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

March 15, 2024

Jay Ludlam
Deputy Secretary for North Carolina Medicaid
North Carolina Department of Health and Human Services
2001 Mail Service Center
Raleigh, NC 27699-2001

Dear Deputy Secretary Ludlam:

The Centers for Medicare & Medicaid Services (CMS) completed its review of the North Carolina Substance Use Disorder (SUD) Interim Evaluation Report, which is required by the Special Terms and Conditions (STCs), specifically STC #38 "Interim Evaluation Report" of North Carolina's section 1115 demonstration, "North Carolina Medicaid Reform Demonstration" (Project No: 11-W-00313/4 and 21-W-00070/4), effective through October 31, 2024. This Interim Evaluation Report covers the period from May 1, 2019 through September 31, 2022 (with baseline data from October 1, 2016). CMS determined that the Evaluation Report, submitted on June 8, 2023 and revised on December 1, 2023, is in alignment with the CMS-approved Evaluation Design and the requirements set forth in the STCs, and therefore, approves the state's SUD Interim Evaluation Report.

Many key outcome measures improved over the demonstration period. Interrupted time series analyses show that SUD provider capacity increased, including the number of providers offering medications for opioid use disorder, as did follow-up care after mental illness-related emergency department visits. Use of some SUD services increased, including withdrawal management services and pharmacotherapy for OUD. Key informant interviews note that many providers and beneficiaries felt positively about the increased integration of behavioral and physical healthcare. Effects on other health care quality measures were mixed; for example, though avoidable emergency department visits among SUD beneficiaries decreased over the demonstration period, overall emergency department utilization among those beneficiaries increased. However, the COVID-19 public health emergency, which coincided with part of the evaluation period, confounded the trends in health care utilization. We look forward to future evaluations of the demonstration to provide more conclusive findings on the demonstration's progress.

In accordance with STC #41, the approved Interim Evaluation Report may now be posted to the state's Medicaid website within 30 days. CMS will also post the Interim Evaluation Report on Medicaid.gov.

We look forward to our continued partnership on the North Carolina Medicaid Reform Demonstration. If you have any questions, please contact your CMS demonstration team.

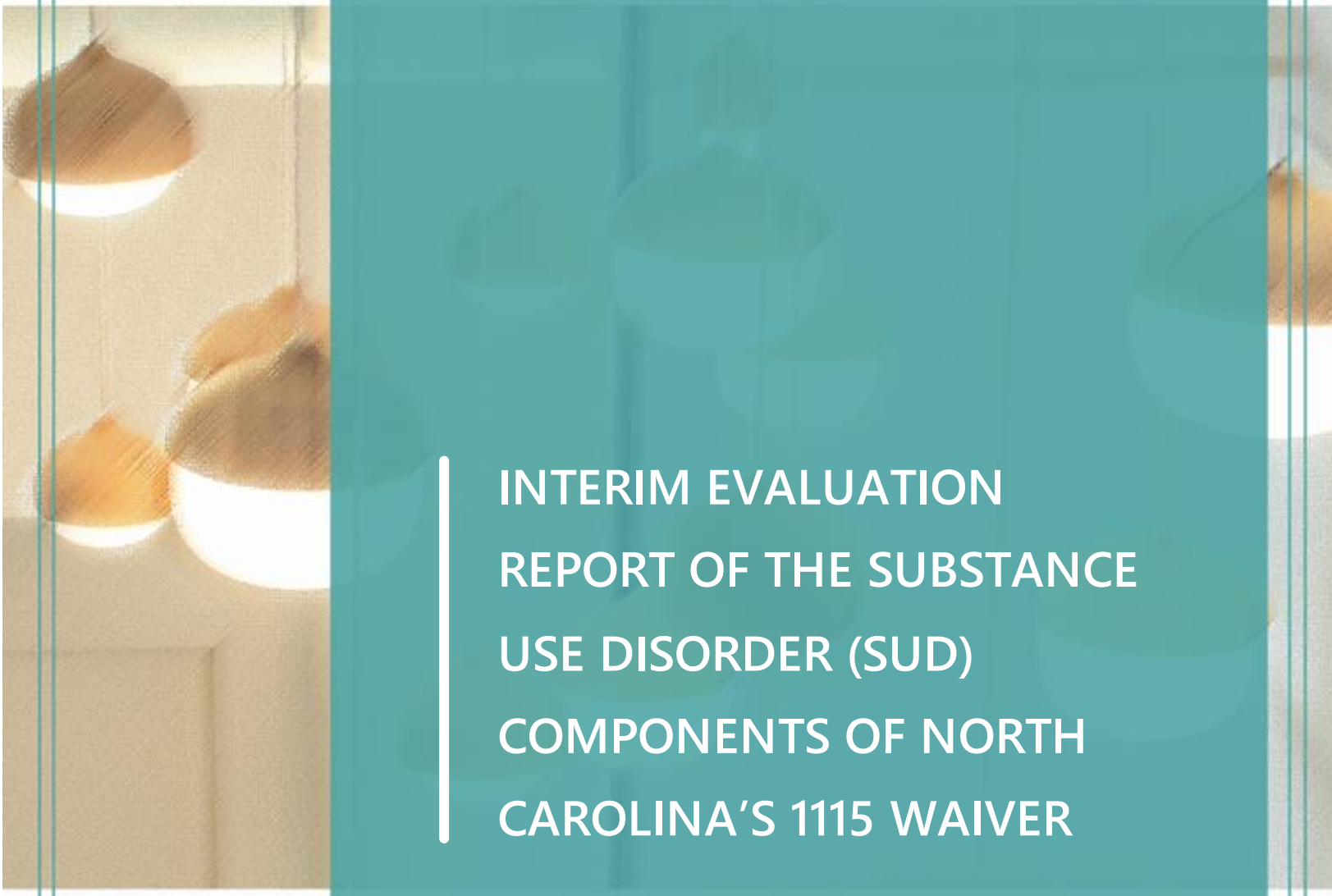
Sincerely,

Danielle Daly -S

Digitally signed by Danielle Daly -S
Date: 2024.03.15 05:22:26 -04'00'

Danielle Daly
Director
Division of Demonstration Monitoring and Evaluation

cc: Morlan Lannaman, State Monitoring Lead, CMS Medicaid and CHIP Operations Group



INTERIM EVALUATION REPORT OF THE SUBSTANCE USE DISORDER (SUD) COMPONENTS OF NORTH CAROLINA'S 1115 WAIVER

UNC | THE CECIL G. SHEPS CENTER FOR HEALTH SERVICES RESEARCH

Table of Contents

Executive Summary

The purpose of the NC 1115 Waiver is to improve Medicaid beneficiary health outcomes through the implementation of a new delivery system, to enhance the viability and sustainability of the NC Medicaid program by maximizing the receipt of high-value care, and to reduce substance use disorders (SUD) statewide. The demonstration consists of two major elements: components to address the opioid use epidemic and general substance use treatment needs in the state of North Carolina, and other components to restructure Medicaid and Health Choice delivery system and benefit structure in NC. The SUD components were authorized on January 1, 2019 and will expire on October 31, 2023. This report evaluates changes in a large number of metrics reflecting quality of care, process of care, and health outcomes, focused on the SUD components of the 1115 waiver.

The report presents two driver diagrams developed for the Evaluation Design document that convey the pathways by which waiver goals would be achieved. These diagrams lead to a number of testable hypotheses and research questions, which are developed and tested below. We focus on Goal 3 of the waiver, to reduce substance use disorder, and test research questions using a number of data sources including Medicaid enrollment, claims and encounters, and state-level public data sources such as Behavioral Risk Factor Surveillance System. We also test several hypotheses and research questions related to general health and access to preventative care and access to mental health treatments for beneficiaries with a substance use disorder diagnosis.

The evaluation study period for the Interim Evaluation Report runs from October 1, 2015 – September 31, 2022. May 1, 2019 is used as the official start of the SUD waiver, since approval was received in April 2019. Many waiver SUD changes were phased in over time and thus our estimates will be conservative since we include months prior to each event. Two major events occurred during the SUD implementation period. First, the Public Health Emergency from the COVID-19 pandemic began with stay-at-home orders in March 2020 and only ended in May 2023, after the study period for this report. We developed a novel method of identifying the return-to-normal dates in our data. Second, the launch of Standard Plans (SPs) occurred on July 1, 2021. While most of the population with an SUD has not yet enrolled in a managed care plan, but will be enrolled in a Tailored Plan, the launch of SPs may have

affected outcomes for people with SUD if SP's benefit design affected access to care or if SPs changed providers' patterns of care, directly or indirectly. We found that 25% of the population identified as having a substance use disorder were enrolled in SPs.

We use interrupted time series models to examine the trends in metrics before the start of the SUD waiver and during the waiver implementation period. These models control for changes due to other factors such the COVID-19 time period, SP implementation, month effects, county effects, and beneficiary-level controls for age, race/ethnicity, sex, and the Chronic Disease Payment System (CDPS-Rx) risk score. This report does not incorporate a comparison group that was not exposed to the NC Medicaid transformation and thus the models will attribute any remaining factors that occurred during the SUD implementation period to the SUD waiver. We take this into account when describing results.

Below, we summarize the findings by major hypothesis:

Hypothesis 3.1: Expanding coverage of SUD services will result in improved care quality and outcomes for beneficiaries with SUD.

We examined 27 metrics reflecting quality of care and outcomes for Medicaid beneficiaries with substance use disorders to test hypothesis 3.1. Analysis of these variables found that only six metrics represented progress in improving outcomes and quality of care for people with SUD, one metric demonstrated no change, one had data issues and could not be analyzed, while the remaining 19 metrics demonstrated declines. The metrics that improved during the SUD waiver were important high-level reflections of the health of the population of Medicaid beneficiaries who struggle with substance use disorders. These include proportionately a greater percent of beneficiaries with diagnosed with SUD after a peak around the time of the COVID-19 pandemic, potentially indicating better access to care (although we note that it is impossible to tell whether this reflects a higher prevalence of SUD or a higher diagnosed prevalence), greater use of withdrawal management services, the growth in the availability of providers to provide SUD and MOUD treatments, continued low lengths of stay in IMDs, and greater continuity of care for OUD. These are important metrics of the success of the waiver. Many of the metrics demonstrating declines were measures of access to specific types of services, initiation and engagement in care. Most of these metrics declined during the COVID PHE, despite our effort to control these effects using trends from Medicaid beneficiaries without SUD diagnoses. The remaining metrics that did not demonstrate progress examined availability and use of specialty behavioral health services, which may reflect the fact that many of the expansions in benefits offered to meet American

Society of Addiction Medicine (ASAM)'s levels of care have only been recently introduced or are still in process. In addition, the Tailored Plans had been envisioned as a major driver of improvements in care have still not been implemented and potentially caused disruption in care during the two prior delayed launches of this benefit plan.

Hypothesis 3.2: Expanding coverage of SUD services will increase the use of MOUD and other appropriate opioid treatment services and decrease the long-term use of prescription opioids.

We examined the trends in 16 additional metrics reflecting medication and other treatments for OUD and long-term use of opioids in order to test Hypothesis 3.2 (Table 1). Four of the metrics demonstrated appreciable progress since the SUD waiver implementation, one demonstrated no change, and the remaining 11 moved in the opposite direction as the waiver goals. The metrics that indicated appreciable progress during the SUD waiver implementation period included the use of pharmacotherapy for OUD, 30-day follow up after ED visit for mental health among beneficiaries with SUD diagnoses; two metrics reflecting the receipt of opioids from multiple providers. The use of non-medication services for OUD did not change. The eleven metrics that did not demonstrate progress included metrics reflect follow up care after emergency and hospital visits for SUD, use of opioids at high doses, and the rate of ED and inpatient use per 1000 beneficiaries with SUD.

Hypothesis 3.3: Expanding coverage of SUD services will result in no changes in total Medicaid and out-of-pocket costs for people with SUD diagnoses and increases in Medicaid costs on SUD IMD services.

We examined six measures reflecting total spending, per beneficiary spending, and out-of-pocket costs overall for SUD services and specifically for IMD services. We found that total spending on SUD services increased after SUD waiver implementation, as expected. This reflects both the greater number of beneficiaries receiving benefits, especially after the start of the PHE, but also greater spending per capita, even after controlling for changes in case mix. Spending on SUD services in IMDs remained stable, although per capita spending on SUD services in IMDs grew slightly. A somewhat greater percent of beneficiaries with SUD had out-of-pocket spending after the waiver was implemented, affecting 2% of beneficiaries with SUD. However, the average copay among beneficiaries with some out-of-pocket spending declined during the SUD implementation period.

Additional Hypotheses 4.1: The implementation of the SUD waiver will increase access to health care and improve the quality of care and health outcomes.

We examined eight measures reflecting general health care quality and health outcomes in order to test the effect of the SUD waiver implementation on overall health. We note that the largest component of the SUD waiver intended to improve overall health among beneficiaries with SUD, Tailored Plans, were intended to launch earlier in the waiver, but have not yet launched, and thus the mechanisms for improving overall health outcomes for people with SUD are not strong. In this set of analyses, we found an improvement in one measure of care – access to ambulatory / preventative visits. We found that three of the measures did not have a measurable effect of the SUD waiver, and four of the measures showed worse outcomes associated with the SUD waiver implementation.

Additional Hypothesis 4.2: The implementation of the SUD waiver will increase the rate of use of behavioral health services at the appropriate level of care and improve the quality of behavioral health care received.

This section mostly focuses on the impact of the SUD waiver on mental health measures. A high proportion of people with substance use disorders also qualify for mental health diagnoses. We tested hypothesis 4.2 on access to and quality of behavioral health care for beneficiaries with SUD diagnoses using 18 measures, including 13 that had been used in prior hypotheses (see Table 1). One of the measures was unaffected by the Medicaid SUD transformation (antidepressant management during the acute phase), while all remaining 17 measures declined during SUD implementation. These estimates attempt to control for trends observed during the COVID-19 PHE in the Medicaid beneficiary population without SUD and not transitioned to standard plans, but these adjustments are not without limitations due to the differences in these populations.

Stratified analyses show important declines in several disparities in care across numerous dimensions and effects both directly from SP implementation as well as indirect effects in the beneficiary population with SUD diagnoses.

Conclusions

The results from this report are consistent with the tremendous losses and pivots that North Carolina, like virtually all other states, had to make during the COVID-19 PHE. The SUD components of the waiver were only beginning to gain traction as the PHE began, having been implemented only 10 months before its start. Most NC DHHS staff and providers worked under extraordinary conditions, that lasted longer than anyone imagined. Many professionals left the public health and medical workforce at a time of greater demand for substance use services. The findings in this report do not in any way detract from the dedication of the thousands of dedicated public health professionals that accomplished daily miracles during this time. The SUD waiver is the most challenging waiver component to evaluate because it is not a discrete event, like managed care launch, but comprised of multitudes of policy changes and approvals, many of which are still in progress. One major event, the IMD waiver, happened quickly, to little fanfare, while the other, Tailored Plan launch, has been postponed several times, compromising the momentum of SUD implementation.

There are some bright spots in this report: the number of beneficiaries diagnosed with a substance use disorder has started to decline, consistent with the stated goals of the demonstration, the number of people using evidence-based medication treatments for opioid use disorder is increasing, the continuity of pharmaceutical care for OUD is increasing, more providers are available to provide SUD services to beneficiaries, fewer beneficiaries without cancer are receiving opioid prescriptions from multiple providers, and beneficiaries with SUD diagnoses are accessing more ambulatory and preventative care.

In no uncertain terms, however, we have identified serious lack of access to many essential services for people with substance use disorders, even after the implementation of many of the components of the SUD waiver. Most of the SUD metrics required by CMS for SUD 1115 waivers declined rather than improved during the waiver implementation. The percent of beneficiaries with SUD receiving any type of care has stagnated at 35-40% of the population identified for treatment. This statistic alone indicates that more than 60% of people in the target population are not receiving any type of Medicaid-paid SUD service in a given month. The percent of beneficiaries with a diagnosed SUD condition receiving outpatient SUD services has dropped to levels below those experienced during the initial months of the PHE when the state was under stay-at-home orders. These levels indicate that in a typical month almost 75% of the eligible population is not receiving a single outpatient service. Finally, over 40% of non-elderly adults with opioid use disorder are not accessing evidence-based medication treatments for opioid use disorder, an essential tool the provider community has to fight this deadly condition.

