results to which the balance statistics correspond. When matching was repeated (in a quarter or year), the results shown are for the last matched period. The high bias reduction and p-values reflect the similarity between treatment and comparison groups ensured through matching.

Table 4: Adjusted impact of removal of the IMD exclusion on MAT utilization among Medicaid beneficiaries with SUD age 55-64

Variable	Unmatched / Matched	Mean: Treated	Mean: Control	%bias	%reduct |bias|	t-test: t	t-test: p>|t|	V(T)/ V(C)
Male	U	.58329	.59673	-2.7		-1.16	0.244	.
	M	.58326	.57919	0.8	69.7	0.81	0.419	.
CDPS Score 1-2	U	.2652	.18006	20.6		8.33	0.000	.
	M	.26483	.25762	1.7	91.5	1.60	0.109	.
CDPS Score 2-3	U	.20139	.17411	7.0		2.92	0.004	.
	M	.2015	.20406	-0.7	90.6	-0.62	0.534	.
CDPS Score 3-5	U	.22147	.24504	-5.6		-2.42	0.016	.
	M	.22155	.23403	-3.0	47.1	-2.91	0.004	.
CDPS Score > 5	U	.22147	.32937	-24.3		-10.95	0.000	.
	M	.2216	.21596	1.3	94.8	1.33	0.182	.
#Chronic Cond = 1	U	.16633	.09673	20.7		8.13	0.000	.
	M	.16616	.16956	-1.0	95.1	-0.89	0.374	.
#Chronic Cond = 2	U	.15521	.12649	8.3		3.41	0.001	.
	M	.1553	.15128	1.2	86.0	1.09	0.275	.
#Chronic Cond = 3	U	.13669	.125	3.5		1.46	0.145	.

	M	.13677	.13891	-0.6	81.7	-0.61	0.543	.
#Chronic Cond = 4	U	.10549	.11855	-4.1		-1.81	0.071	.
	M	.10555	.1042	0.4	89.6	0.43	0.665	.
#Chronic Cond = 5	U	.07857	.11111	-11.1		-5.08	0.000	.
	M	.07862	.07836	0.1	99.2	0.09	0.924	.
#Chronic Cond > 6	U	.15266	.29663	-35.0		-16.62	0.000	.
	M	.15275	.15254	0.1	99.9	0.06	0.955	.
Black	U	.40017	.32391	15.9		6.68	0.000	.
	M	.39987	.40442	-0.9	94.0	-0.91	0.365	.
Hispanic	U	.09621	.14236	-14.3		-6.56	0.000	.
	M	.09626	.09376	0.8	94.6	0.84	0.403	.
Asian	U	.00532	.00843	-3.8		-1.78	0.075	.
	M	.00532	.00334	2.4	36.2	2.96	0.003	.
Other Race/Ethnicity	U	.06949	.14633	-25.0		-12.37	0.000	.
	M	.06953	.06917	0.1	99.5	0.14	0.888	.
Mental Health Condition	U	.73074	.69296	8.3		3.62	0.000	.
	M	.73058	.74055	-2.2	73.6	-2.21	0.027	.
Enrolled Days	U	89.462	90.362	-8.7		-3.45	0.001	1.50*
	M	89.499	90.429	-9.0	-3.4	-8.70	0.000	1.34*

* if variance ratio outside [0.97; 1.03] for U and [0.97; 1.03] for M

Table 6: Adjusted impact of removal of the IMD exclusion on 7-day and 30-day rates of follow-up after ED visits for AOD abuse or dependence among Medicaid beneficiaries age 55-64

Variable	Unmatched / Matched	Mean Treated	Mean Control	%bias	%reduct |bias|	t-test t	t-test p>|t|	V(T)/V(C)
Male	U	.67467	.73118	-12.4		-1.10	0.271	.
	M	.68904	.71233	-5.1	58.8	-0.97	0.332	.
CDPS Score 1-2	U	.224	.2043	4.8		0.43	0.667	.
	M	.23014	.26438	-8.3	-73.8	-1.52	0.130	.
CDPS Score 2-3	U	.19733	.15054	12.3		1.08	0.281	.
	M	.18767	.19726	-2.5	79.5	-0.46	0.642	.
CDPS Score 3-5	U	.23733	.21505	5.3		0.48	0.633	.
	M	.23562	.1863	11.8	-121.3	2.31	0.021	.
CDPS Score > 5	U	.26933	.29032	-4.7		-0.43	0.668	.
	M	.2726	.26301	2.1	54.3	0.41	0.679	.
#Chronic Cond = 1	U	.17867	.11828	17.0		1.46	0.146	.
	M	.16027	.10959	14.3	16.1	2.84	0.005	.
#Chronic Cond = 2	U	.15867	.16129	-0.7		-0.07	0.948	.
	M	.16301	.13014	8.9	-1153.1	1.78	0.076	.
#Chronic Cond = 3	U	.14133	.09677	13.8		1.18	0.238	.
	M	.1411	.12877	3.8	72.3	0.69	0.491	.
#Chronic Cond = 4	U	.10667	.08602	7.0		0.61	0.540	.
	M	.10959	.11096	-0.5	93.4	-0.08	0.933	.
#Chronic Cond = 5	U	.07467	.09677	-7.9		-0.75	0.452	.
	M	.07671	.09726	-7.3	7.1	-1.39	0.164	.
#Chronic Cond ≥ 6	U	.15067	.21505	-16.7		-1.61	0.108	.

	M	.15479	.15479	0.0	100.0	0.00	1.000	.
Black	U	.416	.41935	-0.7		-0.06	0.951	.
	M	.4274	.48219	-11.1	-1533.3	-2.10	0.036	.
Hispanic	U	.09867	.16129	-18.6		-1.86	0.064	.
	M	.10137	.08219	5.7	69.4	1.27	0.205	.
Other Race/Ethnicity	U	.06533	.11828	-18.3		-1.87	0.061	.
	M	.06712	.03562	10.9	40.5	2.73	0.006	.
Mental Health Condition	U	.78667	.64516	31.7		3.08	0.002	.
	M	.78082	.7863	-1.2	96.1	-0.25	0.800	.

* if variance ratio outside [0.87; 1.15] for U and [0.86; 1.16] for M

Table 8: Adjusted impact of removal of the IMD exclusion on IP stays for SUD and OUD among Medicaid beneficiaries age 55-64

Table 10: Adjusted impact of removal of the IMD exclusion on ED visits for SUD and OUD among Medicaid beneficiaries age 55-64

Variable	Unmatched / Matched	Mean Treated	Mean Control	%bias	%reduct |bias|	t-test t	t-test p>|t|	V(T)/ V(C)
Male	U	.44225	.35843	17.2		34.56	0.000	.
	M	.44224	.44417	-0.4	97.7	-1.10	0.273	.
CDPS Score 1-2	U	.24384	.23367	2.4		4.83	0.000	.
	M	.24383	.24296	0.2	91.4	0.58	0.564	.
CDPS Score 2-3	U	.14036	.15348	-3.7		-7.59	0.000	.
	M	.14036	.13953	0.2	93.6	0.68	0.495	.
CDPS Score 3-5	U	.11875	.15105	-9.5		-19.70	0.000	.
	M	.11875	.11911	-0.1	98.9	-0.31	0.755	.
CDPS Score > 5	U	.09475	.14903	-16.6		-35.49	0.000	.
	M	.09475	.09501	-0.1	99.5	-0.25	0.805	.
#Chronic Cond = 1	U	.16077	.11583	13.0		25.64	0.000	.
	M	.16077	.16017	0.2	98.7	0.46	0.644	.
#Chronic Cond = 2	U	.14177	.1266	4.5		8.93	0.000	.
	M	.14177	.14018	0.5	89.5	1.30	0.195	.
#Chronic Cond = 3	U	.1142	.12586	-3.6		-7.36	0.000	.
	M	.1142	.11533	-0.3	90.3	-1.00	0.318	.
#Chronic Cond = 4	U	.08197	.11159	-10.0		-21.08	0.000	.
	M	.08197	.08143	0.2	98.2	0.56	0.579	.
#Chronic Cond = 5	U	.05433	.08776	-13.0		-27.99	0.000	.
	M	.05433	.05381	0.2	98.4	0.65	0.516	.

#Chronic Cond ≥ 6	U	.08208	.16303	-24.9		-54.44	0.000	.
	M	.08208	.08259	-0.2	99.4	-0.52	0.602	.
Black	U	.22613	.1609	16.6		32.62	0.000	.
	M	.22612	.22505	0.3	98.4	0.72	0.472	.
Hispanic	U	.17522	.20736	-8.2		-16.87	0.000	.
	M	.17522	.17409	0.3	96.5	0.84	0.399	.
Asian	U	.05924	.05944	-0.1		-0.17	0.868	.
	M	.05924	.05924	0.0	96.8	0.01	0.994	.
Other Race/Ethnicity	U	.13669	.26123	-31.6		-68.22	0.000	.
	M	.13669	.13589	0.2	99.4	0.65	0.513	.
Mental Health Condition	U	.53334	.45292	16.1		32.74	0.000	.
	M	.53334	.53407	-0.1	99.1	-0.41	0.678	.
Enrolled Days	U	87.749	89.827	-16.8		-32.04	0.000	1.78*
	M	87.75	87.92	-1.4	91.8	-3.45	0.001	1.02*

* if variance ratio outside [0.99; 1.01] for U and [0.99; 1.01] for M

Table 11: Adjusted impact of the SUD demonstration on 30-day readmission rates among Medicaid beneficiaries age 18+ with SUD

Variable	Unmatched / Matched	Mean: Treated	Mean: Control	%bias	%reduct |bias|	t-test: t	t-test: p>|t|	V(T)/V(C)
Age	U	48.098	55.463	-42.4		-24.47	0.000	0.43*
	M	48.098	46.944	6.6	84.3	4.42	0.000	0.68*
Male	U	.51582	.25997	54.4		31.52	0.000	.
	M	.51582	.49311	4.8	91.1	2.61	0.009	.
CDPS Score 1-2	U	.06465	.11843	-18.7		-10.82	0.000	.
	M	.06465	.05087	4.8	74.4	3.40	0.001	.
CDPS Score 2-3	U	.10704	.15433	-14.1		-8.13	0.000	.
	M	.10704	.10659	0.1	99.0	0.08	0.933	.
CDPS Score 3-5	U	.24058	.22245	4.3		2.49	0.013	.
	M	.24058	.26889	-6.7	-56.2	-3.74	0.000	.
CDPS Score > 5	U	.58092	.48507	19.3		11.17	0.000	.
	M	.58092	.56699	2.8	85.5	1.62	0.106	.
#Chronic Cond = 1	U	.1193	.10137	5.7		3.32	0.001	.
	M	.1193	.09659	7.3	-26.6	4.21	0.000	.
#Chronic Cond = 2	U	.11824	.0896	9.4		5.44	0.000	.
	M	.11824	.11385	1.4	84.7	0.79	0.431	.
#Chronic Cond = 3	U	.12369	.08607	12.3		7.13	0.000	.
	M	.12369	.11718	2.1	82.7	1.15	0.250	.
#Chronic Cond = 4	U	.10916	.09019	6.3		3.67	0.000	.
	M	.10916	.11915	-3.3	47.3	-1.81	0.071	.
#Chronic Cond = 5	U	.10235	.09122	3.8		2.18	0.029	.