Chapter 1: General Background Information

This document is the Interim Evaluation Report of the Substance Use Disorder (SUD) components of North Carolina's 1115 waiver. The purpose of the NC 1115 Waiver is to improve Medicaid beneficiary health outcomes through the implementation of a new delivery system, to enhance the viability and sustainability of the NC Medicaid program by maximizing the receipt of high-value care, and to reduce substance use disorders statewide. North Carolina's 1115 waiver entitled "North Carolina Medicaid Reform Demonstration" was approved by the Centers for Medicare & Medicaid Services (CMS) on October 24, 2018. The demonstration consists of two major elements: components to address the opioid use epidemic and general substance use treatment needs in the state of North Carolina, and other components to restructure Medicaid and Health Choice delivery system and benefit structure in NC. The SUD components were authorized on January 1, 2019 and will expire on October 31, 2023.

The SUD waiver components consist of several important policy changes. First, as of July 2019, the State was approved to begin billing for substance use services received in an "Institute for Mental Disease" (IMD), the traditional term for specialty facilities that have more than 16 beds with most patients receiving treatment for mental illness and/or substance use disorder. State Medicaid programs have been historically unable to bill for services in IMDs for Medicaid beneficiaries between the ages of 21 and 64. IMDs typically consist of psychiatric hospitals and residential SUD treatment facilities. The ability of the State to bill for SUD services in an IMD creates substantial savings for the State by allowing NC to receive the Federal financial participation or Federal match for these services, reducing the price of IMD services by almost 66%. Second, the state has modified numerous policies that expand SUD services in the state by increasing the types of providers who can bill Medicaid for SUD services and expanding the continuum of care to be consistent with the American Society of Addiction Medicine (ASAM) continuum. These benefit expansions started during the first year of the waiver and continue to be implemented, with many still in progress. Finally, Medicaid enrollees with severe SUD, severe mental illness, intellectual or developmental disabilities, and/or traumatic brain injuries who meet criteria established by the Department of Health and Human Services will be enrolled in separate capitated plans with specialized features that have enhanced behavioral health benefits, called BH I/DD Tailored Plans. The transition to Tailored Plans was initially scheduled to occur earlier in the demonstration, but the launch of this waiver component has been postponed until October 1, 2023 and thus is not evaluated in this report.

Other components of the 1115 waiver, such as the transition of most Medicaid beneficiaries without a SUD diagnosis into capitated health plans called Standard Plans, on July 1, 2021, or implementation of the Healthy Opportunities Pilots in the spring of 2022, creating a new set of covered benefits which address social-related health needs, such as food insecurity or housing instability in certain regions of the state, may have affected patterns of health care for people with SUD diagnoses. This report, however, will focus on the direct impact of the SUD components of the waiver outlined above.

While most Medicaid beneficiaries with SUD will be covered under either a Standard or Tailored capitated plan under the demonstration, several groups are excluded from participation in any type of managed care, including Medicaid enrollees dually eligible for Medicare[2], Medicaid enrollees who are eligible through the Medically Needy program, those with limited eligibility such as through family planning waivers, those presumptively eligible for Medicaid, and prison inmates receiving Medicaid covered inpatient services. In addition, Medicaid-only beneficiaries receiving long-stay nursing home services and Community Alternatives Program for Children and Community Alternatives Program for Disabled Adults enrollees are also excluded. These beneficiaries will remain in fee-for-service Medicaid, now called NC Medicaid Direct.

Evaluation Questions and Hypotheses

There are three stated goals of the demonstration:

1. Measurably improve health outcomes via a new delivery system
2. Maximize high-value care to ensure sustainability of the Medicaid program, and
3. Reduce the Burden of Substance Use Disorder (SUD)[1]

All three goals can be used as a lens through which the SUD components of the waiver are evaluated, although the third goal is the most specific for this report.

The primary and secondary drivers, or pathways through which these goals will be achieved, are diagrammed below. Goal 3 is additionally broken out in more detail in the subsequent figure.

[1] The original goal was stated as “Reduce Substance Use Disorder.” It has since been modified to “Reduce the Burden of Substance Use Disorder.”

The primary drivers for both Goals 1 and 2 include an increased use of alternative payment models, providing care with a whole person orientation, enhanced access to care, and more use of evidence-based practices and medicines.

The use of alternative payment models is expected to increase through the use of prepaid health plans including Standard Plans (SP), which serve most of the Medicaid population and Tailored Plans (TP), according to the value-based payment strategy. SPs are encouraged to use alternative payment models (APMs) to pay providers and are incentivized to move along the Health Care Payment Learning and Action Network's Framework[6] towards more population-based models of payment and accountability. With the use of value-based payments, SPs will have more ability to place incentives upon providers to meet quality expectations. The SPs are held to quality expectations and other oversight/compliance by the State; this puts more emphasis on quality and value than existed prior to the waiver.

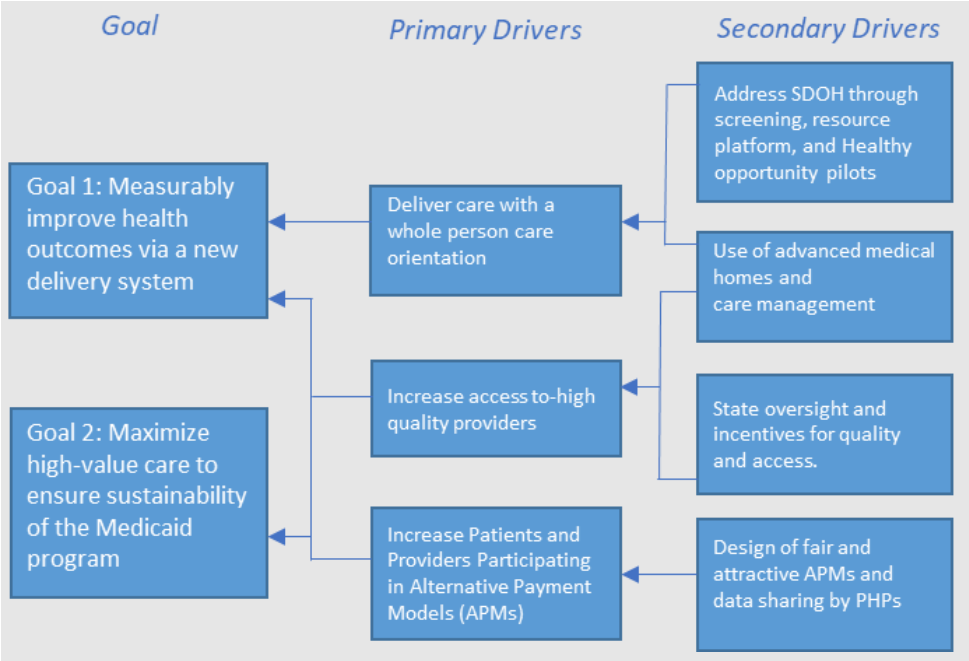
It is well known that medical care is only responsible for a fraction of a person's health; other factors like social determinants of health and the environment are also considerable drivers. An increased emphasis on a whole person orientation will improve beneficiary outcomes. A number of managed care initiatives specifically address social determinants of health; these include the Healthy Opportunities Pilots, the resource platform linking needs to local assets, and mandated screening for patients' SDOH-related needs.

Multiple secondary drivers will improve the use of evidence-based practices (EBP). This driver is deliberately worded to account for both the recommendation of EBPs by providers as well as the ability and willingness of patients to participate in the EBP - ability to access recommended care (e.g., transportation needs met), trust in the provider's recommendation through shared decision-making, and adherence to the recommended treatment (e.g., medication). Some of the secondary drivers are focused on the provider side (e.g., quality improvement activity and shared data/transparency) while others are more focused on the patient and family (patient engagement, use of advanced medical homes). Likewise, oversight of the PHPs and providers will increase the practice of EBPs, and access to the resource platform will attenuate social barriers inhibiting patients' abilities to access evidence-based practices.

Finally, these primary drivers also improve the ability of patients to access care more generally. These will improve provider satisfaction and willingness to treat and manage Medicaid beneficiaries. As

providers become more satisfied with the Medicaid program, more providers will be willing to manage Medicaid beneficiaries, and many will increase the number of Medicaid beneficiaries they are able to manage.

Figure 1 Driver Diagram for Goals 1 and 2.



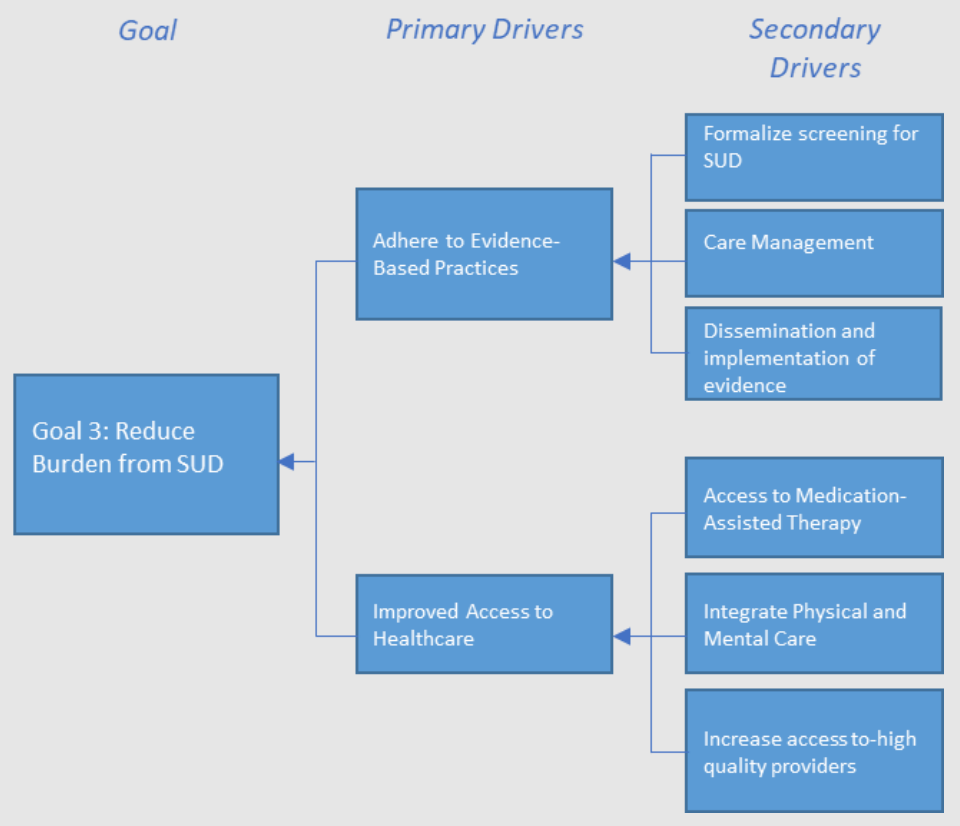
Goal 3 is "reduce the burden of substance use disorder." In Figure 2, we provide additional detail on this goal, which includes reducing the burden of substance use disorder, both in terms of reductions in mortality and morbidity. The primary intention of the SUD components of the waiver is to provide beneficiaries with substance use disorders the high-quality care they need and to reduce the long-term use of opioids.

The Goal 3-specific Driver Diagram focuses on drivers uniquely leading to Goal 3. Secondary drivers of better management, integration between physical and behavioral health, patient satisfaction with SUD treatment and an increase in prescribers of medications for opioid use disorders (MOUD; also referred to as Medication Assisted Therapies, (MAT)[2]) leads to treatment being provided in the most appropriate care setting, adherence to medications and SUD services (including, as above, the notion that providers

[2] We use both terms in this report: MOUD is the currently preferred term while MAT is the traditional name and is included here only when it is the name of specific outcome metrics or interventions.

need to be recommending EBPs as well), and improving rates of treatment and engagement with SUD treatment and providers.

Figure 2 Driver Diagram for Goal 3.



Each of the three goals leads to a number of hypotheses which will be tested in the demonstration evaluation through the related research questions. The research questions specific to SUD services or beneficiaries with SUD diagnoses include:

Goal 3: Reduce the Burden of Substance Use Disorder (SUD)

Hypothesis 3.1: Expanding coverage of SUD services will result in improved care quality and outcomes for patients with SUD.

- Research question 3.1.a Does the expanded coverage of SUD services increase the quality of care for patients with SUD?
- Research question 3.1.b Does the expanded coverage of SUD services improve outcomes for people with SUD?

Hypothesis 3.2: Expanding coverage of SUD services will increase the use of MOUD and other appropriate opioid treatment services and decrease the long-term use of prescription opioids.

- Research question 3.2.a Does the expanded coverage of SUD services increase the use of MOUD?
- Research question 3.2.b Does the expanded coverage of SUD services increase the use of non-medication opioid treatment services at the appropriate level of care?
- Research question 3.2.c Does the expanded coverage of SUD services decrease the probability of long-term use of opioids?

Hypothesis 3.3: Expanding coverage of SUD services will result in no changes in total Medicaid and out-of-pocket costs for people with SUD diagnoses, increases in Medicaid costs on SUD IMD services, increases in SUD pharmacy, outpatient, and rehabilitative costs, and decreases in acute care crisis-oriented, inpatient, ED, long-term care and other SUD costs.

- Research question 3.3a Does the expanded coverage of SUD services change total Medicaid costs?
- Research question 3.3b Does the expanded coverage of SUD services change out-of-pocket costs to Medicaid enrollees with an SUD diagnosis?
- Research question 3.3c Does the expanded coverage of SUD services increase Medicaid costs on SUD IMD services, SUD pharmacy, outpatient, and rehabilitative costs?
- Research question 3.3d Does the expanded coverage of SUD services decrease Medicaid costs on acute care crisis-oriented, inpatient, ED, long-term care and other SUD costs?
- Research question 3.3e Does the expanded coverage of SUD services decrease Medicaid spending on non-SUD services for people with an SUD diagnosis?

We also test several hypotheses and research questions related to general health and access to preventative care and access to mental health treatments for beneficiaries with a substance use disorder diagnosis. The metrics for this were drawn from those relevant to people with SUD diagnoses and available in our database.

Evaluation Measures

This Interim Evaluation Report assesses the current degree to which the Demonstration has been effective in achieving its goals to date and will examine the processes, facilitators and barriers

experienced during the initial four years of the Demonstration period using a set of metrics relevant to beneficiaries with SUD that measure the quality of care, the process of care, and the outcomes of care.

The sections and tables below detail the quantitative measures to be used to test each hypothesis, the source or custodian of each measure, the sample or population to which the measure is relevant, and the proposed data sources. Measures were generated from the CMS-required metrics for SUD 1115 waiver demonstrations, PHP Quality Metrics,[3] the Quality Strategy,[4] the SUD guidance document,[5,6] and other public sources. Several of these measures will be employed for multiple hypotheses, to examine the effect of different components of the waiver on outcomes or in different Medicaid populations. The data sources and analytic methods are further described below. For the majority of these measures, we used claims and encounter data, which includes fee-for-service (FFS) claims data prior to July 1, 2021 as well as remaining populations or services subject to FFS payments after July 1, 2021; LME/MCO encounter data; and SP encounter data.

Table 1.1 Measures included in the Interim Evaluation Report.

Measure (Metric abbreviation)	Hypotheses	Milestone*	Measure custodian	Numerator	Denominator	Process / Outcome
Hypothesis 3.1: Expanding coverage of SUD services will result in improved care quality and outcomes for patients with SUD						
Medicaid Beneficiaries with SUD Diagnosis (M3)	3.1		CMS	Coded as receiving MAT or have qualifying facility, provider, or pharmacy claims with a SUD diagnosis and a SUD-related treatment service	All beneficiaries	Outcome
Medicaid Beneficiaries Treated in an IMD for SUD (M5)	1.2, 3.1	2	CMS	Coded as receiving inpatient/residential treatment in an IMD	Beneficiaries with SUD diagnosis	Process
Any SUD treatment (M6)	1.3, 3.1, 3.2	1	CMS	Beneficiaries receiving at least one SUD treatment or pharmacy claim	Beneficiaries with SUD diagnosis	Outcome

[3] BH I/DD Tailored Plan Quality Metrics. Available at: https://files.nc.gov/ncdma/4---Addendum-3-RFA-30-2020-052-DHB-Section-VII-Attachments-A-P.pdf

[4] NC Medicaid Managed Care Quality Strategy. Available at: https://medicaid.ncdhhs.gov/transformation/quality-management-and-improvement

[5] Monitoring Metrics for Section 1115 Demonstrations with SUD Policies . Available at: https://www.medicaid.gov/medicaid/section-1115-demo/downloads/evaluation-reports/sud-monitoring-metrics.pdf

[6] NC Substance Use Disorder Implementation Plan Protocol. Available at: https://www.medicaid.gov/Medicaid-CHIP-Program-Information/By-Topics/Waivers/1115/downloads/nc/Medicaid-Reform/nc-medicaid-reform-demo-sud-imp-plan-prtcl-20190425.pdf

Measure (Metric abbreviation)	Hypotheses	Milestone*	Measure custodian	Numerator	Denominator	Process / Outcome
Early Intervention for SUD (M7)	3.1	1	CMS	Beneficiaries with a service claim for early intervention services	Beneficiaries with SUD diagnosis	Outcome
Outpatient Services for SUD (M8)	3.1	1	CMS	Beneficiaries with a service claim for outpatient services for SUD	Beneficiaries with SUD diagnosis	Outcome
Intensive Outpatient and Partial Hospitalization Services (M9)	3.1	1	CMS	Beneficiaries who have a service or pharmacy claim for intensive outpatient and/or partial hospitalization services for SUD	Beneficiaries with SUD diagnosis	Outcome
Residential and Inpatient Services (M10)	3.1	1	CMS	Beneficiaries who have a service for residential and/or inpatient services for SUD	Beneficiaries with SUD diagnosis	Outcome
Withdrawal Management (M11)	3.1	1	CMS	Beneficiaries with a service or pharmacy claim for withdrawal management services	Beneficiaries with SUD diagnosis	Outcome
Medication-Assisted Treatment (M12)	1.3, 3.1, 3.2	1	CMS	Beneficiaries who have a claim for a MAT dispensing event for SUD	Beneficiaries with SUD diagnosis	Process
Behavioral health Providers with a Medicaid contract	3.1		UNC	Number of behavioral health providers with a Medicaid contract	Number of Medicaid beneficiaries with SUD	Outcome
SUD Provider availability (M13)	3.1, 3.2	4	CMS	Total number of SUD providers who were enrolled and qualified to deliver Medicaid services		Process
SUD Provider availability for MAT (M14)	3.1, 3.2	4	CMS	Total number of SUD providers who were enrolled and qualified to deliver Medicaid services and who meet standards to provide buprenorphine or methadone as part of MAT		Process
Initiation and Engagement of Alcohol and Other	1.2, 1.5, 3.1	6	NQF#: 0004 / NCQA –	Beneficiaries who initiated AOD treatment within 14 days of the diagnosis and	Adult beneficiaries with a new episode of SUD	Process

Measure (Metric abbreviation)	Hypotheses	Milestone*	Measure custodian	Numerator	Denominator	Process / Outcome
Drug Abuse or Dependence Treatment (IET/M15)			HEDIS / Adult Core Set	who were engaged in ongoing AOD treatment within 34 days of the initiation visit		
Concurrent Use of Opioids and Benzodiazepines (M21/COB)	1.1, 3.1	5	NQF#: 3389 / PQA / Adult Core Set	Received concurrent prescriptions for opioids and benzodiazepines	Adults beneficiaries with two or more prescriptions of opioids on different service dates and with a cumulative days' supply of 15 or more days	Process
Access to Preventive/Ambulatory Health Services for Adult Medicaid Beneficiaries with SUD (M32)	3.1		NCQA – HEDIS / CMS	Had an ambulatory or preventative care visit	Adult beneficiaries with SUD	Process
Average Length of Stay in IMDs (M36)	1.1, 3.1	2	CMS	Number of days in an IMD for inpatient/residential discharges for SUD	Number of discharges from an IMD for beneficiaries with an inpatient or residential treatment stay for SUD	Outcome
Percent of Individuals Receiving MOUD who are also Receiving Counseling and Behavioral Therapies to Treat Substance Use Disorders (Q3)	1.3, 3.1, 3.2		--	Psychosocial visits during the current and prior 3 months	Beneficiaries in their first 12 months of receiving MOUD	Process
Poor mental health in the past 30 days	3.1		BRFSS			
Binge drinking in the past 30 days	3.1		BRFSS			
Hypothesis 3.2: Expanding coverage of SUD services will increase the use of MAT and other appropriate opioid treatment services and decrease the long-term use of prescription opioids						

Measure (Metric abbreviation)	Hypotheses	Milestone*	Measure custodian	Numerator	Denominator	Process / Outcome
Follow-Up After Emergency Department Visit for Alcohol and Other Drug Abuse or Dependence (M17.1)	1.2, 3.2	6	NQF#: 3488 / NCQA – HEDIS / Adult Core Set	A follow-up visit with any practitioner within 7 and 30 days of the ED visit	ED visits for beneficiaries ages 18 and older with a principal diagnosis of AOD abuse or dependence	Outcome
Follow-Up After Emergency Department Visit for Mental Illness (M17.2)	1.2, 3.2	6	NQF#: 3489 / NCQA – HEDIS / Adult Core Set	A follow-up visit with any practitioner within 7 and 30 days of the ED visit	ED visits for beneficiaries ages 18 and older with a principal diagnosis of mental illness or intentional self-harm	Outcome
Use of Opioids at High Dosage in Persons without Cancer (M18)	1.3, 3.2	5	NQF#: 2940 / PQA / Adult Core Set	Beneficiaries who received prescriptions for opioids with an average daily dosage of ≥90 morphine milligram equivalents (MME) over a period of 90 days or more	Adults with two or more prescription claims for opioids filled on different service dates and with a cumulative days' supply of 15 or more days	Outcome
Use of Opioids from Multiple Providers in Persons Without Cancer (M19)	1.3, 3.2	5	NQF#: 2950 / PQA	Evidence of opioid prescription claims from 4 or more prescribers AND 4 or more pharmacies within 180 days	Adults with two or more prescription claims for opioids filled on different service dates and with a cumulative days' supply of 15 or more days	Outcome
Use of Opioids at High Dosage and from Multiple Providers in Persons Without Cancer (M20)	1.3, 3.2	5	NQF#: 2951 / PQA	Evidence of opioid prescription claims with an average daily dosage of ≥90 morphine milligram equivalents (MME) AND from 4 or more prescribers AND 4 or more pharmacies	Adults with two or more prescription claims for opioids filled on different service dates and with a cumulative days' supply of 15 or more days	Outcome
Percent of Enrollees Diagnosed with OUD Receiving Non-medication Opioid Treatment Services	3.2		--	Evidence of psychosocial service for OUD	Beneficiaries with an OUD diagnosis	Process
Emergency Department Utilization for	3.2	5	CMS	Number of ED visits for SUD	All fully eligible beneficiaries	Process

Measure (Metric abbreviation)	Hypotheses	Milestone*	Measure custodian	Numerator	Denominator	Process / Outcome
SUD per 1000 beneficiaries (M23)						
Inpatient Stays for SUD per 1000 beneficiaries (M24)	3.2		CMS	Number of inpatient discharges related to a SUD stay	All fully eligible beneficiaries	Process
Hypothesis 3.3: Expanding coverage of SUD services will result in no changes in total Medicaid and out-of-pocket costs for people with SUD diagnoses, increases in Medicaid costs on SUD IMD services, increases in SUD pharmacy, outpatient, and rehabilitative costs, and decreases in acute care crisis-oriented, inpatient, ED, long-term care and other SUD costs						
SUD spending (M28)	3.3		CMS	Total Medicaid spending on SUD treatment services		Outcome
SUD spending within IMDs (M29)	3.3		CMS	Total Medicaid spending on inpatient/residential treatment for SUD provided within IMDs		Outcome
Per capita SUD spending (M30)	3.3		CMS	Total Medicaid spending on SUD treatment services	All fully eligible beneficiaries	Outcome
Per capita SUD spending within IMDs (M31)	3.3		CMS	Total Medicaid spending on inpatient/ residential treatment for SUD provided within IMDs	All fully eligible beneficiaries with a claim for inpatient/residential treatment for SUD in an IMD	Outcome
Out-of-pocket costs to Medicaid Enrollees (All services)	2.3, 3.3		--	Total out-of-pocket expenditures	Beneficiaries with SUD diagnosis	Outcome
Additional measures examined among beneficiaries with a SUD diagnosis						
Avoidable or Preventable Emergency Department Visits	--		Oregon Health	Evidence of an avoidable ED visit	Beneficiaries with a SUD diagnosis	Outcome
Readmissions Among Beneficiaries with SUD (M25)	--	6	CMS	Readmission within 30 days of discharge	Hospital stays for beneficiaries with a SUD diagnosis	Outcome
Connecting Primary Care to	--		--	Had a PCP visit in the 30 days following a SUD visit	SUD visits that did not have an inpatient or	Process

Measure (Metric abbreviation)	Hypotheses	Milestone*	Measure custodian	Numerator	Denominator	Process / Outcome
SUD Service Offerings (Q2)					residential SUD stay for 30 days after the visit	
Rate of Screening for Pregnancy Risk	--		NC Administrative Measure	Coded as receiving screening for pregnancy risk	Women with a SUD diagnosis and a claim/encounter for prenatal services	Process
Annual Dental Visits (ADV)	--		NQF#: 1388 / NCQA - HEDIS	Coded as receiving 1 or more outpatient dental visit	Beneficiaries 2 years of age or older and with a SUD diagnosis	Process
Breast Cancer Screening (BCS)	--		NQF#: 2372 / NCQA – HEDIS / Adult Core Set	Coded as receiving breast cancer screening	Women 50-74 years of age with a SUD diagnosis	Process
Cervical Cancer Screening (CCS)	--		NQF#: 0032 / NCQA – HEDIS / Adult Core Set	Coded as receiving cervical cancer screening	Women 21-64 years of age with a SUD diagnosis	Process
Continuity of Pharmacotherapy for OUD (M22)	--	1	NQF#: 3175 / University of Southern California / HEDIS	At least 180 days of continuous pharmacotherapy use	Adult beneficiaries 18 years of age and older with OUD and at least one claim for pharmacotherapy	Process
Follow-up After Hospitalization for Mental Illness (FUH): 7 and 30 days after discharge	--		NQF#: 0576 / NCQA – HEDIS / Adult & Child Core Set	Evidence of outpatient visit in the appropriate time frame	Beneficiaries ages 6 and older who were hospitalized for treatment of selected mental illnesses and have a SUD diagnosis	Process
Use of Behavioral Health Care for People with SMI/SUD/SED	--			Evidence of behavioral health care use	Children and adults with a SUD diagnosis	Process

Measure (Metric abbreviation)	Hypotheses	Milestone*	Measure custodian	Numerator	Denominator	Process / Outcome
Antidepressant Medication Management (AMM)	--		NQF#: 0105 / NCQA – HEDIS / Adult Core Set	Beneficiaries who remained on antidepressant treatment	Beneficiaries ages 18 and older with a SUD diagnosis who filled at least one prescription for antidepressant medication	Process

* SUD metrics are also presented by Milestones in Table 2.

Chapter 2: Assessment Methodology

Evaluation Design

The evaluation design in this Interim Evaluation Report focuses on the trends in and analysis of the measures outlined in Table 1. We have conducted analyses of metrics on a monthly or annual basis. Many of these results have already been reported to NC DHHS through data dashboards that have been developed as part of the Evaluation as well as through verbal and written reports.

Evaluation Period

The evaluation study period for the Interim Evaluation Report runs from October 1, 2015 – September 31, 2022. The baseline period is slightly less than five years prior to the start of Demonstration, but coincident with the launch of ICD-10 codes. Monthly metrics use this full time-period unless a look back for specific metrics is required. Annual measures have different baseline periods, depending on whether they are calendar-year metrics (baseline begins January 1, 2016) or demonstration year metrics (baseline begins November 1, 2015).

May 1, 2019 is used as the official start of the SUD waiver, since approval was received in April 2019. Many waiver SUD changes were phased in over time and thus our estimates will be conservative since we include months prior to each event. We note in the results section if the metrics are trending up or down during the SUD implementation period.

Important Confounders during SUD Implementation

Two major events occurred during the SUD implementation period. First, the PHE from the COVID-19 pandemic began with stay-at-home orders in March 2020 that dramatically reduced the use of most Medicaid-funded health care services and also resulted in a number of policy levers implemented to attempt to reduce the impact on the Medicaid beneficiary and provider populations. The PHE only ended in April 2023, after the study period for this report, although different types of service returned to normal at different times during the PHE. We developed a novel method of identifying the return-to-normal dates in our data, as described below. Our estimation analysis includes the relevant time period for COVID as identified in our return-to-normal analysis, although for two categories of service, prescription drugs and hospitalizations, utilization has not yet returned to normal as of the end of our

study period. This has a very important implication for our estimation models, because there are only 10 months of data during the SUD implementation period before the COVID PHE began and thus it is much harder to tease out independent effects of the waiver. In addition, we fully acknowledge that there are many dimensions in which health care use and the Medicaid program design has not returned to normal. Telehealth continues to be used, especially for behavioral health care, which may permanently affect patterns of care. Providers and practices may still function differently from before the pandemic in ways that are not fully captured in these data. Finally, Medicaid has made several of the PHE policies permanent, which may also affect patterns of care, that are difficult to tease out from the SUD waiver effects.

Second, as described above, the launch of Standard Plans (SPs) occurred on July 1, 2021. While most of the population with an SUD has not yet enrolled in a managed care plan, but will be enrolled in a Tailored Plan, the launch of SPs may have affected outcomes for people with SUD due to reduced behavioral health benefits in SPs or if SPs changed providers' patterns of care, directly or indirectly. In addition, TPs have been scheduled to launch twice during the SUD implementation period examined here and have been postponed a third time to October 1, 2023. Gearing up for TP launch may have affected patterns of care examined here and would be attributed to the waiver. Differences in the effect of SP launch by beneficiaries ever in SPs or never in SPs are described in Chapter 5.

Data Sources

The data sources used for this analysis are briefly described below.

NC Medicaid FFS claims and membership information; LME/MCO encounter; and PHP encounter data: These data create the backbone of the quantitative analysis and include specific information on services paid through the Medicaid program (or its subcontracting MCO or PHP plans), administrative diagnoses received, and Medicaid enrollment information, as well as demographic characteristics. This set of data is referred to as "Medicaid data" below.

There are three sources of data we had anticipated using to test metrics for Hypotheses 3.1-3.3 but that were not yet available or became irrelevant. **Death certificate data** would have been used to test hypotheses about the reduction in overdose deaths, but linkage of these data was delayed due to computing limitations and other factors. These data are in progress and should be available for future analyses. The **Controlled Substances Reporting System (CSRS)** data were not made available for this analysis, as the state agency denied repeated requests to access this data. The **DEA waiver data** was

abandoned both because the DEA stopped making this data available and because of changes in the DEA waiver policy that no longer required a waiver to prescribe buprenorphine.

Analysis of Monthly Measures

Most of the measures analyzed for this report are generated monthly, and thus have sufficient data points to conduct interrupted time-series analysis models to examine the effect that the SUD components of 1115 Waiver have on the monthly outcomes both in terms of shifting the average values up or down, as compared to prior to the implementation of the SUD waiver, as well as examining differences in the rate of change of the metrics after the implementation of the SUD waiver components as compared to the baseline period.

Interrupted time-series (ITS) analysis models take the following form:

$$Y_{it} = f(\beta_0 + \beta_1 Time_{it} + \beta_2 Post_t + \beta_3 Time_{it} * Post_t + \beta_4 Z_{it}) + \varepsilon_{it}$$

We use estimates from this model to generate average marginal effects of the SUD intervention on the level of each outcome and on the trends in the outcomes. Models are currently run as linear models for ease of interpretation. A limitation of the ITS approach is that it is subject to confounding from events that occur during the post-period such as the availability of treatments or changes in the health services environment.