	M	.10235	.09508	2.5	34.7	1.40	0.161	.
#Chronic Cond ≥ 6	U	.35761	.44843	-18.6		-10.76	0.000	.
	M	.35761	.38047	-4.7	74.8	-2.72	0.006	.
Black	U	.36927	.24158	28.0		16.21	0.000	.
	M	.36927	.39909	-6.5	76.6	-3.53	0.000	.
Hispanic	U	.10098	.20009	-28.0		-16.16	0.000	.
	M	.10098	.09523	1.6	94.2	1.11	0.266	.
Asian	U	.00484	.03119	-19.9		-11.46	0.000	.
	M	.00484	.00288	1.5	92.5	1.82	0.068	.
Other Race/Ethnicity	U	.06419	.13594	-24.1		-13.90	0.000	.
	M	.06419	.06071	1.2	95.1	0.83	0.408	.
Aged/Blind/Disabled	U	.4486	.60733	-32.2		-18.64	0.000	.
Eligibility Category	M	.4486	.47843	-6.1	81.2	-3.44	0.001	.
Other NJFC	U	.12627	.22701	-26.6		-15.40	0.000	.
Eligibility Category	M	.12627	.13656	-2.7	89.8	-1.75	0.080	.
Medicaid Expansion/GA	U	.42347	.16242	59.9		34.72	0.000	.
Eligibility Category	M	.42347	.38335	9.2	84.6	4.70	0.000	.
Children’s Services	U	.00136	.00265	-2.9		-1.66	0.097	.
Eligibility Category	M	.00136	.00151	-0.3	88.2	-0.23	0.818	.
Other Eligibility	U	.0003	.00059	-1.4		-0.78	0.434	.
Category	M	.0003	.00015	0.7	47.0	0.58	0.564	.
Dual	U	.19016	.47006	-62.3		-36.02	0.000	.
	M	.19016	.19152	-0.3	99.5	-0.20	0.842	.

* if variance ratio outside [0.95; 1.05] for U and [0.95; 1.05] for M

Table 12: Adjusted impact of the removal of the IMD exclusion on 30-day readmission rates among Medicaid beneficiaries age 18+ with SUD

Variable	Unmatched / Matched	Mean Treated	Mean Control	%bias	%reduct |bias|	t-test t	t-test p>|t|	V(T)/ V(C)
Male	U	.5688	.6105	-8.5		-1.47	0.141	.
	M	.56909	.57984	-2.2	74.2	-0.68	0.497	.
CDPS Score 1-2	U	.05064	.04972	0.4		0.07	0.942	.
	M	.05067	.02508	11.7	-2694.6	4.20	0.000	.
CDPS Score 2-3	U	.09309	.08287	3.6		0.62	0.536	.
	M	.09263	.08342	3.2	9.9	1.02	0.310	.
CDPS Score 3-5	U	.23171	.23757	-1.4		-0.24	0.809	.
	M	.23183	.2738	-9.9	-616.7	-3.02	0.003	.
CDPS Score > 5	U	.61739	.62155	-0.9		-0.15	0.881	.
	M	.61771	.61003	1.6	-84.7	0.49	0.622	.
#Chronic Cond = 1	U	.04194	.03591	3.1		0.53	0.595	.
	M	.04197	.02866	6.9	-120.6	2.25	0.024	.
#Chronic Cond = 2	U	.07263	.03867	14.8		2.37	0.018	.
	M	.07267	.05578	7.4	50.3	2.15	0.031	.
#Chronic Cond = 3	U	.10281	.08287	6.9		1.16	0.245	.
	M	.10287	.09621	2.3	66.6	0.69	0.487	.
#Chronic Cond = 4	U	.11458	.08287	10.6		1.77	0.076	.
	M	.11464	.11361	0.3	96.8	0.10	0.920	.
#Chronic Cond = 5	U	.111	.12707	-5.0		-0.89	0.376	.
	M	.11105	.12436	-4.1	17.2	-1.29	0.197	.

#Chronic Cond ≥ 6	U	.54476	.62431	-16.2		-2.80	0.005	.
	M	.54504	.57421	-5.9	63.3	-1.84	0.066	.
Black	U	.39488	.40331	-1.7		-0.30	0.763	.
	M	.39509	.39253	0.5	69.6	0.16	0.870	.
Hispanic	U	.06854	.09392	-9.3		-1.71	0.087	.
	M	.06858	.05885	3.6	61.7	1.24	0.213	.
Asian	U	.00205	.00276	-1.5		-0.27	0.787	.
	M	.00205	.00051	3.1	-114.3	1.34	0.180	.
Other Race/Ethnicity	U	.07315	.13536	-20.4		-3.96	0.000	.
	M	.07318	.05885	4.7	77.0	1.80	0.071	.
Mental Health Condition	U	.85934	.77624	21.6		4.04	0.000	.
	M	.85926	.88076	-5.6	74.1	-2.00	0.046	.

* if variance ratio outside [0.92; 1.09] for U and [0.92; 1.09] for M

Table 13: Adjusted impact of the SUD demonstration on avoidable hospitalizations among Medicaid beneficiaries age 6+ with SUD

Table 14: Adjusted impact of the SUD Demonstration on avoidable ED visits among Medicaid beneficiaries age 6+ with SUD

Variable	Unmatched / Matched	Mean: Treated	Mean: Control	%bias	%reduct |bias|	t-test: t	t-test: p>|t|	V(T)/ V(C)
Age	U	41.836	37.717	21.4		55.43	0.000	0.36*
	M	41.835	42.574	-3.8	82.1	-11.76	0.000	0.87*
Male	U	.55618	.36939	38.1		112.14	0.000	.
	M	.55615	.54252	2.8	92.7	6.36	0.000	.
#Chronic Cond = 1	U	.22753	.20184	6.3		18.48	0.000	.
	M	.22751	.23048	-0.7	88.5	-1.64	0.101	.
#Chronic Cond = 2	U	.12264	.09491	8.9		26.87	0.000	.
	M	.12264	.12344	-0.3	97.1	-0.56	0.573	.
#Chronic Cond = 3	U	.0764	.06251	5.5		16.37	0.000	.
	M	.07641	.07432	0.8	85.0	1.83	0.067	.
#Chronic Cond = 4	U	.05087	.04419	3.1		9.33	0.000	.
	M	.05088	.05059	0.1	95.7	0.30	0.761	.
#Chronic Cond = 5	U	.03524	.03105	2.3		6.93	0.000	.
	M	.03524	.03558	-0.2	91.8	-0.43	0.667	.
#Chronic Cond ≥ 6	U	.06063	.05497	2.4		7.18	0.000	.
	M	.06064	.0596	0.4	81.7	1.01	0.311	.
CDPS Score 1-2	U	.32551	.27761	10.5		30.88	0.000	.
	M	.32554	.32939	-0.8	92.0	-1.91	0.056	.

CDPS Score 2-3	U	.21172	.15861	13.7		41.30	0.000	.
	M	.21174	.21321	-0.4	97.2	-0.84	0.403	.
CDPS Score 3-5	U	.20308	.11718	23.6		73.58	0.000	.
	M	.20308	.20486	-0.5	97.9	-1.03	0.303	.
CDPS Score > 5	U	.15985	.09243	20.4		63.91	0.000	.
	M	.1598	.14953	3.1	84.8	6.60	0.000	.
Black	U	.31722	.20132	26.7		81.32	0.000	.
	M	.31717	.32116	-0.9	96.6	-1.99	0.047	.
Hispanic	U	.13201	.25042	-30.5		-83.20	0.000	.
	M	.13202	.12478	1.9	93.9	5.03	0.000	.
Asian	U	.00874	.04053	-20.6		-51.44	0.000	.
	M	.00874	.00866	0.1	99.7	0.21	0.835	.
Other Race/Ethnicity	U	.05783	.11069	-19.1		-51.64	0.000	.
	M	.05783	.05465	1.2	94.0	3.21	0.001	.
Aged/Blind/Disabled Eligibility Category	U	.25	.30953	-13.3		-38.04	0.000	.
	M	.25002	.25506	-1.1	91.5	-2.69	0.007	.
Other NJFC Eligibility Category	U	.2283	.46751	-51.9		-144.34	0.000	.
	M	.22832	.22341	1.1	97.9	2.73	0.006	.
Medicaid Expansion/GA Eligibility Category	U	.51418	.20267	68.7		213.87	0.000	.
	M	.51414	.51481	-0.1	99.8	-0.31	0.753	.
Children’s Services Eligibility Category	U	.00679	.02005	-11.5		-29.74	0.000	.
	M	.00679	.0061	0.6	94.8	2.02	0.044	.
Other Eligibility Category	U	.00073	.00024	2.2		7.72	0.000	.
	M	.00073	.00062	0.5	77.4	0.99	0.320	.
Dual	U	.11655	.2035	-23.9		-65.56	0.000	.
	M	.11656	.11679	-0.1	99.7	-0.17	0.867	.

Enrolled Days	U	88.652	89.843	-10.4		-32.43	0.000	1.54*
	M	88.657	89.436	-6.8	34.6	-15.28	0.000	1.29*

* if variance ratio outside [0.99; 1.01] for U and [0.99; 1.01] for M

Table 15: Average marginal effects (AME) per person-quarter from regression analyses of cost of care components
(top panel)

Variable	Unmatched / Matched	Mean: Treated	Mean: Control	%bias	%reduct |bias|	t-test: t	t-test: p>|t|	V(T)/V(C)
Male	U	.55629	.392	33.4		98.91	0.000	.
	M	.55624	.55671	-0.1	99.7	-0.22	0.825	.
Age 21-34	U	.29098	.13543	38.7		125.08	0.000	.
	M	.29097	.29076	0.1	99.9	0.11	0.913	.
Age 35-64	U	.6071	.33504	56.6		168.84	0.000	.
	M	.6071	.60662	0.1	99.8	0.22	0.822	.
Age 65-74	U	.03299	.06209	-13.7		-37.26	0.000	.
	M	.03299	.03374	-0.4	97.4	-0.97	0.332	.
Age ≥ 75	U	.00815	.06084	-29.2		-71.29	0.000	.
	M	.00815	.00844	-0.2	99.5	-0.73	0.462	.
Dual	U	.1163	.18324	-18.8		-52.67	0.000	.
	M	.11632	.1177	-0.4	97.9	-1.00	0.316	.
CDPS Score 1-2	U	.32501	.26487	13.2		39.72	0.000	.
	M	.32505	.32415	0.2	98.5	0.45	0.653	.
CDPS Score 2-3	U	.21146	.1622	12.7		38.56	0.000	.
	M	.21148	.21126	0.1	99.5	0.13	0.899	.
CDPS Score 3-5	U	.203	.11544	24.1		76.56	0.000	.
	M	.20302	.20421	-0.3	98.6	-0.69	0.491	.
CDPS Score > 5	U	.16034	.09621	19.3		60.96	0.000	.
	M	.16025	.16056	-0.1	99.5	-0.19	0.847	.

#Chronic Cond = 1	U	.22746	.19791	7.2		21.65	0.000	.
	M	.22748	.22674	0.2	97.5	0.42	0.678	.
#Chronic Cond = 2	U	.1225	.08683	11.7		36.13	0.000	.
	M	.12252	.12208	0.1	98.8	0.31	0.758	.
#Chronic Cond = 3	U	.07629	.05639	8.0		24.67	0.000	.
	M	.0763	.07639	-0.0	99.5	-0.08	0.935	.
#Chronic Cond = 4	U	.05079	.0398	5.3		16.17	0.000	.
	M	.0508	.05124	-0.2	96.0	-0.47	0.639	.
#Chronic Cond = 5	U	.03518	.02796	4.1		12.61	0.000	.
	M	.03518	.0353	-0.1	98.3	-0.15	0.880	.
#Chronic Cond ≥ 6	U	.0605	.04949	4.8		14.68	0.000	.
	M	.06051	.06077	-0.1	97.6	-0.25	0.801	.
Black	U	.31696	.19844	27.4		84.71	0.000	.
	M	.31688	.31828	-0.3	98.8	-0.70	0.486	.
Hispanic	U	.13252	.26409	-33.5		-91.77	0.000	.
	M	.13254	.13248	0.0	100.0	0.04	0.970	.
Asian	U	.00876	.0388	-19.8		-49.77	0.000	.
	M	.00876	.00879	-0.0	99.9	-0.07	0.945	.
Other Race/Ethnicity	U	.05792	.11114	-19.2		-52.28	0.000	.
	M	.05793	.05797	-0.0	99.9	-0.04	0.971	.
Enrolled Days	U	88.65	89.871	-10.7		-33.96	0.000	1.56*
	M	88.657	88.856	-1.7	83.7	-3.74	0.000	1.07*

* if variance ratio outside [0.99; 1.01] for U and [0.99; 1.01] for M

Appendix H: Approved Evaluation Design, Substance Use Disorder (SUD) Component

DEPARTMENT OF HEALTH & HUMAN SERVICES
Centers for Medicare & Medicaid Services
7500 Security Boulevard, Mail Stop S2-25-26
Baltimore, Maryland 21244-1850

State Demonstrations Group

JAN 3 0 2020

Jennifer Langer Jacobs
Director, Department of Human Services
Division of Medical Assistance and Health Services
P.O. Box 712
Trenton, NJ 08625-0712

Dear Ms. Jacobs:

The Centers for Medicare & Medicaid Services (CMS) has approved the evaluation design for the Substance Use Disorder (SUD) component of New Jersey's section 1115 demonstration entitled, "New Jersey FamilyCare Comprehensive Demonstration" (Project Number 11-W00279/2) effective through June 30, 2022. We sincerely appreciate the state's commitment to a rigorous evaluation of your demonstration.

CMS has added the approved evaluation design to the demonstrations Special Terms and Conditions (STCs) as part of Attachment M. A copy of the STCs, that includes the new attachment, is enclosed with this letter per 42 CFR 431.424(c). The approved evaluation design may now be posted to the state's Medicaid website within thirty days. CMS will also post the approved evaluation design as a standalone document separate from the STCs on Medicaid.gov.

Please note that an interim evaluation report, consistent with the approved evaluation design is due to CMS one year prior to the expiration of the demonstration, or at the time of the renewal application if the state chooses to extend the demonstration. Likewise, a summative evaluation report, consistent with this approved design, is due to CMS within 18 months of the end of the demonstration period.

We look forward to our continued partnership with you and your staff on the New Jersey FamilyCare Comprehensive Demonstration. If you have any questions, please contact your CMS project officer, Ms. Sandra Phelps. Ms Phelps may be reached by email at Sandra.Phelps@cms.hhs.gov.

Sincerely,

[redacted]

Danielle Daly
Director
Division of Demonstration
Monitoring and Evaluation

[redacted]

Angela D. Garner
Director
Division of System Reform
Demonstrations

cc: Francis McCullough, Director, Division of Medicaid Field Operations - East
Ricardo Holligan, Deputy Director, Division of Medicaid Field Operations - East

New Jersey FamilyCare Opioid Use Disorder/Substance Use Disorder Demonstration Program: 10/31/2017-6/30/2022

Evaluation Plan by Rutgers Center for State Health Policy

General Background Information

Under the NJ FamilyCare 1115 Demonstration Waiver, the New Jersey Division of Medical Assistance and Health Services (DMAHS) is participating in a new initiative for addressing the opioid use disorder/substance use disorder (OUD/SUD) crisis over the period 10/31/2017-6/30/2022. The NJ FamilyCare OUD/SUD program under development will bring a full continuum of evidence-based care to beneficiaries with OUD/SUD in an effort to improve accessibility, treatment quality, and health outcomes for this population.

The Implementation Plan for New Jersey's OUD/SUD program was approved by CMS on May 17, 2018.[1] In this plan, the State details the overall **goals** of the OUD/SUD program. They are:

1. Increase the rates of identification, initiation and engagement in treatment for OUD and other SUDs;
2. Increase adherence to, and retention in, treatment for OUD and other SUDs;
3. Reduction in overdose deaths, particularly those due to opioids;
4. Reduce utilization of emergency departments and inpatient hospital settings for OUD and other SUD treatment, where the utilization is preventable or medically inappropriate;
5. Reduce preventable, or potentially preventable, readmission to the same or higher level of care for OUD and other SUD; and
6. Improve access to care for physical health conditions among beneficiaries with OUD or other SUDs.

[1] NJDHS-DMAHS (New Jersey Department of Human Services, Division of Medical Assistance and Health Services). 2018. *NJ FamilyCare Comprehensive Demonstration Implementation Protocol for the Opioid Use Disorder (OUD)/Substance Use Disorder (SUD) Program*. Trenton: NJDHS-DMAHS. https://www.state.nj.us/humanservices/dmahs/home/Comprehensive_Demonstration_Implementation_Protocol_OUD-SUD_Program.pdf.

In pursuit of these goals, the Centers for Medicare and Medicaid Services (CMS) has prescribed milestones for the implementation of New Jersey's OUD/SUD program.[2,3] These **milestones** require the State to:

1. Establish new benefits for access to critical levels of care for OUD/SUDs;
2. Establish requirements for evidence-based, SUD-specific patient placement criteria to govern providers' assessments of beneficiaries and guide utilization management;
3. Establish residential treatment provider qualifications using evidence-based, SUD program standards and require that residential treatment providers offer access to Medication Assisted Treatment (MAT), and ensure provider compliance with standards of care;
4. Assess provider capacity at each level of care (including MAT for OUD) and develop a plan for addressing any identified gaps;
5. Implement comprehensive treatment and prevention strategies to address opioid abuse and OUD via prescribing guidelines, access to Naloxone, and an SUD Health Information Technology (IT) Plan for prescription drug monitoring;
6. Develop and implement policies to improve transitions between levels of care and improve care coordination between residential/inpatient facilities and community supports.

The timeframes laid out in the Waiver Special Terms and Conditions (STCs) require completion of Milestones 1-5 within 24 months of the demonstration approval on October 31, 2017. Milestone 6 is carried out over the course of the five-year demonstration period.

To allow for the flexibility and innovation needed to craft a successful OUD/SUD program, the Waiver also gives the State authority to make key service delivery changes. Due to an existing federal policy, only Medicaid members ages 18 to 20 and 65 or older were covered for both detox-rehabilitative services and short-term residential treatment (STR) in an Institution for Mental Disease (IMD). Any hospital, nursing facility, or other institution of more than 16 beds caring for individuals where the majority (over 50%) have a diagnosis of mental disease qualifies as an IMD, thus severely limiting the bed capacity in the state available for treatment of Medicaid beneficiaries with OUD/SUD aged 21-64. These individuals had to self-pay or access state funding for treatment, which entailed waiting for a bed in one of only four facilities statewide. The result was delayed treatment admission for withdrawal management services that are vital to the continuum of care in New Jersey. Subsequent to Waiver approval on October 31, 2017, gaps in the care

[2] CMS (Centers for Medicare & Medicaid Services). 2017. *NJ FamilyCare Comprehensive Demonstration (Project No. 11-W-00279/2)*. Baltimore: CMS. https://www.medicaid.gov/Medicaid-CHIP-Program-Information/By-Topics/Waivers/1115/downloads/nj/nj-1115-request-ca.pdf.

[3] CMS (Centers for Medicare & Medicaid Services). 2017. *SMD #17-003 Re: Strategies to Address the Opioid Epidemic*. Baltimore: CMS. https://www.medicaid.gov/federal-policy-guidance/downloads/smd17003.pdf.

continuum, like the IMD exclusion, can be closed. Specifically, the State was granted waiver authority to make these **service delivery changes**[4]:

1. Remove the exclusion prohibiting withdrawal management or residential treatment services delivered in an Institute for Mental Disease (IMD);
2. Add long-term residential treatment, including treatment in an IMD, as a new level of care in the OUD/SUD service continuum;
3. Add peer recovery support specialist and case management programs to the benefit package for individuals with OUD/SUD;
4. Move to a managed care delivery system with integrated physical and behavioral health services, with gubernatorial approval, over the course of the five year demonstration under an amendment to the waiver.

These service delivery changes complement additional activities and policies enacted by the State under this initiative. These other activities are described in detail in the State's Implementation Plan. Briefly, the State will:

- Operationalize the use of American Society for Addiction Medicine (ASAM) criteria and the LOCI-3 assessment tool for SUD treatment;
- Operationalize and align the utilization management by managed care organizations and the Interim Managing Entity (IME) to ensure the appropriate level of care;
- Ensure NJ residential treatment facility (RTF) regulations and provider contracts with MCOs (managed care organizations) meet ASAM criteria for services types, hours of care, and staff credentials and establish a review process to ensure provider compliance;
- Ensure access to MAT on-site and after RTF discharge;
- Conduct a statewide capacity report and maintain provider capacity data profiles for all levels of care with a plan to address any insufficiency;
- Implement strategies under the Health IT plan to connect SUD providers to EHRs and the Prescription Drug Monitoring Program;
- Utilize and expand training and use of Naloxone to reverse overdoses; and
- Implement an Opioid Overdose Recovery program to those who have received Narcan reversal.

All together, these changes under the demonstration enable New Jersey to achieve the programmatic milestones and goals described above, Specifically, lifting the IMD exclusion (delivery change 1) increases access to critical levels of care for OUD/SUD for beneficiaries aged 21-64 who will have access to hundreds more withdrawal

[4] NJDHS-DMAHS (New Jersey Department of Human Services, Division of Medical Assistance and Health Services). 2018. NJ FamilyCare Comprehensive Demonstration Implementation Protocol for the Opioid Use Disorder (OUD)/Substance Use Disorder (SUD) Program. Trenton: NJDHS-DMAHS. https://www.state.nj.us/humanservices/dmahs/home/Comprehensive_Demonstration_Implementation_Protocol_OUD-SUD_Program.pdf.

management and detox beds in NJ. The addition of long-term residential (LTR) treatment (delivery change 2), peer recovery support, and case management (delivery change 3) are also new benefits expanding the continuum of care as per the first milestone. LTR treatment and peer recovery services are available to beneficiaries of all ages with OUD/SUD, and the case management benefit will be available for adults ages 18 and older.[5] The movement towards integrated physical and behavioral health under a managed care model (delivery change 4) supports the sixth milestone of improving transitions and care coordination in OUD/SUD treatment and affects beneficiaries of all ages with OUD/SUD.[6] Finally, all the additional activities in the State's Implementation Plan enumerated above are also intended to benefit beneficiaries with OUD/SUD of all ages.

Evaluation Questions and Hypotheses

A robust and timely independent evaluation is required as part of the Waiver Special Terms and Conditions (STCs) to determine if the State's OUD/SUD program succeeds in meeting the population health goals of the national initiative. The STCs set forth the following research question relevant to the Waiver OUD/SUD program:

What is the impact of providing substance use disorder services to Medicaid beneficiaries? Including paying for services rendered in an institution for mental disease (IMD)?

Following the evaluation design requirements also put forth in the STCs, hypotheses aligning with the overall goals of the OUD/SUD initiative will be tested to answer this research question.