Monthly analyses control for the effects of COVID-19, using a variable-time approach described below. We also control for baseline, post-waiver, COVID-19, and managed care periods intercepts and slopes, month fixed effects, county fixed effects, and beneficiary-level controls: age (in quadratic form), race/ethnicity, sex, and CDPS-Rx risk score (in quadratic form). SUD weights are omitted in the CDPS risk score calculation since the full sample for analyses have a SUD diagnosis. A small number of monthly metrics occurred too infrequently to use the full set of beneficiary characteristics: for M5 (beneficiaries treated in an IMD for SUD), analysis was performed on the aggregate count of those treated rather than analyzing outcomes at the beneficiary level. M7 (early intervention for SUD) was a rare outcome with a idiosyncratic pattern, so we only present a descriptive count without ITS analysis. Spending metrics are particularly meaningful both at the aggregate (state) level and the beneficiary (per capita) level: thus, we present state-level monthly SUD spending and SUD spending with IMDs, as well as per capita spending.

Analysis of Annual Measures

We used adjusted and unadjusted linear regression models to evaluate the trends in annual measures specified in Table 1. Adjusted analyses controls for other covariates that may affect the outcomes, including age (in quadratic form), sex (if appropriate), urban location, race, ethnicity, and risk adjustment through the Chronic Illness and Disability Payment System (CDPS + Rx) risk adjustment scores to account for changes in the prevalence of chronic conditions in the Medicaid population over time.

Annual measures that required a lookback period for the identification of the eligible population exclude the first year of the baseline period, as described above. We applied Version 5.0 of the SUD Technical Specifications to all years of available data at the time of analyses.

In order to explore the impact of the intervention on mental health related outcomes from the BRFSS survey, we used linear regression models within the framework of a quasi-experimental difference-in-differences approach. The effects of the SUD waiver were evaluated during the post-intervention period (2019- 2021) compared to pre-intervention years (2016-2018). The treatment group included individuals who resided in North Carolina, whereas those from Oklahoma formed the control group. Oklahoma was chosen as a control state because of its relative similarity in terms of population composition and absence of Medicaid managed care in the state during the baseline period. The regression models included separate interaction terms between the treatment status indicator and post-SUD waiver implementation time period indicator. The coefficients on these interaction terms indicate the changes in the outcome associated with the SUD waiver in NC. We included the following covariates: sex, age groups, employment, educational and marital status variables as well as year and state fixed effects. Due to small sample size issues, we did not restrict the sample to only Medicaid beneficiaries, so the estimated effects under-estimate true waiver effects. Observations with missing values for covariates were excluded from the sample.

Cost of Care

Research question 3.3 examines the costs of SUD care and out-of-pocket costs to beneficiaries. We use actual payments from NC DHHS or from the Standard plans to providers in our analysis. This means that we are not taking a strictly Medicaid perspective for this analysis, which would only include direct fee-for-service payments and the capitated payments to SPs but would omit the services delivered through SPs since those come at no net cost to NC DHHS. For this report, we opt to use actual payments as expenditure weights, using expenditures to reflect the intensity of service use.

Limitations

Our analysis approach uses distinct time periods to examine different phases of waiver activities, although in reality, these are not as distinct as would be ideal. Efforts to create a managed care waiver were initiated by North Carolina's General Assembly some time before the baseline time period incorporated here. If provider behavior changed as a result of expectations of upcoming changes, then our baseline period does not capture a true baseline, but rather a baseline under increasing expectation of managed care implementation. An additional concern when using encounter data is how accurate and complete these data are, given that the incentives for complete reporting are dampened over fee-for-service claims. Any deficits in quality of encounter data would confound the SP analyses, since they would be contemporaneous to the implementation of capitated care. The evaluation team has monitored the quality of encounter data as the SPs were implemented and have reported any data quality concerns to NC DHHS as soon as they were discovered, in an effort to improve data quality as the demonstration continues. An additional limitation is that the ITS models are unable to tease out effects that happened concurrently with the SUD waiver implementation. We control for the COVID-19 pandemic by comparing trends in care from Medicaid beneficiaries that were not affected by either the SUD or the managed care components of the waiver, and thus and changes we see during this time period are more likely to be from the PHE. The ITS approach may capture over changes that were contemporaneous with the SUD waiver but may have had nothing to do with the waiver.

The evaluation team spent a considerable amount of time examining options for a contemporaneous comparison group in order to conduct difference-in-differences analyses for the evaluation. We examined other state Medicaid programs in the hopes of finding one that looked similar to NC prior to its Medicaid transformation. Oklahoma seemed like a strong possibility, since their primary care case management model was modeled after North Carolina's program, but they were on a similar trajectory to implement capitated managed care around the same time as North Carolina, which invalidates their use as a control state. We considered other states but learned that CMS does not provide support for purchasing T-MSIS data for an 1115 waiver evaluation and the price of purchasing these data are both cost-prohibitive and the lag of 2-3 years does not permit timely analysis.

The evaluation team received permission to use BCBSNC Marketplace plan data, available to the Sheps Center, as a comparison group, but have discovered that there are very few children covered in these plans, so they were not comparable for children's metrics. There are some similarities for adult metrics,

but the sample sizes were modest. The evaluation team has begun comparing selected metrics with Arizona's Medicaid data, which one of our team leads has access to on a timely basis (with a 1 month lag). We hope to use one or both of these sources to conduct difference-in-differences models for the Final Summative Report.

Several variables planned for analysis were not included in this report for various reasons. These include mortality (death certificate data was not linked with Medicaid data), DEA DATA 2000 Waivers (no longer relevant), and some expenditure measures (alternative expenditure measures were used instead). Mortality data and further expenditure variables will be analyzed for the Final Summative Report.

Finally, the evaluation will not be able to assess all aspects of the Demonstration due either to data limitations or statistical limitations. For example, we do not have information on enrollees' labor market status and thus were not able to evaluate whether improved services increase the ability of enrollees to participate in the labor market.

Chapter 3: Results

In this chapter, we report the results of our analyses, organized by the Hypotheses from the Evaluation Design Document[7].

For monthly metrics reported below, we begin by presenting a figure of the unadjusted metric during the full evaluation period to date. Metric numbers for required SUD metrics refer to the numbering system used by CMS for these metrics, although we describe the metric in the text. We present a table of estimates from the interrupted time series (ITS) models for each monthly metric with adequate sample size, focusing on estimates of the difference in the average effect of the metric during the full post- SUD implementation period (May 2019 – present) as well as differences in the rate of change during the post SUD implementation period. The intercept reflects the immediate impact of the waiver on metrics and is given in the tables below as Difference in the Predicted Outcome in May 2019. A difference in the slope from the baseline (baseline) to the post-waiver (implementation) time periods indicates that the rate of change was different since SUD implementation than it was during the baseline period. An outcome can have changes in either the intercept or slope, both, or neither. We provide a brief interpretation of the metric findings in each section.

We also plot the counterfactual estimated rate for each measure, should the waiver not have been implemented. By comparing the actual measures at each time period to this estimated rate, we can observe the estimate of the impact of the SUD waiver on outcomes, controlling for other characteristics and events that may also affect outcomes.

Hypothesis 3.1: Expanding coverage of SUD services will result in improved care quality and outcomes for beneficiaries with SUD.

We examined 27 metrics reflecting quality of care and outcomes for Medicaid beneficiaries with substance use disorders to test hypothesis 3.1 (Table 2). Analysis of these variables found that only six metrics represented progress in improving outcomes and quality of care for people with SUD, one metric demonstrated no change, one had data issues and could not be analyzed, while the remaining 19

[7] https://www.medicaid.gov/Medicaid-CHIP-Program-Information/By-Topics/Waivers/1115/downloads/nc/Medicaid-Reform/nc-medicaid-reform-demo-eval-des-appvl-01152020.pdf

metrics demonstrated declines. The metrics that improved during the SUD waiver were important high-level reflections of the health of the population of Medicaid beneficiaries who struggle with substance use disorders. These include proportionately a greater percent of beneficiaries with SUD diagnoses after a peak around the time of the COVID-19 pandemic (although we note that it is impossible to tell whether this reflects a higher prevalence of SUD or a higher diagnosed prevalence), greater use of withdrawal management services, the growth in the availability of providers to provide SUD and MOUD treatments, continued low lengths of stay in IMDs, and greater continuity of care for OUD. These are important metrics of the success of the waiver. Many of the metrics demonstrating declines were measures of access to specific types of services, initiation and engagement in care. Most of these metrics declined during the COVID PHE, despite our effort to control these effects using trends from Medicaid beneficiaries without SUD diagnoses. The remaining metrics that did not demonstrate progress examined availability and use of specialty behavioral health services, which may reflect the fact that many of the expansions in benefits offered to meet American Society of Addiction Medicine (ASAM)'s levels of care have only been recently introduced or are still in process. In addition, the Tailored Plans had been envisioned as a major driver of improvements in care have still not been implemented and potentially caused disruption in care during the two prior delayed launches of this benefit plan.

Table 0.1. Summary of SUD Metric Results for Hypothesis 3.1

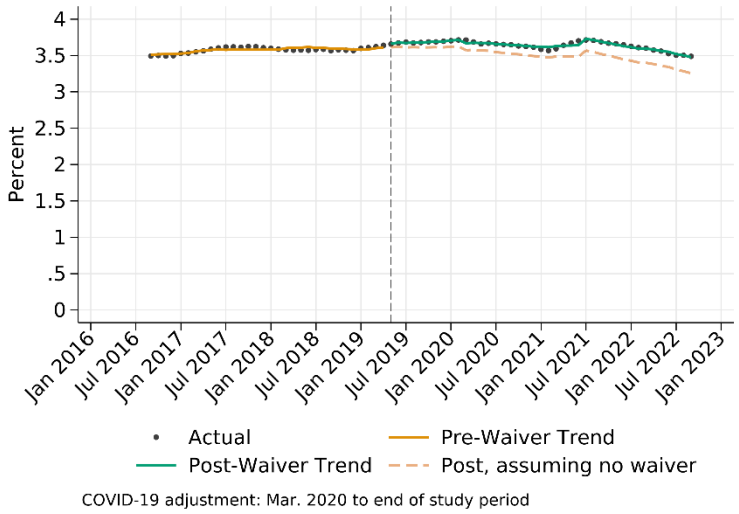
#	Measure (Metric abbreviation)	State's demonstration target+	Directionality at mid-point (Oct 2021)	Adjusted waiver effects at Sept 2022	Progress * (Yes/No)
3.1.1	Medicaid Beneficiaries with SUD Diagnosis (M3)	Increase then decrease	Increase	Increase	Yes
3.1.2	Medicaid Beneficiaries Treated in an IMD for SUD (M5)	Increase	Increase	Decrease	No
3.1.3	Any SUD treatment (M6)	Increase	NI	Decrease	No
3.1.4	Early Intervention for SUD (M7)	Increase	Decrease	--	--
3.1.5	Outpatient Services for SUD (M8)	Increase	Increase	Decrease	No
3.1.6	Intensive Outpatient and Partial Hospitalization Services (M9)	Increase	Decrease	Decrease	No
3.1.7	Residential and Inpatient Services (M10)	Increase	Decrease	Decrease	No
3.1.8	Withdrawal Management (M11)	Increase	Increase	Increase	Yes

#	Measure (Metric abbreviation)	State's demonstration target+	Directionality at mid-point (Oct 2021)	Adjusted waiver effects at Sept 2022	Progress * (Yes/No)
3.1.9	Medication-Assisted Treatment (M12)	Increase	Increase	Decrease	No
3.1.10	Behavioral Health Providers with a Medicaid Contract	Increase	NI	Decrease	No
3.1.11	Ratio of Behavioral Health Providers with a Medicaid Contract per 1000 Medicaid Beneficiaries	Increase	NI	Decrease	No
3.1.12	SUD Provider availability (M13)	Increase	NI	Increase	Yes
3.1.13	SUD Provider availability for MAT (M14)	Increase	NI	Increase	Yes
3.1.14	Initiation of Alcohol Abuse or Dependence Treatment (IET/M15)	Increase	NI	Initiation: Decrease	No
3.1.15	Initiation of OUD Treatment (IET/M15)	Increase	NI	Initiation: Decrease	No
3.1.16	Initiation of Other Drug Abuse or Dependence Treatment (IET/M15)	Increase	NI	Initiation: Decrease	No
3.1.17	Initiation of Any Drug Abuse or Dependence Treatment (IET/M15)	Increase	Initiation: Increase	Initiation: Decrease	No
3.1.18	Engagement in Alcohol Abuse or Dependence Treatment (IET/M15)	Increase	NI	Engagement: Decrease	No
3.1.19	Engagement in OUD Treatment (IET/M15)	Increase	NI	Engagement: Decrease	No
3.1.20	Engagement in Other Drug Abuse or Dependence Treatment (IET/M15)	Increase	NI	Engagement: Decrease	No
3.1.21	Engagement in Any Drug Abuse or Dependence Treatment (IET/M15)	Increase	Engagement: Decrease	Engagement: Decrease	No
3.1.22	Concurrent Use of Opioids and Benzodiazepines (M21/COB)	Decrease	Decrease	--	--
3.1.23	Average Length of Stay in IMDs (M36)	Decrease	Increase	No change	Yes[1]
3.1.24	Percent of Individuals Receiving MOUD who are also Receiving Counseling and Behavioral Therapies to Treat Substance Use Disorders (Q3)	Increase	NI	Decrease	No
3.1.25	Continuity of Pharmacotherapy for OUD (M22)	Increase	Decrease	Increase	Yes
3.1.26	Poor mental health in the past 30 days	Decrease	NI	Increase	No
3.1.27	Binge drinking in the past 30 days	Decrease	NI	--	No

+= if a target wasn't explicitly created for a metric, then we use the projected direction from the Driver Diagram or the study team's intuition. 1=because this metric is substantially below CMS's target, even if this change wasn't due to the waiver, we believe remaining low indicates progress. NI=Not included in the MPA.

3.1.1 Medicaid Beneficiaries with SUD increased slightly during the SUD waiver period.

Figure 3.1 Trends in Medicaid Beneficiaries with SUD



Notes: Baseline and SUD Waiver Implementation trends are predictions from the multivariate interrupted time series model described in Methods. "Post, assuming no waiver" is a prediction from the same ITS model, setting the post-waiver incremental intercept and slope to zero but including trends due to COVID or changing beneficiary characteristics.

Figure 3.1.1 Interrupted time series estimates: Medicaid beneficiaries with SUD

	Baseline	SUD Waiver Implementation	Difference
Predicted Average Outcome (May 2019)	3.68* (3.65, 3.70)	3.73* (3.70, 3.76)	0.051* (0.028, 0.074)
Slope	0.0028* (0.0017, 0.0039)	0.0071* (0.0039, 0.0102)	0.0042* (0.0007, 0.0078)
N	145,672,259		

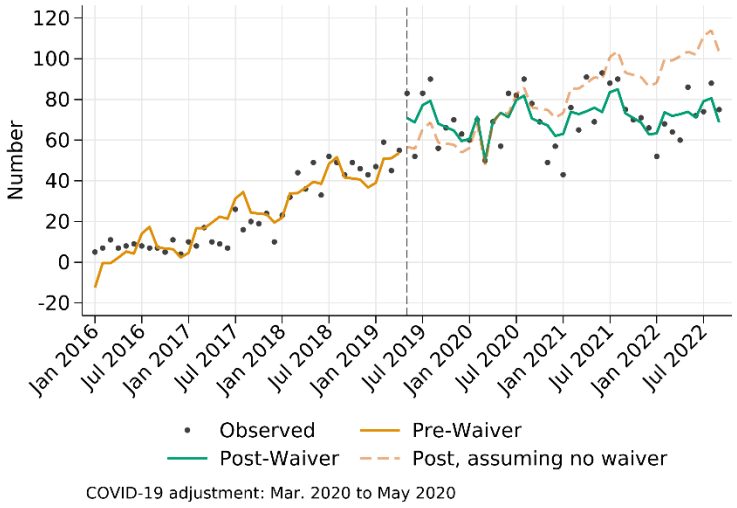
*Notes: 95% confidence intervals in brackets. *=p<0.05. The Predicted Average Outcome (May 2019) represents the difference between the pre- and post-SUD waiver implementation trend lines in May 2019, while slope change represents the difference in slopes between the two periods. The SUD Waiver Implementation slope is the sum of the baseline slope and the slope change during the implementation period. Baseline and SUD Waiver Implementation means are the means of the unadjusted outcomes.*

Metric 3 quantifies the percent of Medicaid beneficiaries diagnosed with a substance use disorder diagnosis in a rolling 12-month period. We calculate this as a rate over the total number of fully eligible Medicaid beneficiaries, since the beneficiary population expanded substantially during the PHE. At the start of the baseline period for this metric, around 3.5 percent of beneficiaries of all ages had a SUD diagnosis during the prior 12-month period. This rate was trending upwards slightly during the baseline period. During the waiver period, we estimated an average of just over one-quarter of a percent (0.28%-point) increase in the rate of SUD diagnoses. This rate increased at a slightly quicker rate during the implementation period, with a 0.0071% point increase each month after waiver implementation, compared to a 0.0028%-point increase before waiver implementation. Overall, we estimate that the percent of beneficiaries with SUD is slightly higher than it would have been without the SUD waiver.

While an increase in SUD diagnoses is difficult to place a value on, since it could reflect either an increase in the prevalence of substance use diagnoses in the beneficiary population or greater access to SUD care, the stated goal of the waiver was to first increase the rate of diagnoses for SUD as new cases are discovered in the beneficiary population due to greater access to a broader array of SUD services and then to decrease the proportion of beneficiaries diagnosed through greater prevention and treatment. Although we have not yet observed the decline, we count this as a metric with demonstrated progress (Table 2). However, the estimated changes are small, and the rate of SUD diagnosis has varied little since October 2015.

3.1.2 More Medicaid beneficiaries with SUD are treated in an IMD but at a slower rate of growth.

Figure 3.1.2 Trends in the number of beneficiaries with SUD treated in an IMD.



Notes: Baseline and SUD Waiver Implementation trends are predictions from the multivariate interrupted time series model described in Methods. "Post, assuming no waiver" is a prediction from the same ITS model, setting the post-waiver incremental intercept and slope to zero but including trends due to COVID or changing beneficiary characteristics.

Table 0.2.1.2 Interrupted time series estimates: Medicaid beneficiaries with SUD treated in an IMD.

	Baseline	SUD Waiver Implementation	Difference
Predicted Average Outcome (May 2019)	53.90 (48.78, 59.02)	68.10 (58.39, 77.81)	14.20* (3.15, 25.25)
Slope	1.43* (1.19, 1.67)	0.21 (-0.53, 0.95)	-1.22* (-2.00, -0.44)
N	81		

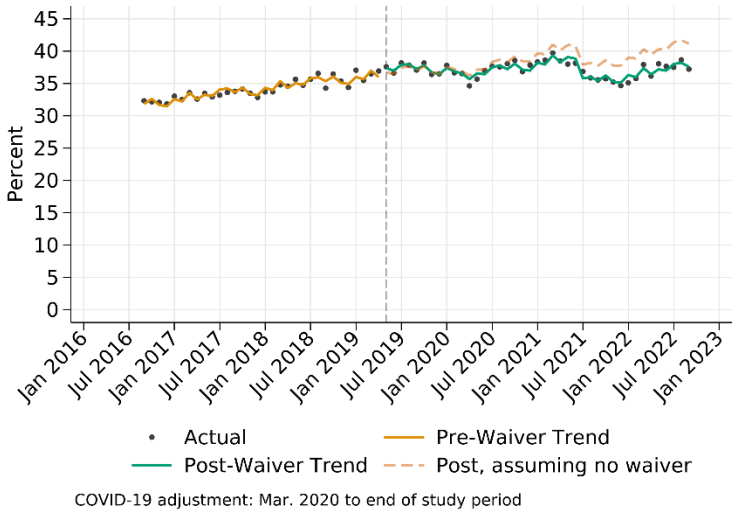
*Notes: 95% confidence intervals in brackets. *=p<0.05. The Predicted Average Outcome (May 2019) represents the difference between the pre- and post-SUD waiver implementation trend lines in May 2019, while slope change represents the difference in slopes between the two periods. The SUD Waiver Implementation slope is the sum of the baseline slope and the slope change during the implementation period. Baseline and SUD Waiver Implementation means are the means of the unadjusted outcomes. Data run on aggregated counts only because of small cell sizes. 95% confidence intervals in brackets.*

Metric 5 counts the number of unique beneficiaries who used Medicaid-paid services in an IMD. The technical specifications for this metric do not restrict to the age groups that would be affected by waiving this provision (ages 22-64), so it does not necessarily reflect the number of individuals who are newly covered for IMD benefits. We converted this metric from an annual measure to a monthly measure to better capture changes over time. Because of the small sample size, this metric was run only on monthly counts, which means the ITS model and projections do not control for comorbidities, demographic factors or other person-level covariates.

The number of beneficiaries treated in an IMD with stays paid for by Medicaid has been increasing over time, even before the waiver was implemented. In the baseline period, there was an average of one additional person using services each month. After the waiver was implemented, we estimated an initial increase of 14 people overall. There was a decline in the rate of change of Medicaid-paid IMD users during the implementation period, by 1.2 people per month. The figure shows that in the early months of the waiver, there was a higher level of IMD use compared to what was estimated in the absence of the waiver, but by January 2020, the IMD usage dropped below what it would have been in the absence of the waiver, even after controlling for trends in hospital utilization during the COVID-19 PHE.

3.1.3 More Medicaid beneficiaries with SUD received any SUD treatment after waiver implementation, but at a declining rate.

Figure 3.1.3. Trends in the use of any SUD treatment among those with a SUD diagnosis.



Notes: Baseline and SUD Waiver Implementation trends are predictions from the multivariate interrupted time series model described in Methods. "Post, assuming no waiver" is a prediction from the same ITS model, setting the post-waiver incremental intercept and slope to zero but including trends due to COVID or changing beneficiary characteristics.

Table 0.3.1.3. Interrupted time series estimates: Percent of Medicaid beneficiaries with SUD who receive any treatment.

	Baseline	SUD Waiver Implementation	Difference
Predicted Average Outcome (May 2019)	36.98* (36.71, 37.25)	37.63* (37.30, 37.96)	0.65* (0.32, 0.98)
Slope	0.15* (0.14, 0.17)	0.0487* (-0.0020, 0.0993)	-0.106* (-0.159, -0.052)
N	4,992,585		

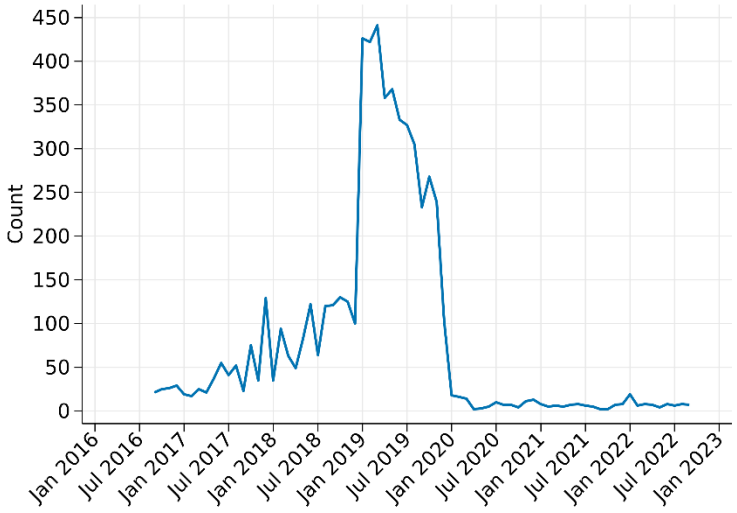
*Notes: 95% confidence intervals in brackets. *=p<0.05. The Predicted Average Outcome (May 2019) represents the difference between the pre- and post-SUD waiver implementation trend lines in May 2019, while slope change represents the difference in slopes between the two periods. The SUD Waiver Implementation slope is the sum of the baseline slope and the slope change during the implementation period. Baseline and SUD Waiver Implementation means are the means of the unadjusted outcomes.*

The percent of the population with an active SUD diagnosis who received any type of treatment has been steadily increasing over the study period, but is still low, ranging from an average of approximately 35% prior to the waiver to an average of about 38% after the waiver. The treatment rate increased

overall by almost 0.65%-point at the beginning of the SUD implementation period, but the rate of increase declined during this period by approximately 0.1%-point. The treatment rate is actually estimated to be slightly higher in the absence of the SUD waiver than with the waiver, as seen by the dashed yellow line above the green line in Figure 3.1.3. This trend began with the COVID PHE and may reflect uncaptured effects due to the PHE.

3.1.4 Early intervention for SUD

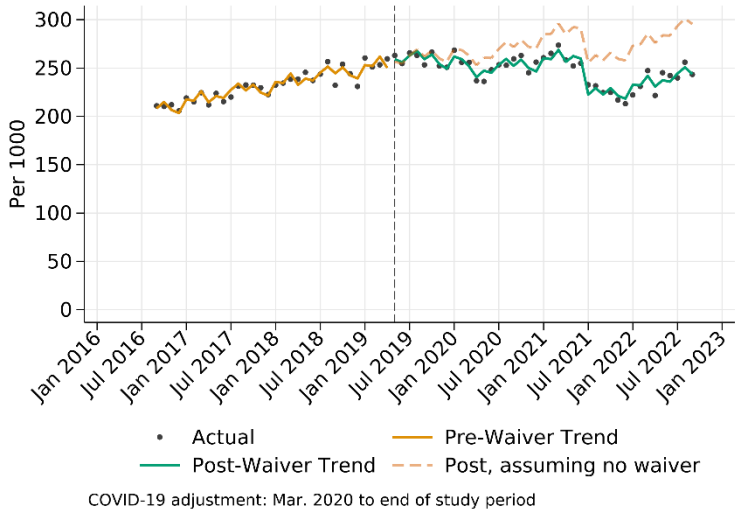
Figure 3.1.4. Trends in Early intervention services for SUD.



Early intervention services are seldom used in North Carolina's Medicaid program, with fewer than 1% of Medicaid beneficiaries with SUD receiving these services. The number of users per month ranged from about 25 to over 400 and the large variation coupled with the small sample size did not allow for reliable multivariate ITS estimates. We therefore present only the unadjusted trends in the use in the figure above. For unknown reasons, there was a relatively large increase in use in early 2019, that dropped off almost entirely by early 2020 before the start of the PHE. There were only a small number of providers providing these services during the study period.

3.1.5 The percent of beneficiaries with SUD receiving outpatient services increased after implementation then declined.

Figure 3.1.5. Trends in the percent of beneficiaries with SUD receiving outpatient services for SUD.



Notes: Baseline and SUD Waiver Implementation trends are predictions from the multivariate interrupted time series model described in Methods. "Post, assuming no waiver" is a prediction from the same ITS model, setting the post-waiver incremental intercept and slope to zero but including trends due to COVID or changing beneficiary characteristics.

Table 3.1.5. Interrupted time series estimates: the percent of Medicaid beneficiaries with SUD who received outpatient SUD services.

	Baseline	SUD Waiver Implementation	Difference
Predicted Average Outcome (May 2019)	259.72 (257.18, 262.27)	262.38 (259.39, 265.37)	2.66 (-0.25, 5.57)
Slope	1.55* (1.44, 1.67)	0.19 (-0.25, 0.63)	-1.36* (-1.84, -0.89)
N	5,260,516		

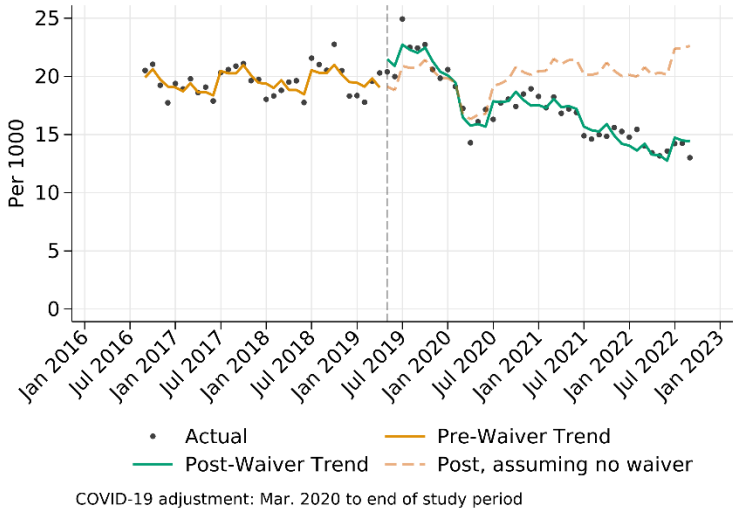
*Notes: 95% confidence intervals in brackets. *=p<0.05. The Predicted Average Outcome (May 2019) represents the difference between the pre- and post-SUD waiver implementation trend lines in May 2019, while slope change represents the difference in slopes between the two periods. The SUD Waiver Implementation slope is the sum of the baseline slope and the slope change during the implementation period. Baseline and SUD Waiver Implementation means are the means of the unadjusted outcomes.*

The percent of Medicaid beneficiaries with a SUD diagnosis receiving outpatient SUD services ranged from 20% to 25% during the study period. The rate increased during the baseline period by about 1.5 people per 1000 beneficiaries with SUD each month. We estimate no difference in the average

percentage of beneficiaries with a SUD diagnosis receiving outpatient services but found that the trend in outpatient service use began declining during SUD waiver implementation by 1.4 people per 1000, even after controlling for the PHE. The percent of beneficiaries with SUD receiving outpatient SUD services is estimated to have been lower with the waiver than it was estimated to be in its absence; this difference started before the COVID PHE.

3.1.6 Initial increase in the use of intensive outpatient or partial hospitalization services with a substantial decline over time.

Figure 3.1.6. Trends in the use of intensive outpatient or partial hospitalization services



Notes: Baseline and SUD Waiver Implementation trends are predictions from the multivariate interrupted time series model described in Methods. "Post, assuming no waiver" is a prediction from the same ITS model, setting the post-waiver incremental intercept and slope to zero but including trends due to COVID or changing beneficiary characteristics.

Table 3.1.6. Interrupted time series estimates: the percent of Medicaid beneficiaries with SUD who received intensive outpatient or partial hospitalization services.

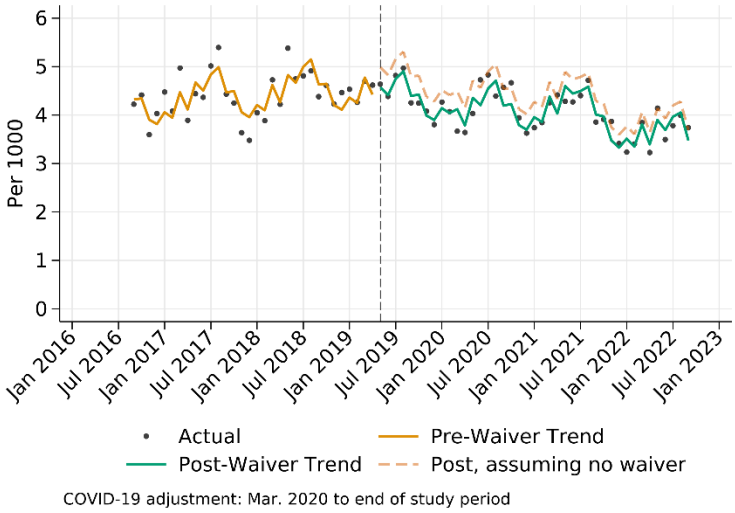
	Baseline	SUD Waiver Implementation	Difference
Predicted Average Outcome (May 2019)	19.98* (19.34, 20.63)	22.34* (21.33, 22.34)	2.35* (1.25, 3.46)
Slope	0.0391* (0.0067, 0.0714)	-0.225* (-0.400, -0.049)	-0.264* (-0.444, -0.083)
N	5,260,516		

*Notes: 95% confidence intervals in brackets. *=p<0.05. The Predicted Average Outcome (May 2019) represents the difference between the pre- and post-SUD waiver implementation trend lines in May 2019, while slope change represents the difference in slopes between the two periods. The SUD Waiver Implementation slope is the sum of the baseline slope and the slope change during the implementation period. Baseline and SUD Waiver Implementation means are the means of the unadjusted outcomes.*

This metric, like most examined in this report, is based on national technical specifications, and not limited to North Carolina's SACOT services. Just under 20 beneficiaries with SUD per 1000 received intensive outpatient or partial hospitalization services during the baseline period. This rate increased slightly each month during the baseline period. During the waiver implementation period, the number of intensive outpatient or partial hospitalization service users increased by 2 people per 1000 but declined slightly over time. We estimate that starting around the time of the COVID PHE, the rate of receipt of intensive outpatient or partial hospitalization services was substantially lower during the waiver implementation period than it would have been without the waiver. This difference could reflect uncaptured effects due to the PHE.