As is clear from the milestones, the primary strategy for achieving the goals under this initiative is building an effective, evidence-based delivery system for OUD-SUD treatment.[7] Lifting the IMD exclusion allows beneficiaries aged 21-64 increased access to withdrawal management or detox services to access treatment rather than delaying treatment on a waiting list for a state-funded facility. This can increase adherence to OUD-SUD treatment and avoid overdose deaths. The addition of peer support recovery services is an evidence-based strategy to support individuals with OUD/SUD during critical transitions in care and into recovery. These and the other changes fulfilling Milestone 1 should improve adherence to and retention in OUD-SUD treatment, averting use of emergency departments and hospitals for unmet treatment needs. Similar benefits are expected from achievement of Milestone 2 establishing widespread use of evidence-

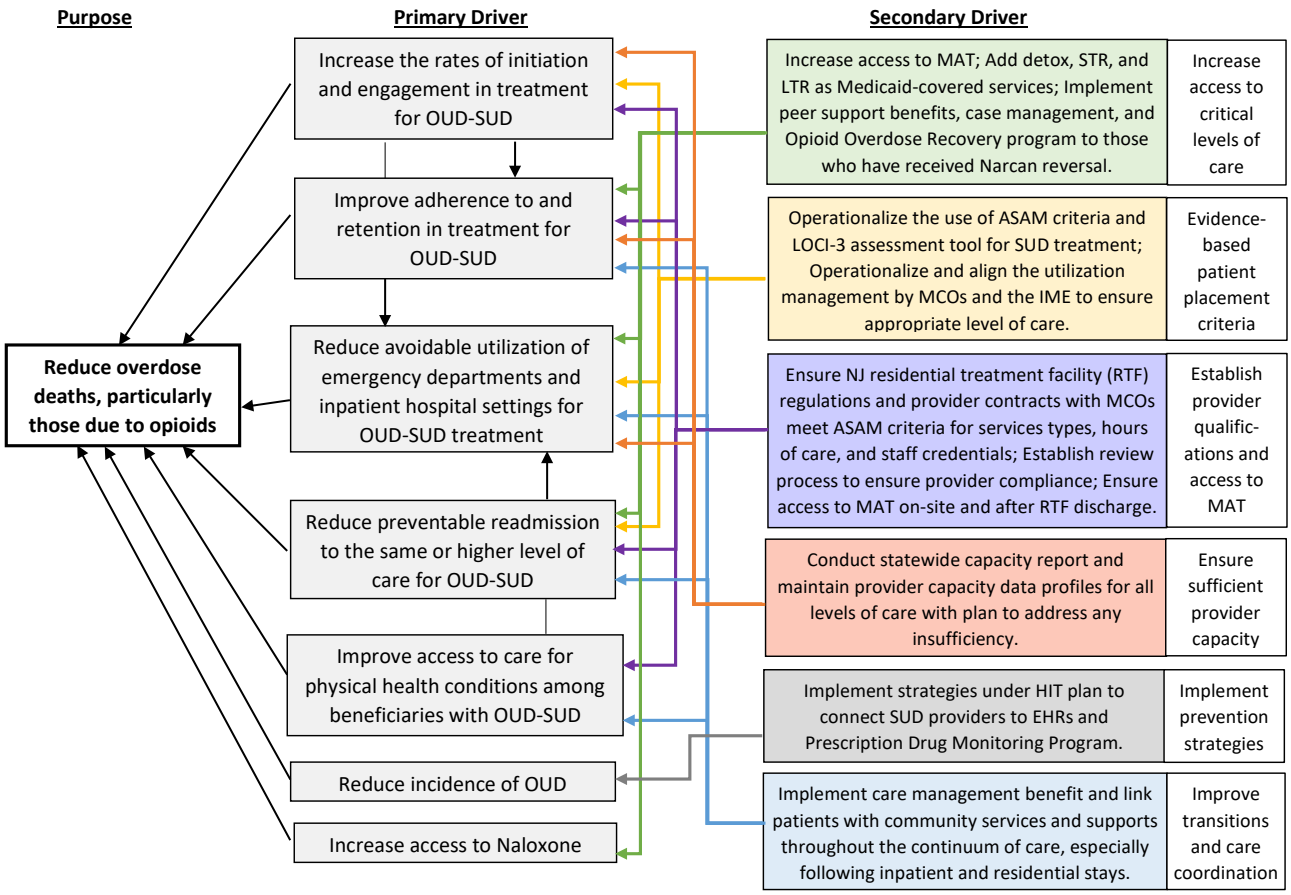
[5] Children with behavioral health needs already receive case management services.

[6] Some special populations (MLTSS, DDD, and FIDE-SNP) are already receiving integrated physical and behavioral health services under managed care, but most SUD services were carved out at the time this initiative began.

[7] NJ also has a few complementary activities aimed at reducing the incidence of OUD (e.g. prescribing guidelines and increasing utilization and functioning of prescription drug monitoring).

based, SUD-specific patient placement criteria. By matching individuals with the appropriate level of care for their diagnosis and treatment needs, adherence to treatment can be improved and readmissions to a higher level of care can be prevented. NJ is also committed to increased access to MAT and integrated care for individuals with an OUD. A fundamental addition to the continuum of care is supporting individuals as they transition between levels of care or into the community with the addition of SUD specific Care Management services. These links, and others, between the milestones and goals are shown in the following driver diagram. This diagram depicts this relationship between the service delivery changes that fulfill each milestone (secondary drivers), the care and treatment goals they are intended to impact (primary drivers), and the overall purpose of the OUD-SUD initiative, which is to reduce deaths due to drug overdose. This diagram may be modified over the course of the evaluation to reflect what is learned about the interventions that are helping to achieve desired results.[8]

Driver Diagram for NJ OUD/SUD Program



[8] CMS-CMMI (Center for Medicare & Medicaid Services – Center for Medicare and Medicaid Innovation) 2013. *Defining and Using Aims and Drivers for Improvement: A How-To Guide*. Baltimore: U.S. Department of Health and Human Services. https://innovation.cms.gov/files/x/hciatwoaimsdrvrs.pdf.

Accordingly, the hypotheses aligning with these goals which will be addressed in the evaluation are:

Hypothesis 1: Rates of identification, initiation and engagement in treatment for OUD and other SUDs will increase as a result of the OUD/SUD program.

Hypothesis 2: Rates of adherence to, and retention in treatment for OUD and other SUDs, overall and for individuals aged 21-64, will increase as a result of the OUD/SUD program.

Hypothesis 3: Overdose deaths, particularly those due to opioids, will decline overall and for individuals aged 21-64 as a result of the OUD/SUD program.

Hypothesis 4: Utilization of emergency departments and inpatient hospital settings for OUD and other SUD treatment where the utilization is preventable or medically inappropriate through improved access to other continuum of care services will decline overall (including individuals aged 21-64) as a result of the OUD/SUD program.

Hypothesis 5: *Readmissions to the same or higher level of care where readmissions is preventable or medically inappropriate for individuals with OUD and other SUD will decline overall (including individuals aged 21-64) as a result of the OUD/SUD program*

Hypothesis 6: *Access to care for physical health conditions among beneficiaries with OUD or other SUDs will improve as a result of the OUD/SUD program*

These hypotheses will be evaluated for the overall OUD/SUD program using both qualitative and quantitative methods. Select outcomes for a subset of hypotheses (e.g. 2, 3, 4 and 5) will also be separately assessed for isolating the impact of removing the IMD exclusion on beneficiaries ages 21-64. Statistical hypothesis testing will be done using, where possible, both process and outcome measures selected preferentially from nationally-recognized sources and measures sets.

Methodology

The approach to testing these hypotheses will be structured around three aims:

Aim 1: Collect information for structuring a robust analytic strategy.

Integral to assessing the effect of the policy changes is identification of the set of relevant quality metrics that will reflect potential changes in our outcomes of interest. In this stage we will examine the peer-reviewed and gray literature to identify the most relevant process and outcome measures for each hypothesis. We will consider metrics utilized during similar evaluation activities in the State and nationally. We will determine the applicability of such measures to New Jersey's OUD/SUD program and the feasibility of constructing such measures with available data. We will seek input from key stakeholders on what process and outcome measures would be of interest for understanding the impact of this initiative. Stakeholder engagement will be planned in consultation with the State. We will monitor developments and modifications in nationally-recognized quality measures in response to the opioid crisis to make use of the most current, validated

metrics that can be reliably trended over the demonstration period. We will consult the State's monitoring protocol for the OUD/SUD program, when complete, and CMS's required and optional demonstration monitoring and performance measures.[9,10] We will also closely follow the State's implementation activities to provide context for qualitative interviewing which will both directly and indirectly address the evaluation hypotheses.

The culmination of this stage will be an inventory of independently calculated evaluation measures, measures collected from secondary sources, and qualitative interview domains pertaining to each hypothesis. A preliminary version of this, containing candidate measures thus far identified, is presented below as Table 1.[11] We will use a subset of these measures for our final analysis.

[9] CMS (Centers for Medicare & Medicaid Services). 2017. *SMD #17-003 Re: Strategies to Address the Opioid Epidemic*. Baltimore: CMS. https://www.medicaid.gov/federal-policy-guidance/downloads/smd17003.pdf.

[10] CMS (Center for Medicare & Medicaid Services) 2019. *Monitoring Metrics for Section 1115 Demonstrations with SUD Policies*. Baltimore: U.S. Department of Health and Human Services. https://www.medicaid.gov/medicaid/section-1115-demo/downloads/evaluation-reports/sud-monitoring-metrics.pdf.

[11] Additional details on each candidate measure, including the specific age groups for which they are relevant, are presented in Table 2 later in this evaluation plan.

Table 1: Preliminary Inventory of Candidate OUD/SUD Program Evaluation Measures and Qualitative Interview Domains

Quantitative			Qualitative
Process Measures	**Outcome Measures**	**IMD[4]**	**Domains/Sample Interview Questions**
Hypothesis 1: Rates of identification, initiation, and engagement in treatment for OUD/SUD			
Initiation and Engagement of Alcohol and Other Drug Dependence Treatment (NCQA; NQF #0004)	Identification of alcohol and other drug services: summary of the number and percentage of members with OUD and SUD who received the following chemical dependency services during the measurement period: any service, inpatient, intensive outpatient or partial hospitalization, outpatient or ambulatory MAT, ED, or telehealth (NCQA).		Access to guideline-adherent care for OUD/SUD Performance of IME What has been the experience of getting individuals who are identified as having OUD/SUD into the right level of care?
Hypothesis 2. Adherence and retention in OUD/SUD treatment			
Follow-up after Discharge from Emergency Department for Alcohol or Other Drug Dependence (NCQA) Continuity of Pharmacotherapy for OUD (RAND; NQF #3175) Use of peer support services following discharge from inpatient/residential stays for OUD/SUD	Percentage of beneficiaries with an SUD diagnosis including those with OUD who used the following services (multiple rates reported) [2]: • Outpatient; • Intensive outpatient and partial hospitalization services; • Medication assisted treatment for OUDs and alcohol; • Residential/inpatient treatment (including average lengths of stay (LOS) in residential treatment aiming for a statewide average LOS of 30 days); and • Medically supervised withdrawal management	X	Continuum of care; Provider availability and quality of care What have been the challenges and benefits of establishing peer support services? How has the availability of OUD/SUD services impacted treatment success?
Hypothesis 3: Overdose deaths			
Use of Opioids at High Dosage in Persons without Cancer	Mortality rate for individuals with SUD, and specifically OUD.[2]	X	What are the key interventions for averting deaths due to

(NCQA or Pharmacy Quality Alliance; NQF #2940) Use of Opioids from Multiple Providers in Persons without Cancer (NCQA; NQF #2950)	Rate of all and OUD overdose deaths (Medicaid and NJ overall)[3]		overdose and how well have these been addressed in the OUD/SUD program?
Hypothesis 4: Preventable ED and inpatient use for OUD/SUD treatment			
	Rate of Emergency department visits for SUD-related diagnoses and specifically for OUD[2] Rate of Inpatient admissions for SUD and specifically OUD[2]	X	How well have beneficiaries' needs for treatment been met within the OUD/SUD program?
Hypothesis 5: Fewer readmissions to the same or higher level of care for individuals with OUD/SUD			
Transitions of Care – Patient Engagement after Hospital Discharge (NCQA) [1]	30 day readmission rate for OUD/SUD treatment following hospitalization or residential treatment for an SUD-related diagnosis and specifically for OUD[2] 30 day all-cause readmission rate following hospitalization or residential treatment for an SUD-related diagnosis and specifically for OUD[2]	X	How is care coordinated for people in the OUD/SUD program?
Hypothesis 6. Access to care for physical health among individuals with OUD/SUD			
Use of OUD/SUD case management services	PQI rate among individuals with OUD/SUD (AHRQ)[1] Avoidable ED visits for individuals with OUD/SUD (NYU)[1] Percentage of beneficiaries with an SUD diagnosis, and specifically those with OUD, who access preventive/ambulatory care[2]		What has been the impact of case management on access to care for physical health among those with OUD/SUD?

[1] In cases where existing, nationally-recognized quality metrics are not specific to OUD/SUD, we will calculate the metric for the OUD/SUD population.

[2] For metrics that are not part of established, nationally-recognized measure sets, we will adapt a related validated metric, relying as much as possible on established cohort identification and clinical definitions (e.g. in HEDIS) and/or on decisions made by the State and CMS in developing the data monitoring protocol for the OUD/SUD program.

[3] Deaths due to drug overdose cannot be identified in Medicaid claims data. The rate of overdose deaths due to opioids would need to be provided by the State. Depending on data availability, trends in drug-induced deaths in NJ overall can be assessed using NJ State Health Assessment Data for comparison purposes.