3.1.7 Receipt of residential and inpatient services was slightly lower during the SUD waiver period

Figure 3.1.7. Trends in the use of residential or inpatient services



Notes: Baseline and SUD Waiver Implementation trends are predictions from the multivariate interrupted time series model described in Methods. "Post, assuming no waiver" is a prediction from the same ITS model, setting the post-waiver incremental intercept and slope to zero but including trends due to COVID or changing beneficiary characteristics.

Table 3.1.7. Interrupted time series estimates: the percent of Medicaid beneficiaries with SUD who received residential or inpatient services.

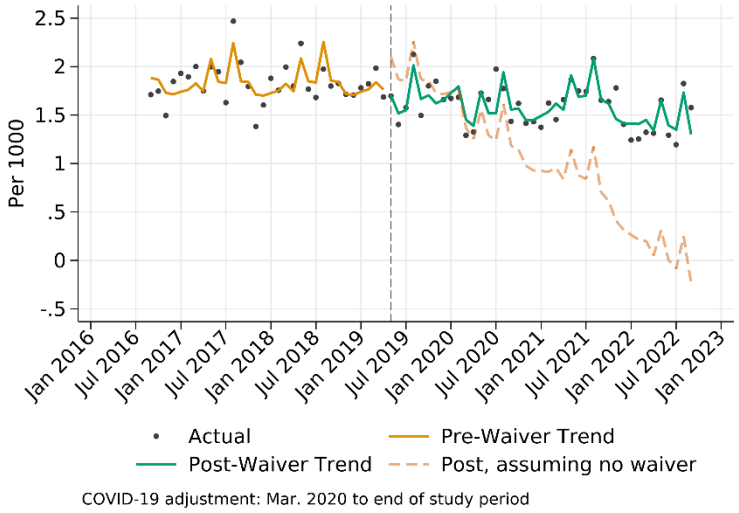
	Baseline	SUD Waiver Implementation	Difference
Predicted Average Outcome (May 2019)	4.67* (4.45, 4.89)	4.26* (3.92, 4.60)	-0.416* (-0.800, -0.032)
Slope	0.0122* (0.0014, 0.0231)	0.0172 (-0.0430, 0.0773)	0.0049 (-0.0565, 0.0664)
N	5,260,516		

*Notes: 95% confidence intervals in brackets. *=p<0.05. The Predicted Average Outcome (May 2019) represents the difference between the pre- and post-SUD waiver implementation trend lines in May 2019, while slope change represents the difference in slopes between the two periods. The SUD Waiver Implementation slope is the sum of the baseline slope and the slope change during the implementation period. Baseline and SUD Waiver Implementation means are the means of the unadjusted outcomes.*

Just under 5 in 1000 Medicaid beneficiaries with SUD received residential or inpatient service use for SUD each month during the study period. This metric is not entirely coincident with IMD services because other inpatient or residential services are included in this metric. The rate of use was relatively flat during both the baseline period and the SUD implementation period, although the average level of use decreased slightly after SUD implementation, by an average of 0.42 users per 1000. Overall, the rate of use of residential or inpatient services for SUD is slightly below what we would have predicted without the waiver.

3.1.8 Lower but increasing rate of use of withdrawal management services.

Figure 3.1.8: Trends in the use of withdrawal management services



Notes: Baseline and SUD Waiver Implementation trends are predictions from the multivariate interrupted time series model described in Methods. "Post, assuming no waiver" is a prediction from the same ITS model, setting the post-waiver incremental intercept and slope to zero but including trends due to COVID or changing beneficiary characteristics.

Table 3.1.8: Interrupted time series estimates: the percent of Medicaid beneficiaries with SUD who received withdrawal management services.

	Baseline	SUD Waiver Implementation	Difference
Predicted Average Outcome (May 2019)	1.84* (1.70, 1.98)	1.44* (1.24, 1.65)	-0.39* (-0.63, -0.15)
Slope	-0.0023 (-0.0091, 0.0046)	0.046* (0.0080, 0.0839)	0.0482* (0.0095, 0.0870)
N	5,260,516		

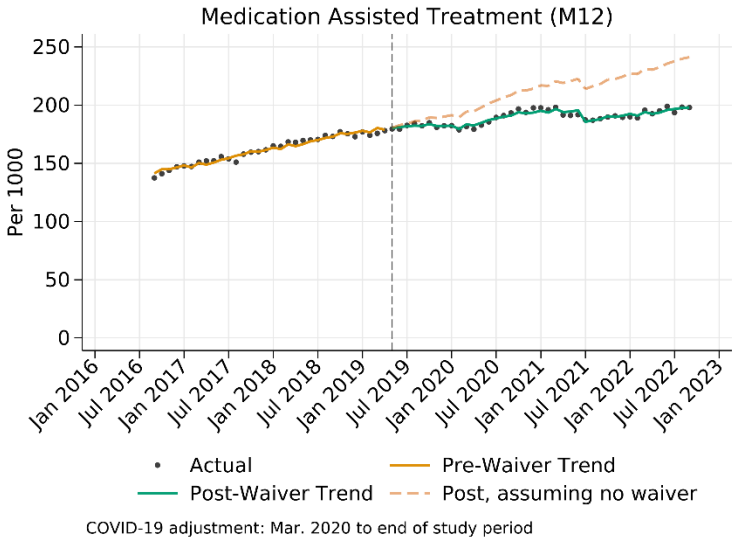
*Notes: 95% confidence intervals in brackets. *=p<0.05. The Predicted Average Outcome (May 2019) represents the difference between the pre- and post-SUD waiver implementation trend lines in May 2019, while slope change represents the difference in slopes between the two periods. The SUD Waiver Implementation slope is the sum of the baseline slope and the slope change during the implementation period. Baseline and SUD Waiver Implementation means are the means of the unadjusted outcomes.*

Only approximately two per 1000 Medicaid beneficiaries with SUD received withdrawal management service use during the study period. The rate of use was flat during the baseline period. After SUD implementation, the average use rate had a decline of 0.39 beneficiaries using withdrawal management services per 1000 beneficiaries per month, which is large in relative terms, representing a 10% relative

decrease. The trend in utilization increased slightly after SUD waiver implementation. We estimate that the rate of receipt of withdrawal management services was substantially above the rate that it would have been without the waiver but note that the counterfactual trend is estimated to be unrealistically steep.

3.1.9 Medication Assisted Treatment continued to increase during the waiver period, but at a slower rate.

Figure 3.1.9. Trends in the use of Medication Assisted Treatment per 1000 beneficiaries with a SUD diagnosis



Notes: Baseline and SUD Waiver Implementation trends are predictions from the multivariate interrupted time series model described in Methods. "Post, assuming no waiver" is a prediction from the same ITS model, setting the post-waiver incremental intercept and slope to zero but including trends due to COVID or changing beneficiary characteristics.

Table 3.1.9. Interrupted time series estimates: the percent of Medicaid beneficiaries with SUD who received Medication Assisted Treatment.

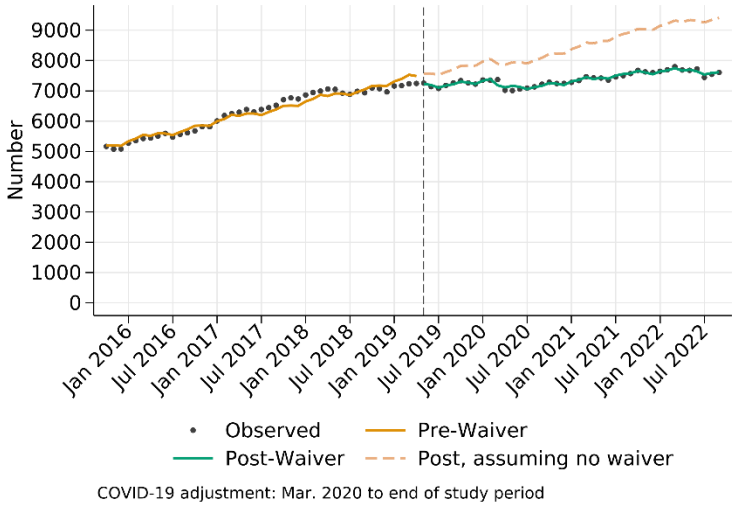
	Baseline	SUD Waiver Implementation	Difference
Predicted Average Outcome (May 2019)	188.83* (186.19, 191.47)	188.40* (185.67, 191.13)	-0.44 (-2.64, 1.77)
Slope	1.41* (1.30, 1.51)	0.336* (0.020, 0.653)	-1.07* (-1.42, -0.72)
N	5,260,516		

*Notes: 95% confidence intervals in brackets. *=p<0.05. The Predicted Average Outcome (May 2019) represents the difference between the pre- and post-SUD waiver implementation trend lines in May 2019, while slope change represents the difference in slopes between the two periods. The SUD Waiver Implementation slope is the sum of the baseline slope and the slope change during the implementation period. Baseline and SUD Waiver Implementation means are the means of the unadjusted outcomes.*

The percent of people with SUD who received MAT ranged from about 14% of people with a SUD diagnosis to about 20%. Note that MAT is not an appropriate treatment for all types of SUDs, so we would not expect this rate ever get close to 100%. The rate had been increasing by about 1.4 people per 1000 per month during the baseline period. While the unadjusted rate continued to grow during the SUD implementation period, the ITS model finds that after controlling for covariates, there was no overall change in the level of use and the trend flattened out during the SUD implementation period, resulting in a net decline in use. We predict that the rate of use after the waiver implementation would have been higher in the absence of the waiver than it was with the waiver. In Hypothesis 3.2, we examine a more focused measure of MOUD use among non-elderly adults with OUD.

3.1.10 The number of behavioral health providers with a contract with NC Medicaid declined during the SUD waiver implementation.

Figure 3.1.10. Trends in the number of behavioral health providers with a contract with NC Medicaid



Notes: Baseline and SUD Waiver Implementation trends are predictions from the multivariate interrupted time series model described in Methods. "Post, assuming no waiver" is a prediction from the same ITS model, setting the post-waiver incremental intercept and slope to zero but including trends due to COVID or changing beneficiary characteristics.

Table 3.1.10. Interrupted time series estimates of the number of behavioral health providers with a contract with Medicaid

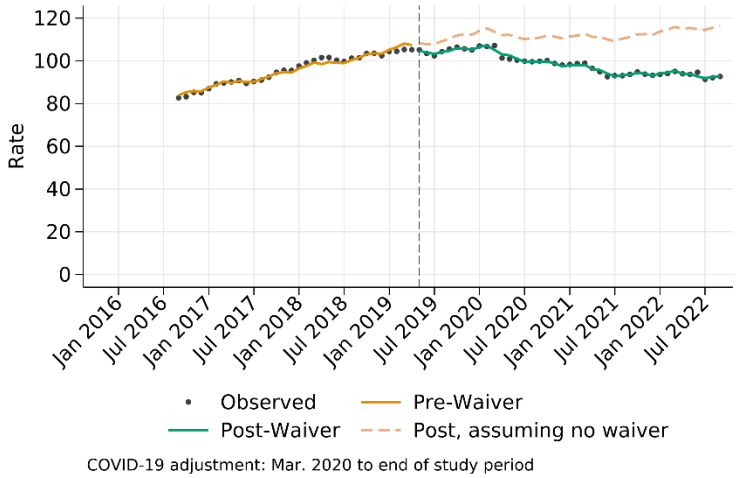
	Baseline	SUD Waiver Implementation	Difference
Predicted Average Outcome (May 2019)	7517.64* (7398.07, 7637.22)	7174.82* (7108.48, 7241.16)	-342.83* (-463.68, -221.98)
Slope	54.96* (50.94, 58.97)	18.75* (5.44, 32.06)	-36.20* (-50.90, -21.51)
N	84		

*Notes: 95% confidence intervals in brackets. *=p<0.05. The Predicted Average Outcome (May 2019) represents the difference between the pre- and post-SUD waiver implementation trend lines in May 2019, while slope change represents the difference in slopes between the two periods. The SUD Waiver Implementation slope is the sum of the baseline slope and the slope change during the implementation period. Baseline and SUD Waiver Implementation means are the means of the unadjusted outcomes.*

We examined the number of providers who had an active contract with Medicaid each month and a behavioral health (mental health or substance use) taxonomy (specialty) code. At the beginning of the study period, there were just over 5000 behavioral health providers with a Medicaid contract. Before the implementation of the SUD waiver, this number had risen to just over 7000 providers statewide and was increasing by 55 providers per month. The number dropped by 343 providers during SUD waiver implementation, and the rate began to flatten out, with an estimated increase of 18.75 additional providers per month during implementation in contrast with the baseline increase of 55 providers per month. We therefore estimate that the level of behavioral health provider participation had declined after SUD waiver implementation. We note three important caveats for this metric: these estimates do not factor in the limited capacity of behavioral health providers in the state (that is, Medicaid cannot contract with more providers than are licensed and practicing in the state), the number of contracted providers is not adjusted for the size of the beneficiary population with SUD, and not all providers with a Medicaid contract provide services to Medicaid beneficiaries. The last two limitations are explored in the next set of metrics.

3.1.11 Behavioral health providers per capita with a contract with NC Medicaid declined during the SUD waiver implementation.

Figure 3.1.11. Trends in the ratio of behavioral health providers with a contract with NC Medicaid per 1000 Medicaid beneficiaries with SUD



Notes: Baseline and SUD Waiver Implementation trends are predictions from the multivariate interrupted time series model described in Methods. "Post, assuming no waiver" is a prediction from the same ITS model, setting the post-waiver incremental intercept and slope to zero but including trends due to COVID or changing beneficiary characteristics.

Table 3.1.11. Interrupted time series estimates: the ratio of behavioral health providers with a contract with NC Medicaid per 1000 Medicaid beneficiaries with SUD

	Baseline	SUD Waiver Implementation	Difference
Predicted Average Outcome (May 2019)	107.82 (106.50, 109.14)	104.3 (105.61, 108.99)	-3.50* (-5.09, -1.90)
Slope	0.74* (0.68, 0.80)	0.23* (0.057, 0.41)	-0.501* (-0.687, -0.316)
N	73		

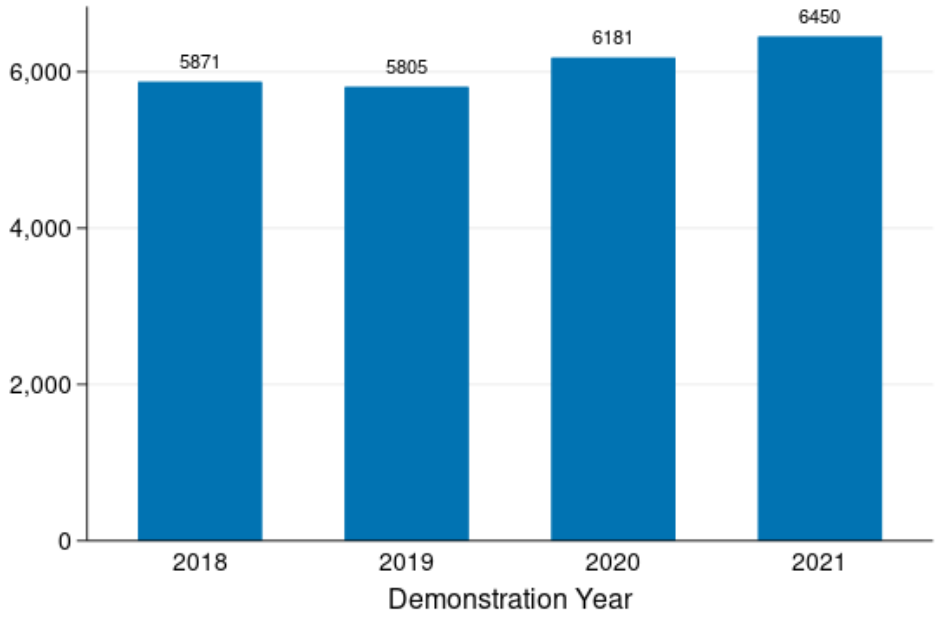
*Notes: 95% confidence intervals in brackets. *=p<0.05. The Predicted Average Outcome (May 2019) represents the difference between the pre- and post-SUD waiver implementation trend lines in May 2019, while slope change represents the difference in slopes between the two periods. The SUD Waiver Implementation slope is the sum of the baseline slope and the slope change during the implementation period. Baseline and SUD Waiver Implementation means are the means of the unadjusted outcomes.*

We divided the number of behavioral health providers with a contract with Medicaid by the size of the Medicaid population with a SUD diagnosis due to the rapid growth in the size of the beneficiary population during the PHE. The number of contracted behavioral health providers per capita grew from

80 to over 100 per 1000 beneficiaries during the baseline period, flattened out during the first year of SUD waiver implementation, then showed a gradual decline beginning around the time of the PHE. Overall, we estimate that 3.5 fewer BH providers per 1000 population had a contract with Medicaid after implementation and that the trend in this ratio declined during SUD implementation by 0.5 fewer BH providers per 1000 beneficiaries per month.