[4] Measures that will also be used to look at the impact of lifting the IMD exclusion will be age-stratified: <21, 21-64, and 65.

Aim 2: Collect and assess stakeholder feedback

Stakeholder feedback is an important source of information for identifying improvements and problems during the demonstration, as well as for evaluating successes and challenges. As the OUD/SUD program is implemented, the evaluation team may attend selected meetings of established councils, committees, and workgroups involved in planning of the demonstration and/or preparing for implementation that are deemed to be relevant. We will review the activities and recommendations of the advisory committees, review meeting minutes and documents, and monitor progress on implementing the demonstration, successes, challenges, and lessons learned.

In this stage we will also conduct 10-15 targeted key informant interviews with stakeholders to assess perceptions of the policy changes, resultant process changes and their impact. Interviews will be conducted with officials from the Department of Human Services, Department of Health, as well as representatives of working groups, community partners, and provider and consumer associations to obtain viewpoints about expected benefits and unanticipated consequences for patients and families. We will attempt to enumerate and represent in our interviews stakeholders representing the various categories of providers and consumers in the state to get the fullest possible picture of how the program is affecting different groups. Our activities under Aim 1 of this evaluation plan will help inform our selection of interviewees. Initial interviewees will be identified by their participation in State-convened stakeholder forums such as the Office-Based Addictions Treatment workgroup, the Opioid Overdose Recovery Program Providers workgroup, and/or the Professional Advisory Council. If needed, we will seek recommendations from the State's technical assistance contractor responsible for convening some stakeholder meetings to assist with identifying key stakeholders from these groups and other provider and consumer associations affected by the OUD/SUD demonstration initiatives. Interview subjects may also be suggested by other interviewees or stakeholders/policymakers and/or may reach out to us upon learning of our role as the third-party evaluator of the OUD/SUD program and Comprehensive Waiver as a whole. Interview subjects will not receive incentives to participate. The timing of the interviews would depend on program implementation and complementary evaluation activities.

The interview protocol will be based on the domains noted in Table 1, which will have been informed by input from stakeholders as part of Aim 1. It will be a semi-structured guide containing key questions to ensure data collection consistency while allowing for follow-up questions and probes to elicit more in-depth responses to the primary questions. A draft interview guide is included as Attachment A to this evaluation plan.

Data from key informant interviews will be de-identified and then independently coded by two researchers to identify themes and patterns in the data using an inductive process.[12] In our analysis, we will consider emergent themes as well as unique comments, as some

[12] Thomas DR. "A General Inductive Approach for Analyzing Qualitative Evaluation Data." American Journal of Evaluation 27(2): 237-246, June 2006.

of our stakeholders may represent unique populations. We will consider stakeholder comments regarding different consumer populations (e.g., as differentiated by age, race/ethnicity, geographic location, existence/type of comorbidity, etc.), different kinds of provider organizations (e.g., different levels of service intensity, different type of clinician certification, etc.), and different kinds of information/referral organizations (e.g., contracted agencies, state advocacy groups, locally based prevention or response organizations, etc.) with respect to how system changes have affected the ability of consumers to access appropriate OUD/SUD services. We are interested in obtaining from our interviewees a picture of the processes through which consumers progress as they access OUD/SUD services—from information and referral, eligibility determination and redetermination, enrollment, receipt of services, follow-up care, and other issues that may be mentioned. If relevant interim quantitative findings are available, we will present selected findings to stakeholders to capture reactions and interpretations that will contextualize the findings.

.Aim 3: Conduct quantitative analyses of independently calculated and reported quality measures

In this stage of the evaluation, we will assess the subset of measures chosen from the candidate list (see Table 1) over the pre- and post-policy period to estimate the impact of the policies related to the OUD/SUD program. This quantitative component will involve analysis of Medicaid claims/encounter data and aggregated or summary statistics from secondary sources. The claims data provides information on patient, provider and geographic characteristics, and we will adjust for such factors while examining the policy effects on our outcomes of interest. We will not have such information for secondary metrics but will construct trends and calculate statistical significance of trends wherever possible. The analytic strategy described below, specifically the multivariate statistical analysis, is thus relevant to the claims data analysis.

We will utilize Medicaid claims and managed care encounter data over the period January 2016 to June 2022. These data are received under an agreement with the NJ Division of Medical Assistance and Health Services and contain statewide data for all Medicaid beneficiaries. Personal identifying information in compliance with guidelines for limited data sets have been removed from records before receipt. Key data elements include:

- Time of Medicaid Enrollment
- Age, Sex, and Race/Ethnicity of Recipient
- Recipient Zip Code of Residence
- Medicaid Eligibility Category
- Fee-for-Service and type Managed Care Plan indicator
- Type of encounter/service
- Type of Medicaid program/waiver category
- Facility/Provider identifiers

- Beginning and ending dates of service
- Charges, paid claims amounts and payment dates
- Principle and Secondary Diagnosis Codes
- Prescription drug information
- Hospital discharge disposition
- Place of service
- Admission type and source of admission

Monthly extracts are received and used to build static, annual analytic claims files with a minimum six month runout. The State has estimated that the majority of FFS and managed care claims are received within six months of the date of service, and this lag efficiently balances data completeness with the timely completion of analyses. If lags in billing occur for new Medicaid providers in the expanded service continuum or due to lifting the IMD exclusion, we will determine whether applying a longer runout period for claims updates (e.g. 12 months) during the implementation years of the demonstration will more accurately capture utilization and costs.

Our analytic files are validated against a real-time database query from DMAHS on total payment amounts, total number of claims, and recipient eligibility counts for a specified period and differ by <1%. Additionally, constructed population indicators will be benchmarked against State figures for these same populations when available. Further assurances of the completeness and quality of claims data are provided by existing State processes and MCO contracting requirements. New Jersey managed care plans must submit encounter claims for all services provided to Medicaid recipients to the State. The accuracy and completeness of provider payment amounts reported on these encounter claims is assured through a number of validation checks. First, service encounters are reviewed for accuracy by New Jersey's fiscal agent before being considered final. The State implements liquidated damages on its health plans for excessive duplicate encounters and excessive denials. Further, accurate payment reporting processes are ensured by the requirement that after a defined period of time the total dollar value of encounters accepted by the State's fiscal agent must also equal 98 percent of the medical cost submitted by the plans in their financial statements. Claims for SUD services that are covered on a FFS basis are also subject to validation checks by the State's contracted billing agency.

We will utilize January 2016-September 2017 as the baseline period preceding the implementation period over October 2017-December 2019 and examine changes

between the baseline and post-policy period spanning January 2020-June 2022.[13] For some policy changes, depending on the timing, a part of this overall implementation period may be included in the post-policy period. We will conduct descriptive analyses, calculating estimates for outcome measures on a monthly, quarterly, or annual basis over these periods and examine trends where applicable. To examine the policy impact and test the hypotheses stated above we will employ three different statistical techniques: difference-in-differences estimation, segmented regression analysis, and regression discontinuity design.

Difference-in-Differences Estimation: For estimating the effect of the OUD/SUD program overall and the removal of the IMD exclusion specifically, the evaluation will utilize a difference-in-differences (DD) estimation technique that identifies the impact of the demonstration by comparing the trend in outcomes for the program targeted (intervention) population from the pre- to the post-implementation period to that of a comparison group (where available) which is otherwise similar, but not subject to the policy effect. Such an estimation strategy is able to identify changes in outcomes that are due to program impact and distinct from secular trends. It accounts for the effect of unobserved factors, as long as their impact on one of the groups relative to the other does not change over time. The following equation illustrates the general DD specification

$$Y_{it} = \beta_0 + \beta_1(target)_i + \beta_2(post\ policy)_t + \beta_3(target_i * post\ policy_t) + \gamma X_{\ it} + \varepsilon_{it}$$

In the above equation, variable Y_{it} represents the outcome measure enumerated for the recipient with OUD/SUD at time t. Post policy is an indicator (0/1) variable that identifies the period the policy under examination was in effect, and target is an indicator variable for the group that is subject to the policy intervention. In this model, β_3 represents the DD estimate measuring the program impact. X_{it} is a vector of other control variables relating to the recipient, and ε_{it} represents the random error term.

We will examine the effect of the policy eliminating the IMD exclusion for SUD services utilizing the DD framework by classifying beneficiaries between ages 55-64 with OUD/SUD as the intervention group and beneficiaries between ages 65-75 with OUD/SUD as a comparison group. [14] As required in a DD framework, the comparison group did not experience a change in the policy related to IMD exclusion. It helps account for the effect of other non-IMD related policy changes, or secular changes over time that need to be factored in while examining the effect of the IMD policy change on the

[13] The incidence of outcomes may require a quarterly or annual measurement period and these period definitions (baseline, implementation, and post-policy) will be modified accordingly to align with these measurement intervals and the policy being examined.

[14] Using similar groups to mitigate unmeasured confounding from age is common in the academic literature to assess policy effects that may differentially impact such populations. See for example Chakravarty, S., Gaboda, D., DeLia, D., Cantor, J. C., & Nova, J. (2015). Impact of Medicare Part D on coverage, access, and disparities among New Jersey seniors. *Med Care Res Rev, 72*(2), 127-148. doi:10.1177/1077558714563762

treatment group. While this specification could include individuals in the intervention group who may have actually received SUD services in smaller residential facilities not subject to the IMD exclusion, or under state-only funding, this would only introduce a conservative bias into the estimate of the policy effect. Wherever possible, we will explore available data and information to account for such utilization. Depending on the policy change, we will also examine the effect of the OUD/SUD program overall on the physical health outcomes of beneficiaries having OUD/SUD within the DD framework by using individuals with behavioral health problems but without OUD/SUD as a comparison group.

We will use propensity score analysis to select Medicaid beneficiaries for the comparison groups. Such a method helps balance the covariate distribution between the intervention and comparison groups.[15] An initial logistic regression models the likelihood of being in the OUD/SUD service-eligible group (this will be individuals aged 55-64) as a function of characteristics such as sex, chronic disability payment score, race/ethnicity, and enrollment history. The predicted probabilities from this model will be used to weigh observations in the comparison group that are above a threshold probability level. Incorporating such propensity score reweighting[16] will generate an optimal comparison group for the difference-in-differences analysis that is similar to the intervention group. The same procedure will be conducted to balance covariates between beneficiaries with OUD/SUD and a comparison group of recipients with behavioral health problems but without OUD/SUD.

A crucial assumption relating to the DD approach is there are no unmeasured factors whose effect on the intervention group relative to the comparison group changes over time. This may not always be fulfilled. In that case, the unobserved factors may result in the two groups having differential trends and the computed effect size will include this difference over time. Accordingly, we will test to see whether there existed statistically significant differences in trends between the intervention and comparison group prior to policy implementation. If this difference is in the same direction as the DD estimate and of comparable magnitude, it would imply that the DD model may be overestimating the effect. Accordingly our estimate process of computing effect sizes will adjust for these differential pre-trends based on well-established methods in peer-reviewed academic publications.[17]

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[15] Austin, PC and Stuart, EA. "Moving towards best practice when using inverse probability of treatment weighting using the propensity score to estimate causal treatment effects in observational studies." Statistics in Medicine 34: 3661-3679, August 2015.

[16] Nichols, A. 2007. Causal inference with observational data. Stata Journal 7: 507–541; Nichols, A. 2008. Erratum and discussion of propensity–score reweighting. The Stata Journal. 2008. Volume 8 Number 4: pp. 532-539.

[17] Harman, J. S., Hall, A. G., Lemak, C. H., & Duncan, R. P. (2014). Do provider service networks result in lower expenditures compared with HMOs or primary care case management in Florida's Medicaid program? Health Serv Res, 49(3), 858-877. PMCID: PMC4231575

In order to eliminate unmeasured confounding arising from age differences, we have restricted our policy and comparison groups in the DD analyses to the narrower age categories. However, as described below, we will use segmented regression analysis to examine effects on the overall policy eligible group between ages 21 and 64.

Segmented Regression Analysis/Interrupted Time Series Modeling: We will use Segmented Regression Analysis (SRA) to examine the effect on policy groups where a comparison group may not be feasible and also to implement alternative specifications to DD models including comparison groups. The SRA model assumes that the policy effect may lead to a change in level, and also a change in the existing time trend of the metric measuring quality or any other relevant outcome of interest. The regression analysis is able to measure this change in trend or level. Potential confounding may arise from factors that determine our outcomes of interest and change at the same time as the policy implementation. However, our multivariate analysis adjusting for patient, provider and geographic factors are expected to mitigate such effects. SRA will be an additional strategy to estimate the impact of OUD/SUD policies overall on different beneficiary groups in the absence of robust comparison groups. We will conduct stratified analysis by age groups, 13-20, 21-64, and 65+ to account for difference in service provisions between individuals belonging to these three groups. The equation below illustrates the general SRA specification:[18]

$$Y_{it} = \beta_0 + \beta_1(time)_t + \beta_2(policy\ post)_t + \beta_3(\ policy\ time)_t + \gamma X_{\ it} + \varepsilon_{it}$$

Here, Y_{it} reflects the outcome related to the i^{th} index event or recipient at time t. On the right hand side of the equation, time is a continuous variable indicating time in months or calendar quarters from the start of the study period. The variable policy post is an indicator (0/1) variable for the period subsequent to these policy changes under the SUD initiative. The variable policy time is a continuous variable equaling the number of months (or quarters) after the corresponding policy change. Coefficient β_0 estimates the baseline level of the outcome at the first time period, and coefficient β_1 indicates the baseline trend, i.e., the trend in the outcome prior to the first policy change. In this model, the specific effect of the SUD initiative on the overall population with OUD/SUD is given by the magnitude of β_2 that gives the change in level and β_3 that gives the change in trend of the specific outcome being examined after the SUD initiative began and we further test whether these values are statistically significant. For interpretability purposes, as in our previous waiver evaluation report[19], we will further compare predicted values of outcomes

[18] Wagner AK, SB Soumerai, F Zhang, and D Ross-Degnan. 2002. "Segmented Regression Analysis of Interrupted Time Series Studies in Medication Use Research." *Journal of Clinical Pharmacy and Therapeutics* 27 (4): 299–309.

[19] Chakravarty, S., Lloyd, K., Farnham J., Brownlee, S., & DeLia D. (2017). Examining the Effect of the NJ Comprehensive Waiver on Access to Care, Quality, and Cost of Care: Draft Final Evaluation Report. New Brunswick, New Jersey: Rutgers Center for State Health Policy. Available at:

post-policy with counterfactual values (that simulate a scenario where the policy implementation did not occur). We will further compute whether this difference is statistically significant.

Regression Discontinuity Analysis: We will explore Regression Discontinuity Analysis (RDA) to examine the effect of the IMD exclusion policy on individuals between ages 21-64 without relying on a comparison group as an additional specification to DD and segmented regression models related to the IMD policy and an alternative in the case where a suitable propensity-matched comparison group cannot be identified. The regression discontinuity technique exploits variations in outcomes around a threshold or cut-point for a rating variable. The 'rating variable' used here for RDA analysis will be age since that will decide whether the individual who is a Medicaid beneficiary with OUD/SUD was eligible for SUD services in an IMD prior to the policy change. The 'cut point' will be age 21 as individuals became eligible for such services in IMDs. We expect to see a change in outcomes at this cut point prior to the policy implementation reflected in a discontinuity or a jump which measures the effect of the treatment on individuals near the cut point. This jump should go away after the policy implementation. RDA is appropriate in this policy setting since it satisfies important criteria namely that rating variable here which is age will not be influenced by the treatment; the cut point is exogenous to the rating variable; and nothing other than the treatment status is discontinuous in the interval analysis.[20]

Adjusting for Patient, Provider and Geographic Factors: Our multivariate analysis will control for patient characteristics that may affect outcomes. These include beneficiary demographics, Medicaid eligibility category, health history (including chronic illness and behavioral health co-morbidities) and information specific to the policy of interest. We will incorporate hospital fixed effects (to account for time-invariant differences across hospitals) for inpatient quality-based measures and zip code fixed effects (to account for time-invariant measures across geographic locations) for measures reflecting ambulatory care. As previously mentioned, we will utilize statistical matching techniques such as "Mahalanobis matching" or propensity score matching to create comparison cohorts of patients unaffected by policy changes for patients subject to policy effects when possible. We will estimate robust standard errors to account for non-independence of observations from clustering at the provider level.

Dose Response: Wherever applicable we will examine whether there is a "dose-response" relationship. Findings of a higher response when the "dose" of a policy change will strengthen causal inferences.

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http://www.cshp.rutgers.edu/publications/examining-the-effect-of-the-nj-comprehensive-waiver-on-access-to-care-quality-and-cost-of-care-draft-final-evaluation-report.

[20] Jacob RT, Zhu P, Sommers MA & H Bloom. 2012. *A Practical Guide to Regression Discontinuity*. MDRC. https://www.mdrc.org/publication/practical-guide-regression-discontinuity.

Trend Analysis: When no comparison group exists and when there are no data for a pre-policy period, we will calculate trends over time and determine if a linearly increasing or decreasing trend exists.

Table 2 below summarizes the hypotheses, drivers, outcomes and analytic strategy for this evaluation, aligning measures with the regression approaches described above. All candidate outcomes presented in Table 1 are included, although our final list may differ based on what is learned in carrying out Aim 1.

Table 2: Summary of Hypotheses, Drivers, Data Sources, and Analytic Approaches for Candidate OUD/SUD Program Evaluation Measures

Driver	Measure Description	Steward/ NQF #	Numerator	Denominator	Data Source	Analytic Approach[7]
Research Question: (a) What is the impact of providing substance use disorder services to Medicaid beneficiaries? (b) Including paying for services rendered in an institution for mental disease (IMD)?						
Demonstration Goal: Increase the rates of identification, initiation and engagement in treatment for OUD and other SUDs.						
Evaluation Hypothesis: Rates of identification, initiation and engagement in treatment for OUD and other SUDs will increase as a result of the OUD/SUD program.						
Primary Driver(s): *Increase the rates of identification, initiation and engagement in treatment for OUD and other SUDs*						
Secondary Drivers (*Use evidence-based, SUD-specific patient placement criteria; Establish evidence-based residential treatment provider qualifications; Ensure access to MAT on-site and after discharge; Ensure sufficient provider capacity at each level of care)*	Initiation and Engagement of Alcohol and Other Drug Dependence Treatment[1]	NCQA; NQF #0004	Initiation: Number who initiate treatment through an inpatient admission, outpatient visit, intensive outpatient encounter, or partial hospitalization with 14 days of the index episode start date. Engagement: Number with initiation of treatment and two or more additional services for treatment within 30 days of the initiation encounter.	Medicaid recipients age 13 or older diagnosed with a new episode of AOD dependency	Claims	**RQ(a)** Descriptive statistics (annual rates) and SRA to compare pre and post-policy periods

Driver	Measure Description	Steward/ NQF #	Numerator	Denominator	Data Source	Analytic Approach[7]
	Identification of alcohol and other drug services	NCQA	Number receiving the following chemical dependency services: • Any service • Inpatient • Intensive outpatient or partial hospitalization • Outpatient or ambulatory MAT • Emergency department • Telehealth	Medicaid recipients with OUD/SUD	Claims	**RQ(a)** Descriptive statistics (quarterly rates) and SRA to compare pre and post-policy periods
Demonstration Goal: Increase adherence to and retention in treatment for OUD and other SUDs.						
Evaluation Hypothesis: Rates of adherence to and retention in treatment for OUD and other SUDs, overall and for individuals aged 21-64, will increase as a result of the OUD/SUD program.						
Primary Driver(s): *Improve adherence to and retention in treatment for OUD/SUD*						
Secondary Drivers (*Increase access to critical levels of care; Establish evidence-based residential treatment provider qualifications; Ensure access to MAT on-site and after discharge; Ensure sufficient provider capacity at each level of care)*	Use of critical levels of care for OUD/SUD[1,2]	N/A	Number using the following services: • outpatient services • Intensive outpatient or partial hospitalization • Residential/inpatient treatment • MAT • Withdrawal management	Medicaid recipients with OUD/SUD	Claims	**RQ(a)** Descriptive statistics (quarterly rates) and SRA to compare pre and post-policy periods **RQ(b)** Descriptive statistics (age-stratified quarterly rates); DD with near-age comparison

Driver	Measure Description	Steward/ NQF #	Numerator	Denominator	Data Source	Analytic Approach[7]
						group and/or RD and SRA
	Average length of stay in residential treatment[1,2]	N/A	Days in residential treatment	Medicaid recipients receiving residential treatment	Claims	**RQ (a)** Descriptive statistics (quarterly averages) and SRA to compare pre and post-policy periods **RQ (b)** Descriptive statistics (age-stratified quarterly averages); DD with near-age comparison group and/or RD and SRA
Secondary Drivers (*Increase access to critical levels of care; Establish evidence-based residential treatment provider qualifications; Ensure access to MAT on-site and after discharge; Ensure sufficient provider capacity at each level of care; Improve care coordination and*	Follow-up after Discharge from Emergency Department for Alcohol or Other Drug Dependence[1]	NCQA	Number with a follow-up visit within 7 and/or 30 days of the ED visit.	ED visits by Medicaid recipients age 13 or older with a principal diagnosis of AOD abuse or dependence	Claims	**RQ (a)** Descriptive statistics (annual rates) and SRA to compare pre and post-policy periods **RQ (b)** Descriptive statistics (age-stratified annual rates); DD with near-age comparison

Driver	Measure Description	Steward/ NQF #	Numerator	Denominator	Data Source	Analytic Approach[7]
transitions between levels of care)						group and/or RD and SRA
	Continuity of Pharmacotherapy for OUD[1]	RAND; NQF #3175	Number with at least 180 days of continuous pharmacotherapy with a medication prescribed for OUD without a gap of more than 7 days	Medicaid recipients age 18-64 who had a diagnosis of OUD and at least one claim for OUD medication	Claims	**RQ (a)** Descriptive statistics (annual rates) and SRA to compare pre and post-policy periods **RQ (b)** Descriptive statistics (age-stratified annual rates); DD with near-age comparison group and/or RD and SRA
Secondary Driver (*Increase access to critical levels of care for OUD/SUD)*	Use of peer support services following discharge from inpatient/residential stays for OUD/SUD[2]	N/A	Number using peer support services after discharge	Medicaid recipients with an inpatient/residential stay for OUD/SUD	Claims	**RQ (a)** Descriptive statistics (quarterly rates) and trend analysis
Demonstration Goal: Reduce overdose deaths, particularly those due to opioids.						
Evaluation Hypothesis: Overdose deaths, particularly those due to opioids, will decline overall and for individuals aged 21-64 as a result of the OUD/SUD program.						
Primary Driver(s): *Reduce incidence of OUD*						
Secondary Driver (*Implement comprehensive prevention strategies to address opioid*	Use of Opioids at High Dosage in Persons Without Cancer[1]	NCQA or Pharmacy Quality Alliance;	Number with opioid prescription claims where the morphine equivalent dose for 90 consecutive days or	Medicaid recipients age 18 and older with two or more	Claims	**RQ (a)** Descriptive statistics (annual rates) and SRA to compare pre