3.1.12 The number of providers providing SUD services to Medicaid beneficiaries has grown since the start of the demonstration.

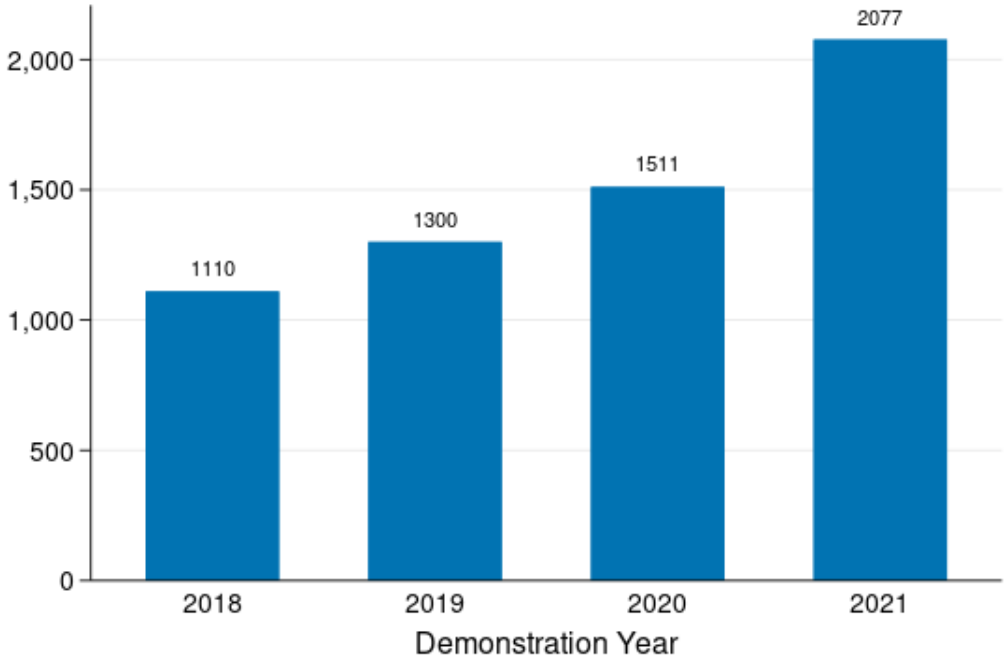
Figure 3.1.12. Trends in annual provider availability.



The number of providers who were enrolled in Medicaid and delivered SUD services to beneficiaries during the demonstration year has generally increased over time since the implementation of the waiver. There was a slight (1%) decrease in the number of providers from Demonstration year 2018 (November 1, 2018 – October 31, 2019) to DY 2019, but then a relatively large annual increase to DY 2020 (6.5%) and DY 2021 (4.4%).

3.1.13 The number of providers providing MOUD to Medicaid beneficiaries has increased substantially since the start of the SUD waiver.

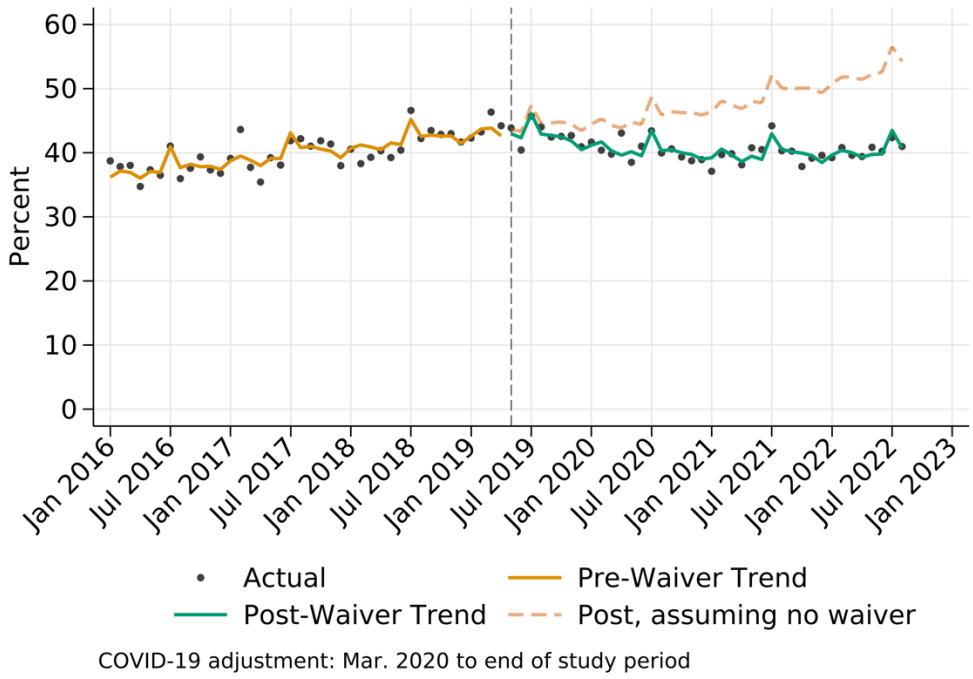
Figure 3.1.13. Trends in annual provider availability for MOUD



The number of providers who were enrolled in Medicaid and qualified to deliver SUD services during the measurement period and who meet the standards to provide buprenorphine or methadone as part of MAT has also grown since the baseline period. There were significant increases over time in this measure (17.1% increase from DY 2018 to DY2019; 16.2% increase from DY2019 – DY2020; and 37.5% increase from DY2020 – DY2021).

3.1.14 The rate of initiation of care for Alcohol Use Disorder (AUD) is above the national median but has decreased over time during the SUD waiver.

Figure 3.1.14. Trends in the rate of initiation of care for Alcohol Use Disorder (AUD) over time



Notes: Baseline and SUD Waiver Implementation trends are predictions from the multivariate interrupted time series model described in Methods. "Post, assuming no waiver" is a prediction from the same ITS model, setting the post-waiver incremental intercept and slope to zero but including trends due to COVID or changing beneficiary characteristics.

Table 3.1.14. Interrupted time series estimates: the rate of initiation of care for Alcohol Use Disorder (AUD)

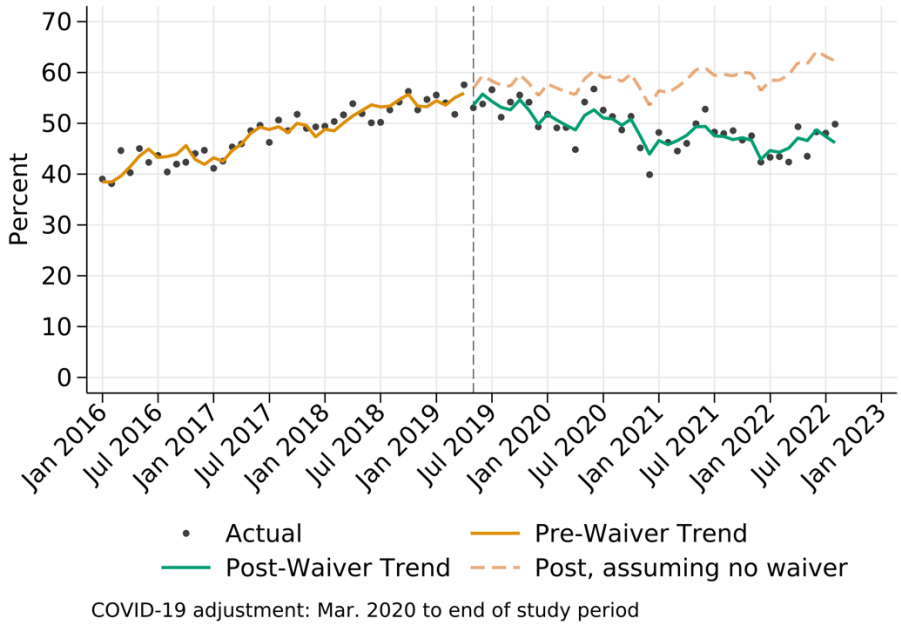
	Baseline	SUD Waiver Implementation	Difference
Predicted Average Outcome (May 2019)	43.64* (42.69, 44.59)	42.98* (41.30, 44.66)	-0.66 (-2.55, 1.23)
Slope	0.18* (0.14, 0.22)	-0.15 (-0.47, 0.17)	-0.33* (-0.65, -0.002)
N	101,348		

*Notes: 95% confidence intervals in brackets. *=p<0.05. The Predicted Average Outcome (May 2019) represents the difference between the pre- and post-SUD waiver implementation trend lines in May 2019, while slope change represents the difference in slopes between the two periods. The SUD Waiver Implementation slope is the sum of the baseline slope and the slope change during the implementation period. Baseline and SUD Waiver Implementation means are the means of the unadjusted outcomes.*

The initiation of care for alcohol use disorder (AUD) reflects the percent of beneficiaries with an AUD diagnosis who initiate treatment through use of an inpatient admission, outpatient visit, intensive outpatient encounter or partial hospitalization, telehealth, or medication treatment within 14 days of an initial diagnosis during the measurement period, after a 60-day wash-out period. The initiation rate has been about 40% during the study period, increasing slightly during the baseline period but then decreasing during SUD waiver implementation. The ITS model predicts a higher initiation rate in the absence of the waiver based on the upward trend in the baseline period. The initiation rate for NC is above the national median (40.8%) for this measure for states reporting data in the CMS Medicaid Scorecard.[8]

3.1.15 The rate of initiation of care for Opioid Use Disorder (OUD) is above the national median but has decreased over time during the SUD waiver.

Figure 3.15: Trends in the rate of initiation of care for Opioid Use Disorder (OUD) over time



Notes: Baseline and SUD Waiver Implementation trends are predictions from the multivariate interrupted time series model described in Methods. "Post, assuming no waiver" is a prediction from the same ITS model, setting the post-waiver incremental intercept and slope to zero but including trends due to COVID or changing beneficiary characteristics.

[8] https://www.medicaid.gov/state-overviews/scorecard/initiation-engagement-alcohol-drug-dependence-treatment/index.html

Table 3.1.15: Interrupted time series estimates: the rate of initiation of care for Opioid Use Disorder (OUD)

	Baseline	SUD Waiver Implementation	Difference
Predicted Average Outcome (May 2019)	56.57* (55.51, 57.63)	53.24* (51.38, 55.09)	-3.33* (-5.42, -1.24)
Slope	0.43* (0.39, 0.48)	0.11 (-0.24, 0.46)	-0.33 (-0.68, 0.03)
N	85,895		

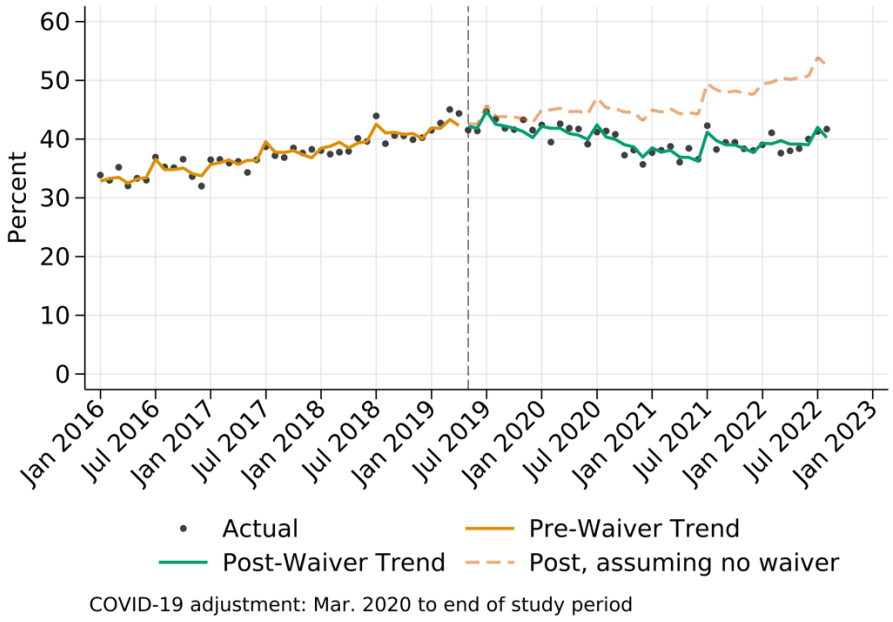
*Notes: 95% confidence intervals in brackets. *=p<0.05. The Predicted Average Outcome (May 2019) represents the difference between the pre- and post-SUD waiver implementation trend lines in May 2019, while slope change represents the difference in slopes between the two periods. The SUD Waiver Implementation slope is the sum of the baseline slope and the slope change during the implementation period. Baseline and SUD Waiver Implementation means are the means of the unadjusted outcomes.*

The initiation of care for OUD reflects the percent of beneficiaries with an OUD diagnosis who initiate treatment through use of an inpatient admission, outpatient visit, intensive outpatient encounter or partial hospitalization, telehealth, or medication treatment within 14 days of an initial diagnosis during the measurement period, after a 60-day wash-out period. The initiation rate increased from about 40% to almost 60% during the baseline period. The rate dropped by 3.3% points during waiver implementation. The ITS model predicts a higher initiation rate in the absence of the waiver based on the higher upward trend in the baseline period. The initiation rate for NC is above the national median (54.9%) for this measure for states reporting data in the CMS Medicaid Scorecard.[9]

[9] https://www.medicaid.gov/state-overviews/scorecard/initiation-engagement-alcohol-drug-dependence-treatment/index.html

3.1.16 The rate of initiation of care for drug use disorders excluding alcohol and opioid use disorder is above the national median but has decreased over time during the SUD waiver.

Figure 3.1.16. Trends in the rate of initiation of care for other drug use disorders (excluding alcohol and opioid use disorder) over time.



Notes: Baseline and SUD Waiver Implementation trends are predictions from the multivariate interrupted time series model described in Methods. "Post, assuming no waiver" is a prediction from the same ITS model, setting the post-waiver incremental intercept and slope to zero but including trends due to COVID or changing beneficiary characteristics.