Driver	Measure Description	Steward/ NQF #	Numerator	Denominator	Data Source	Analytic Approach[7]
abuse via prescribing guidelines and monitoring)		NQF #2940	longer is greater than 120 mg	prescription claims for opioids filled on at least two separate days, for which of the sum of the days' supply is ≥ 15.		and post-policy periods
	Use of Opioids from Multiple Providers in Persons without Cancer[1]	NCQA; NQF #2950	Number receiving opioid prescription claims from: • 4 or more prescribers • 4 or more pharmacies • 4 or more prescribers and 4 or more pharmacies	Medicaid recipients age 18 and older with two or more prescription claims for opioids filled on at least two separate days, for which of the sum of the days' supply is ≥ 15.	Claims	**RQ (a)** Descriptive statistics (annual rates) and SRA to compare pre and post-policy periods
Primary Driver(s): *Increase rates of initiation and engagement in treatment for OUD/SUD; Increase adherence to and retention in OUD/SUD treatment; Reduce avoidable utilization of emergency departments and inpatient hospital settings for OUD-SUD treatment; Reduce preventable readmission to the same or higher level of care for OUD/SUD; Improve access to care for physical health conditions among beneficiaries with OUD/SUD; Reduce incidence of OUD; Increase access to Naloxone.*						
Secondary Driver(s) (*Increase access to critical levels of care; Use evidence-based SUD-specific patient placement criteria; Establish evidence-*	Mortality rate for individuals with SUD, and specifically OUD[2,5]	N/A	Number of deaths	Medicaid recipients with OUD Medicaid recipients with SUD	Claims	**RQ (a)** Descriptive statistics (quarterly rates) and SRA to compare pre and

Driver	Measure Description	Steward/ NQF #	Numerator	Denominator	Data Source	Analytic Approach[7]
based residential treatment provider qualifications; Ensure access to MAT on-site and after discharge; Ensure sufficient provider capacity at each level of care; Implement comprehensive prevention strategies to address opioid abuse via prescribing guidelines and monitoring; Improve care coordination and transitions between levels of care)						post-policy periods **RQ (b)** Descriptive statistics (age-stratified quarterly rates); DD with near-age comparison group and/or RD and SRA
	Rate of all and OUD overdose deaths (Medicaid and NJ overall).[1,2]	N/A	Number of overdose deaths	Medicaid recipients NJ residents	State monitoring data[6]	**RQ (a)** Descriptive statistics (annual rates) and trend analysis or SRA **RQ (b)** Descriptive statistics (age-stratified annual rates) and trend analysis or SRA for ages 21-64
Demonstration Goal: Reduce utilization of emergency departments and inpatient hospital settings for OUD and other SUD treatment, where the utilization is preventable or medically inappropriate.						
Evaluation Hypothesis: Utilization of emergency departments and inpatient hospital settings for OUD and other SUD treatment where the utilization is preventable or medically inappropriate through improved access to other continuum of care services will decline overall and for individuals aged 21-64 as a result of the OUD/SUD program.						
Primary Driver(s): *Reduce avoidable utilization of emergency departments and inpatient hospital settings for OUD/SUD treatment.*						
Secondary Driver(s) (*Increase access to critical levels of care; Use evidence-based SUD-specific patient*	Rate of emergency department visits for SUD-related diagnoses and	N/A	Number of ED visits for: • SUD • OUD	Medicaid recipients	Claims	**RQ (a)** Descriptive statistics (quarterly rates) and SRA to

Driver	Measure Description	Steward/ NQF #	Numerator	Denominator	Data Source	Analytic Approach[7]
placement criteria; Ensure sufficient provider capacity at each level of care; Improve care coordination and transitions between levels of care)	specifically for OUD[1,2]					compare pre and post-policy periods **RQ (b)** Descriptive statistics (age-stratified quarterly rates); DD with near-age comparison group and/or RD and SRA
	Rate of Inpatient admissions for SUD and specifically OUD[1,2]	N/A	Number of IP visits for: • SUD • OUD	Medicaid recipients	Claims	**RQ (a)** Descriptive statistics (quarterly rates) and SRA to compare pre and post-policy periods **RQ (b)** Descriptive statistics (age-stratified quarterly rates); DD with near-age comparison group and/or RD and SRA
Demonstration Goal: Reduce preventable, or potentially preventable readmission to the same or higher level of care for OUD and other SUD.						
Evaluation Hypothesis: Readmissions to the same or higher level of care where readmissions is preventable or medically inappropriate for individuals with OUD and other SUD will decline overall and for individuals aged 21-64 as a result of the OUD/SUD program.						

Driver	Measure Description	Steward/ NQF #	Numerator	Denominator	Data Source	Analytic Approach[7]
Primary Driver(s): *Reduce preventable readmission to the same or higher level of care for OUD/SUD*						
Secondary Driver(s) (*Improve care coordination and transitions between levels of care*	Transitions of Care – Patient Engagement after Hospital Discharge	NCQA	Number with documentation of patient engagement (e.g. office visits, visits to home, telehealth) within 30 days of discharge	Inpatient discharges by Medicaid recipients age 18 and older with OUD/SUD	Claims	**RQ (a)** Descriptive statistics (annual rates) and DD with BH comparison group and/or SRA
Secondary Driver(s) (*Increase access to critical levels of care; Use evidence-based, SUD-specific patient placement criteria; Establish evidence-based residential treatment provider qualifications; Ensure access to MAT on-site and after discharge; Improve care coordination and transitions between levels of care*	30 day readmission rate for OUD/SUD treatment following hospitalization or residential treatment for an SUD-related diagnosis and specifically for OUD[2]	N/A	Number of readmissions for OUD/SUD treatment.	Inpatient/residential treatment discharges for SUD, and separately for OUD,[4] by Medicaid recipients age 18 and older	Claims	**RQ (a)** Descriptive statistics (annual rates) and SRA to compare pre and post-policy periods **RQ (b)** Descriptive statistics (age-stratified annual rates); DD with near-age comparison group and/or RD and SRA
	30 day all-cause readmission rate following hospitalization or residential treatment for an SUD-related diagnosis and		Number of readmissions	Inpatient/residential treatment discharges for SUD, and separately for OUD, [4] by Medicaid	Claims	**RQ (a)** Descriptive statistics (annual rates) and DD with BH comparison group and/or SRA to compare

Driver	Measure Description	Steward/ NQF #	Numerator	Denominator	Data Source	Analytic Approach[7]
	specifically for OUD[2]			recipients age 18 and older		pre and post-policy periods **RQ (b)** Descriptive statistics (age-stratified annual rates); DD with near-age comparison group and/or RD and SRA
Demonstration Goal: Improve access to care for physical health conditions among beneficiaries with OUD or other SUDs.						
Evaluation Hypothesis: Access to care for physical health conditions among beneficiaries with OUD or other SUDs, will improve as a result of the OUD/SUD program.						
Primary Driver(s): *Improve access to care for physical health conditions among beneficiaries with OUD/SUD*						
Secondary Driver(s) (*Improve care coordination and transitions between levels of care)*	Use of OUD/SUD case management services[2]	N/A	Number using case management services	Medicaid recipients age 18 and older with OUD/SUD	Claims	**RQ (a)** Descriptive statistics (quarterly rates) and trend analysis
Secondary Driver(s) (*Establish evidence-based residential treatment provider qualifications; Improve care coordination and transitions between levels of care)*	PQI rate among individuals with OUD/SUD (AHRQ)	AHRQ	Number of hospitalizations for ambulatory care sensitive conditions	Medicaid recipients age 18 and older with OUD/SUD	Claims	**RQ (a)** Descriptive statistics (quarterly rates) and DD with BH comparison group and/or SRA
	Avoidable ED visits for individuals with OUD/SUD	NYU[3]	Number of avoidable ED visits	Medicaid recipients with OUD/SUD	Claims	**RQ (a)** Descriptive statistics (quarterly rates) and DD with BH

Driver	Measure Description	Steward/ NQF #	Numerator	Denominator	Data Source	Analytic Approach[7]
						comparison group and/or SRA
	Access to preventive/ ambulatory care[1,2]	N/A	Number who access preventive/ambulatory health services	Medicaid recipients with OUD Medicaid recipients with SUD	Claims	**RQ (a)** Descriptive statistics (quarterly rates) and DD with BH comparison group and/or SRA

AOD=Alcohol or other drug, MAT=Medication Assisted Treatment; RQ=Research Question; DD=Difference-in-differences; RD=Regression Discontinuity; SRA=Segmented Regression Analysis; BH=Behavioral Health

[1]Exact or very similar to a 1115 SUD Demonstration Monitoring Metric

[2]This metric is not part of any established, nationally-recognized measure sets. Where possible, we will adapt a related validated metric, relying as much as possible on established cohort identification and clinical definitions (e.g. in HEDIS) and/or on decisions made by the State and CMS in developing the data monitoring protocol for OUD/SUD program.

[3] https://wagner.nyu.edu/faculty/billings/nyued-background; This measure is being used to assess avoidable ED use for physical health conditions among individuals with OUD/SUD. The fact that visits due to mental health, alcohol use, and substance abuse are not classified by this algorithm does not affect the utility of this measure for examining physical health outcomes consistent with Hypothesis 6. The measure "Rate of emergency department visits for SUD-related diagnoses and specifically for OUD" under Hypothesis 4 will address ED use for mental health, alcohol use, and substance abuse.

[4]Readmission rates among those with OUD specifically will be calculated only if sample size is sufficient

[5]Disenrollment due to death is in the Medicaid claims data; however, we lack mortality information on individuals who disenroll from Medicaid for any other reason.

[6]Analysis will depend on timeliness, quality, and frequency of reporting of data from the State. Examination of the impact of lifting the IMD exclusion is only possible if age-stratified data are available.

[7]Measurement periods for descriptive analyses may change depending on the incidence of the outcome, alignment with the State's monitoring protocol, or as required by measure steward specifications.

Aim 4: Analyze costs associated with the OUD-SUD Demonstration

A required evaluation objective is to analyze patterns and trends in Medicaid costs associated with the OUD-SUD demonstration to determine whether it results in higher, lower, or neutral health care spending. Attachment A to CMS's SUD Evaluation Design Technical Assistance Document[21] provides detailed guidance for conducting this cost analysis, and we will follow this recommended protocol as closely as possible. This will include calculating the total cost of care for Medicaid recipients with SUD as well as components related specifically to SUD treatment, non-SUD treatment and other potential drivers of total cost (inpatient, non-emergency outpatient, emergency outpatient, pharmacy, and long-term care). All necessary cost information is present in the Medicaid claims database available to us with the exception that some SUD treatment costs may have come from non-Medicaid sources, such as SAMHSA block grants or state funds.

Within the applicable framework (e.g. difference-in-difference, interrupted time series), we will use a generalized linear model with a gamma distribution and log linkage to model the impact of the demonstration policies on costs.[22,23] The time period covered in this analysis will be January 2016 through June 2022. We will use a person-quarter as the unit of analysis and a repeated cross-sectional design which does not require minimum enrollment durations for inclusion in the analysis, although we may control for enrollment duration in our models. We agree with CMS's guidance that this approach is better than a cohort analysis due to suspected Medicaid eligibility churning by the population with SUD.

Our analysis will be conducted in light of the following considerations.

- The default application of a six month runout to our Medicaid claims and encounter database may not fully capture costs if lags in billing occur for new Medicaid providers in the expanded service continuum or due to lifting the IMD exclusion. We will consult with the State to determine whether applying a longer runout period for claims updates (e.g. 12 months) during the implementation years of the demonstration will more accurately capture costs. If this is

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[21] CMS (Center for Medicare & Medicaid Services) *2019. Substance Use Disorder (SUD) Section 1115 Demonstration Evaluation Design – Technical Assistance*. Baltimore: U.S. Department of Health and Human Services. https://www.medicaid.gov/medicaid/section-1115-demo/downloads/evaluation-reports/sud-evaluation-design-tech-assistance.pdf

[22] Chakravarty, S., & Cantor, J. C. (2016). Informing the Design and Evaluation of Superuser Care Management Initiatives: Accounting for Regression-to-the-Mean. *Med Care*, 54(9), 860-867. doi:10.1097/MLR.0000000000000568

[23] Dusetzina, S. B., Huskamp, H. A., Winn, A. N., Basch, E., & Keating, N. L. (2018). Out-of-Pocket and Health Care Spending Changes for Patients Using Orally Administered Anticancer Therapy After Adoption of State Parity Laws. *JAMA Oncol*, 4(6), e173598. doi:10.1001/jamaoncol.2017.3598

necessary, we may need to truncate the study period of our cost analysis by six months.

- Identification of the population of Medicaid recipients with OUD/SUD is dependent on service utilization. We are limited by service utilization appearing in our claims database, which does not include utilization occurring at non-Medicaid providers. This could lead to under-identification of Medicaid recipients with OUD/SUD, particularly in the pre-policy period before certain services became available under the demonstration. For instance, a detoxification visit with a diagnosis of alcohol or other drug dependence can qualify a recipient as having SUD. Due to the restriction on accessing detoxification in IMDs for those 21-64 prior to the demonstration, we are less likely to observe this qualifying utilization in our Medicaid claims database in the pre-policy period for recipients in this age group. We will conduct a sensitivity analysis, ignoring utilization of demonstration-impacted services in identification of our OUD/SUD population.

- Data on SUD treatment costs not paid through Medicaid are not available for this analysis. Trends in SUD treatment costs will need to be interpreted with this limitation in mind. We will consult with the State to quantify the costs over time not included in our analysis to qualitatively assess the extent of any cost shifting.

- Nearly all Medicaid recipients in New Jersey (~95%) are in managed care. Behavioral health services, including treatment for SUD, are carved out of the capitated managed care arrangement except for some special populations, but are being gradually shifted to managed care as part of this waiver demonstration. Therefore, these services will show up on a mix of fee-for-service and encounter claims in our database over the study period. Both types of claims include payment amounts and therefore, we will not need to use shadow pricing or alternative methods to capture costs related to inpatient, ED, or outpatient utilization for either acute or behavioral health care.

- The demonstration in NJ was not implemented in stages based on characteristics of Medicaid recipients, nor was it phased in for certain geographic regions of the State before others. When examining cost components that are not SUD-specific, it may be feasible to use Medicaid recipients with behavioral health conditions, but not SUD, as a comparison group in difference-in-difference models. Because we cannot exploit a staggered rollout to identify a comparison group when modeling cost components for SUD treatment enabling a difference-in-differences estimation, alternative specifications for these cost analyses (e.g. interrupted time series) will need to be used as described in Attachment A to CMS's SUD Evaluation Design Technical Assistance Document.

Methodological Limitations

Qualitative

Qualitative analyses based on key informant interviews are limited by the representativeness of the interviewees and by the generally smaller number of people interviewed as compared with a broader survey; however, the richness of the information and ability to ask follow-up questions makes this approach worthwhile. We will strive to ensure the representativeness of interviewees while respecting the voluntary nature of participation by allotting sufficient lead time when scheduling interviews and a long enough recruitment period to find alternate interviewees representing key viewpoints in the event of cancellations/refusals.

Quantitative

We propose to examine several outcomes specifically for the population with OUD that may require a minimal sample size to ensure accuracy of estimates. This is more likely to limit reporting of outcomes that are based on an index event, such as hospital discharge (followed by a readmission or outpatient physician visit), as opposed to being measured for every member of the population. This, and reporting of all rates over a measurement period, are subject to achieving minimum cell sizes.

To conduct difference-in-differences (DD) analyses, we have proposed a comparison group for examining the impact of removing the IMD exclusion on individuals ages 21-64 and for examining the impact of demonstration policies overall on physical health outcomes using individuals with behavioral health conditions, but without substance use disorder. As mentioned above, there may be limitations associated with such comparison groups, and we have proposed alternative modeling strategies (e.g. regression discontinuity and segmented regression analysis) to be used in such cases. An additional requirement of the DD approach is ensuring there are no significant differences in trends between the intervention and comparison group prior to policy implementation. As mentioned above, we will test for such differential pre-trends and adjust our estimate accordingly if necessary.

There are further limitations related to the use of the difference-in-difference framework for evaluating the impact of lifting the IMD exclusion. The proposed comparison group of elderly adults age 65-75 is more likely than the younger Medicaid beneficiaries in our intervention population to be Medicaid-Medicare dual eligibles. This requires consideration of the completeness of utilization reporting in the Medicaid claims data for services where Medicare is the primary payer. An undercount of utilization for dual eligibles could only impact our difference-in-differences estimates if there was a reporting/policy change between the pre- and post-periods. Similarly, dual eligibles could be exclusively subject to other concurrent policy changes that will need to be accounted for when utilizing them as a comparison group. This latter consideration is often relevant to many comparison groups and we will examine and account for any policy changes that may differentially impact the comparison group.

Additionally, there may be sample size limitations posed by use of an age-restricted intervention group. If prevalence of OUD/SUD in the 55-64 age group is too low, we will expand the treatment group age inclusion criterion iteratively to 45-64 and 35-64 carry out a difference-in-difference model. While this may increase the variation in age across treatment and comparison groups, our controlling for age and comorbid conditions will largely account for such differences. Also, certain outcomes, such as use of critical levels of care for OUD/SUD, may lack sufficient sample if utilization of services is too low in this age group. For most outcomes, assuming sufficient prevalence of OUD-SUD among 55-64 year olds, low utilization of IMDs will not limit our findings since access to, not use, of IMDs is the relevant policy change that we are examining, and this access is experienced by all members of the population ages 55-64 due to the Demonstration. Further we expect that differential access any time over the study period will impact the rates of different outcomes of interest that are not infrequent, such as ED visits. Nevertheless, triangulating DD results with those from alternative specifications such as regression discontinuity and segmented-regression analysis, which makes use of the full intervention population age 21-64 and avoids the comparison group limitations mentioned above, will be very important for evaluating this policy change.

Sometimes outcome data relating to a pre-policy baseline period are not available if reported data is collected only after policy implementation. Our examination of the impact of this initiative on overdose deaths relies on data collected by the State and will depend on the timeliness, quality, and frequency of that data reporting, as well as whether it is available by age. If no pre-policy data are available, we will assess time trends in the post-policy period and assess changes in outcomes over time.

As noted for the cost analysis, identification of the population of Medicaid recipients with OUD/SUD is dependent on service utilization. We are limited by service utilization appearing in our claims database, which does not include utilization occurring at non-Medicaid providers. This could lead to under-identification of Medicaid recipients with OUD/SUD, particularly in the pre-policy period before certain services became available under the demonstration. We have proposed sensitivity tests to assess the impact this has on our findings. Also, some OUD/SUD treatment costs may be absent from our claims database, and the amounts may vary over time due to cost shifting. We will consider how this, and all such limitations, may impact our conclusions about the causal impact of the demonstration policies.

Timelines and Deliverables

An interim and summative evaluation report for New Jersey's OUD/SUD program will be prepared as standalone reports, distinct from the evaluation reports for the other components of the Waiver. These reports will follow the preparation instructions described in Attachment L of the STCs.

Demonstration Period: 10/31/17 to 6/30/2022

Project Period: 1/1/2019-12/31/2023

Stakeholder Report

OUD/SUD Program Stakeholders Interview: 7/30/2022

Interim and Final Evaluation Reports

Draft Interim Evaluation Report: 6/30/2021

Draft Final Evaluation Report: 9/30/2023

Finals reports due 60 days after receiving CMS comments on Draft Evaluation.

Allocations of effort over the study period are reflected in the Budget, which is Attachment B to this evaluation plan.

Attachments

Attachment A – Draft Interview Guide

Attachment B - Budget

Attachment C – About Rutgers Center for State Health Policy

Conflict of interest declarations from all personnel are required by Rutgers University as part of the project initiation process. If requested, copies of these declarations may be submitted to DMAHS prior to project initiation.

ATTACHMENT A

INTERVIEW QUESTIONS for OUD/SUD Initiative

Evaluation of the NJ FamilyCare Comprehensive Waiver Demonstration

NOTE: Individuals interviewed will be stakeholders involved in the administration and implementation of the OUD/SUD initiative or professionals working with populations impacted by the OUD/SUD initiative. Informed consent will be administered prior to interview.

Thank you for agreeing to talk with us about the OUD/SUD initiative. We are talking with a variety of stakeholders about this initiative in order to provide information for our evaluation of the behavioral health reforms related to care and treatment of OUD/SUD for Medicaid beneficiaries under the Medicaid Comprehensive Waiver. We would like to ask you about the successes and challenges of this program. If you do not know the information or would prefer not to answer a question, feel free to let us know.

1. What improvements in access to guideline-adherent care for OUD/SUD, if any, occurred due to the OUD/SUD initiative?

2. What has been the experience of getting individuals who are identified as having OUD/SUD into the right level of care?

3. How is care coordinated for people in the OUD/SUD program?

4. What have been the challenges and benefits of establishing peer support services?

5. How has the availability of OUD/SUD services impacted treatment success?

6. What are the key interventions for averting deaths due to overdose and how well have these been addressed in the OUD/SUD program?

7. How well have beneficiaries' needs for treatment been met within the OUD/SUD program?

8. What has been the impact of case management on access to care for physical health among those with OUD/SUD?

9. What are your observations about the performance of the Interim Managing Entity under the OUD/SUD initiative?

10. Have there been any unanticipated negative consequences of the OUD/SUD initiative?

11. Thank you for your time. We would like to interview a broad spectrum of individuals or organizations that were involved in the planning and implementation of the OUD/SUD initiative. Who do you think we should consider interviewing?

ATTACHMENT C

About the Rutgers Center for State Health Policy

The Rutgers Center for State Health Policy (CSHP) provides impartial policy analysis, research, training, facilitation, and consultation on important state health policy issues. The Center combines Rutgers University's traditional academic strengths in public health, health services research, and social science with applied research and policy analysis initiatives. The Center's signature areas of research include Access and Coverage, Health and Long-Term Care Workforce, Health System Performance Improvement, Long-Term Services and Supports, and Population Health.

Currently, CSHP houses data from the Medicaid Management Information System, which includes Medicaid/CHIP enrollment, claims, and managed care encounter records from 2011 to present. CSHP has been an analytic partner working with Medicaid, using these data to inform program and policy strategy and for evaluation of Medicaid initiatives such as the Comprehensive Waiver Demonstration (2012-2017) and ACO Demonstration programs.

Following is a summary of the qualifications of key faculty and staff at CSHP assigned to evaluation of the OUD/SUD Program:

Sujoy Chakravarty, Ph.D. Assistant Research Professor and Health Economist at the Rutgers Center for State Health Policy; Dr. Chakravarty led the evaluation of the 2012-2017 NJ Medicaid 1115 Comprehensive Waiver Demonstration that included analyses of the MLTSS and DSRIP programs among other reforms. Dr. Chakravarty has considerable expertise in Medicaid policies and their potential effects on healthcare services and outcomes and is an expert in policy evaluation design and analysis strategies. The waiver evaluation involved examining the effect of several simultaneous policy changes relating to eligibility, financing and population health management for specific waiver populations by analyzing Medicaid fee-for-service claims and managed care encounter data. He has published several papers and reports utilizing econometric techniques such as panel data estimation and difference-in-differences modelling to examine provider services, healthcare utilization, prescription coverage, and racial and ethnic disparities in access.

Kristen Lloyd, M.P.H Senior Research Scientist at the Rutgers Center for State Health Policy has been a research analyst at CSHP since 2009. Ms. Lloyd was project manager and lead analyst for the evaluation of the 2012-2017 NJ Medicaid 1115 Comprehensive Waiver Demonstration. She has training in epidemiology and statistics and extensive experience in the implementation of econometric techniques for policy evaluation using New Jersey's Medicaid claims and encounter database and complex survey data. She possesses high-level expertise in the areas of programming and statistical modeling.

Jennifer Farnham, M.S. Senior Research Analyst at the Rutgers Center for State Health Policy has been a research analyst at CSHP since 2005, where she has contributed to

numerous health systems research projects. Her experience includes policy analysis, analysis of census and hospitalization data, survey research, interviewing, and program and policy evaluation. She played a key role in conducting of stakeholder interviews and qualitative analysis for the MLTSS and DSRIP programs during the evaluation of the 2012-2017 New Jersey's Comprehensive Medicaid waiver.

Jose Nova, M.S. Assistant Director of Data Management is an experienced analyst with in-depth knowledge of analysis of large datasets including NJ Medicaid and other administrative data as well as possesses high-level statistical expertise, including in the areas of programming and modeling. Nova serves as a senior analyst and maintains familiarity with the NJ Medicaid and other datasets, providing advanced and specialized data analyses on various Center projects.

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