Table 3.1.16. Interrupted time series estimates: the rate of initiation of care for other drug use disorders (excluding alcohol and opioid use disorder)

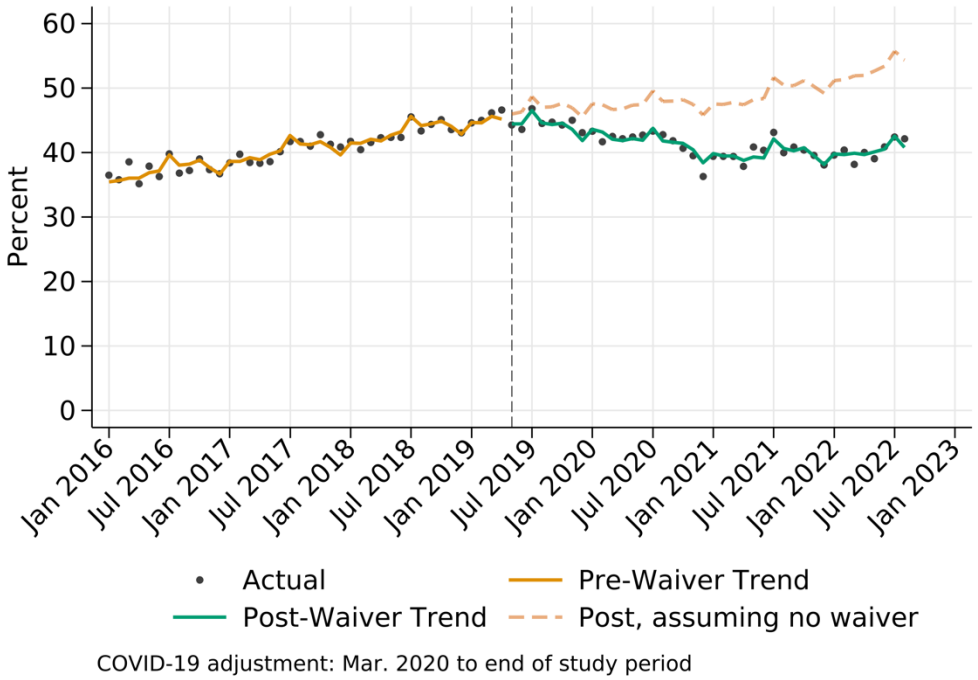
	Baseline	SUD Waiver Implementation	Difference
Predicted Average Outcome (May 2019)	42.69* (41.97, 43.41)	42.29* (41.00, 43.58)	-0.40 (-1.87, 1.07)
Slope	0.26* (0.23, 0.29)	-0.05 (-0.29, 0.20)	-0.30* (-0.55, -0.06)
N	169,183		

*Notes: 95% confidence intervals in brackets. *=p<0.05. The Predicted Average Outcome (May 2019) represents the difference between the pre- and post-SUD waiver implementation trend lines in May 2019, while slope change represents the difference in slopes between the two periods. The SUD Waiver Implementation slope is the sum of the baseline slope and the slope change during the implementation period. Baseline and SUD Waiver Implementation means are the means of the unadjusted outcomes.*

The initiation of care for drug use disorders excluding alcohol and opioid use disorders reflects the percent of beneficiaries who initiate treatment through use of an inpatient admission, outpatient visit, intensive outpatient encounter or partial hospitalization, telehealth, or medication treatment within 14 days of an initial diagnosis during the measurement period, after a 60-day wash-out period. The initiation rate increased from just over 30% to about 45% during the baseline period. There was no immediate change in the rate of initiation during the SUD implementation period, but the initiation rate decreased by 0.3% points each month during the post period. The ITS model predicts a higher initiation rate in the absence of the waiver based on the upward trend in the baseline period. The initiation rate for NC is above the national median (40.5%) for this measure for states reporting data in the CMS Medicaid Scorecard.[10]

3.1.17 The rate of initiation of care for any substance use disorder is above the national median but decreased over time during the SUD waiver.

Figure 3.1.17. Trends in the rate of initiation of care for any SUD over time



[10] https://www.medicaid.gov/state-overviews/scorecard/initiation-engagement-alcohol-drug-dependence-treatment/index.html

Notes: Baseline and SUD Waiver Implementation trends are predictions from the multivariate interrupted time series model described in Methods. "Post, assuming no waiver" is a prediction from the same ITS model, setting the post-waiver incremental intercept and slope to zero but including trends due to COVID or changing beneficiary characteristics.

Table 3.1.17. Interrupted time series estimates: the rate of initiation of care for any alcohol or drug use disorder

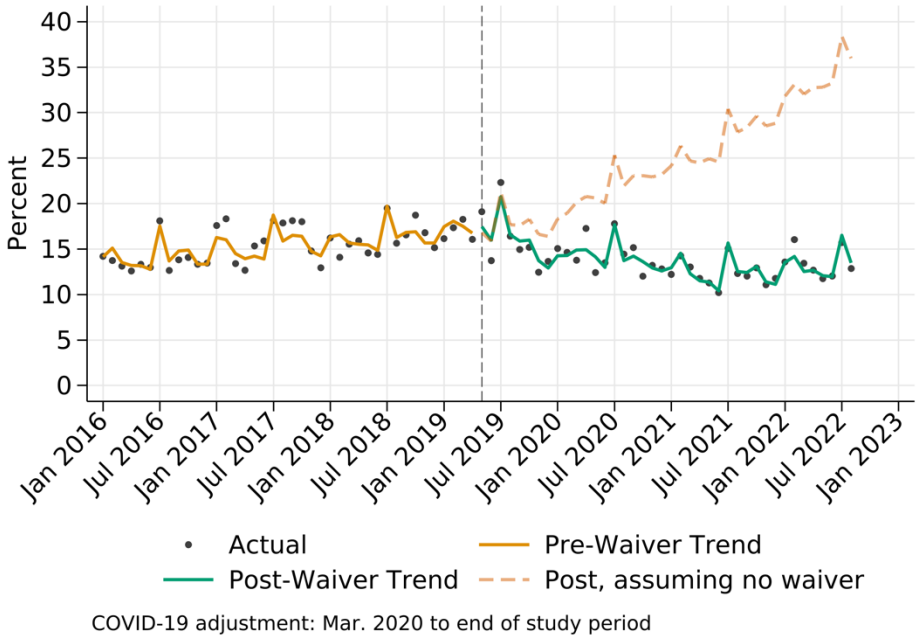
	Baseline	SUD Waiver Implementation	Difference
Predicted Average Outcome (May 2019)	46.02* (45.48, 46.56)	44.49* (43.54, 45.45)	-1.53* (-2.61, -0.45)
Slope	0.26* (0.24, 0.28)	-0.05 (-0.23, 0.14)	-0.31* (-0.49, -0.12)
N	323,695		

*Notes: 95% confidence intervals in brackets. *=p<0.05. The Predicted Average Outcome (May 2019) represents the difference between the pre- and post-SUD waiver implementation trend lines in May 2019, while slope change represents the difference in slopes between the two periods. The SUD Waiver Implementation slope is the sum of the baseline slope and the slope change during the implementation period. Baseline and SUD Waiver Implementation means are the means of the unadjusted outcomes.*

The initiation of care for any SUD diagnosis combines people with SUD diagnoses from the prior three metrics and reflects the percent of beneficiaries with any type of SUD diagnosis who initiate treatment through use of an inpatient admission, outpatient visit, intensive outpatient encounter or partial hospitalization, telehealth, or medication treatment within 14 days of an initial diagnosis during the measurement period, after a 60-day wash-out period. The initiation rate increased from about 35% to almost 45% during the baseline period. The rate dropped on average by about 1.5% points during SUD waiver implementation and decreased over time, by 0.3% points per month. The ITS model predicts a higher initiation rate in the absence of the waiver based on the higher upward trend in the baseline period. The initiation rate for NC is above the national median (42.7%) for this measure for states

3.1.18 The rate of engagement in care for Alcohol Use Disorder (AUD) was above the national median but has decreased over time during the SUD waiver.

Figure 3.1.18. Trends in the rate of engagement in care for Alcohol Use Disorder (AUD) over time



Notes: Baseline and SUD Waiver Implementation trends are predictions from the multivariate interrupted time series model described in Methods. "Post, assuming no waiver" is a prediction from the same ITS model, setting the post-waiver incremental intercept and slope to zero but including trends due to COVID or changing beneficiary characteristics.

Table 3.1.18. Interrupted time series estimates: the rate of engagement in care for Alcohol Use Disorder (AUD)

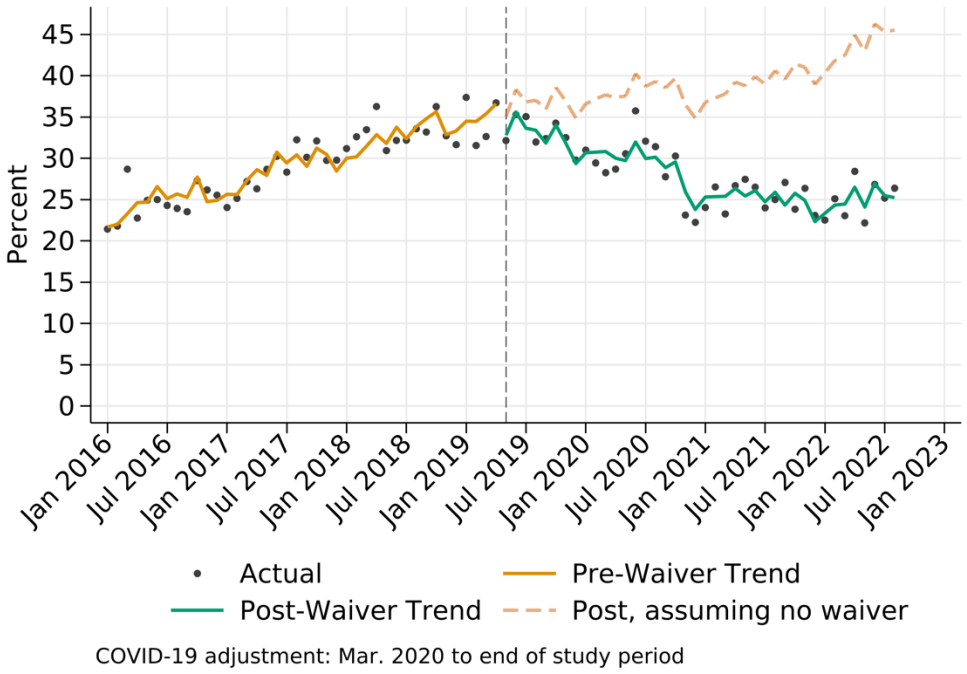
	Baseline	SUD Waiver Implementation	Difference
Predicted Average Outcome (May 2019)	17.33* (16.65, 18.01)	18.01* (16.77, 19.24)	0.68 (-0.71, 2.07)
Slope	0.10* (0.07, 0.13)	-0.50* (-0.73, -0.26)	-0.59* (-0.83, -0.36)
N	101,348		

*Notes: 95% confidence intervals in brackets. *=p<0.05. The Predicted Average Outcome (May 2019) represents the difference between the pre- and post-SUD waiver implementation trend lines in May 2019, while slope change represents the difference in slopes between the two periods. The SUD Waiver Implementation slope is the sum of the baseline slope and the slope change during the implementation period. Baseline and SUD Waiver Implementation means are the means of the unadjusted outcomes.*

Engagement in care for AUD reflects the percent of beneficiaries that had initiated treatment and were engaged in on-going AUD treatment within 34 days of the initiation visit. The engagement rate increased from under 15% to 18% during the baseline period. There was no average change in the engagement rate during the SUD waiver implementation period, but the trend in the engagement rate decreased by 0.6% point each month during the post period. The ITS model predicts a higher engagement rate in the absence of the waiver based on the upward trend in the baseline period and the substantial decline during the initial implementation period prior to the PHE. The engagement rate for NC is generally above the national median (12.5%) for this measure for states reporting data in the CMS Medicaid Scorecard.[11]

3.1.19 The rate of engagement in care for Opioid Use Disorder (OUD) was above the national median but has decreased over time during the SUD waiver.

Figure 3.1.19. Trends in the rate of engagement in care for Opioid Use Disorder (OUD) over time



Notes: Baseline and SUD Waiver Implementation trends are predictions from the multivariate interrupted time series model described in Methods. "Post, assuming no waiver" is a prediction from the same ITS model, setting the post-waiver incremental intercept and slope to zero but including trends due to COVID or changing beneficiary characteristics.

[11] https://www.medicaid.gov/state-overviews/scorecard/initiation-engagement-alcohol-drug-dependence-treatment/index.html

Table 3.1.19. Interrupted time series estimates: the rate of engagement in care for Opioid Use Disorder (OUD)

	Baseline	SUD Waiver Implementation	Difference
Predicted Average Outcome (May 2019)	36.40* (35.45, 37.34)	34.13* (32.41, 35.86)	-2.26* (-4.20, -0.32)
Slope	0.35* (0.32, 0.39)	-0.11 (-0.43, 0.22)	-0.46* (-0.79, -0.14)
N	85,895		

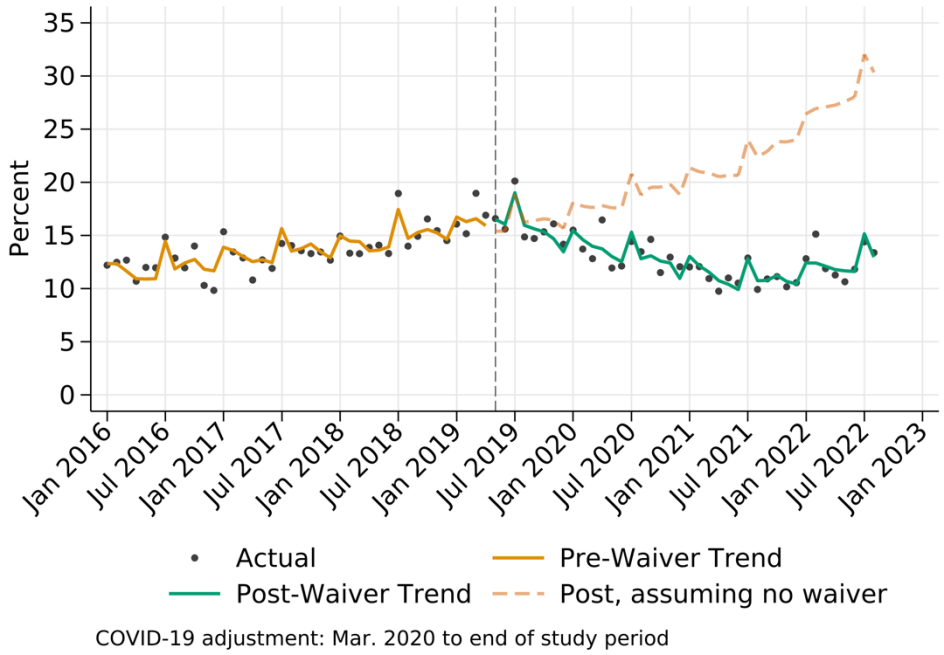
*Notes: 95% confidence intervals in brackets. *=p<0.05. The Predicted Average Outcome (May 2019) represents the difference between the pre- and post-SUD waiver implementation trend lines in May 2019, while slope change represents the difference in slopes between the two periods. The SUD Waiver Implementation slope is the sum of the baseline slope and the slope change during the implementation period. Baseline and SUD Waiver Implementation means are the means of the unadjusted outcomes.*

Engagement in care for OUD reflects the percent of beneficiaries with OUD who had initiated treatment and were engaged in on-going OUD treatment within 34 days of the initiation visit. The engagement rate increased substantially from just over 20% to almost 40% during the baseline period. We estimate that on average, the engagement rate declined by 2.3% points SUD implementation, and the OUD engagement rate continued to decreased by 0.5% points each month. The ITS model predicts a substantially higher engagement rate in the absence of the waiver based on the upward trend in the baseline period. The engagement rate for OUD in NC was above the national median (30.1%) prior to SUD implementation for this measure for states reporting data in the CMS Medicaid Scorecard.[12]

[12] https://www.medicaid.gov/state-overviews/scorecard/initiation-engagement-alcohol-drug-dependence-treatment/index.html

3.1.20 The rate of engagement in care for drug use disorders excluding alcohol use and opioid use disorders is above the national median but has decreased over time during the SUD waiver.

Figure 3.1.20. Trends in the rate of engagement in care for other drug use disorders (excluding alcohol use and opioid use disorders) over time.



Notes: Baseline and SUD Waiver Implementation trends are predictions from the multivariate interrupted time series model described in Methods. "Post, assuming no waiver" is a prediction from the same ITS model, setting the post-waiver incremental intercept and slope to zero but including trends due to COVID or changing beneficiary characteristics.

Table 3.1.20. Interrupted time series estimates: the rate of engagement in care for other drug use disorders (excluding alcohol and opioid use disorder)

	Baseline	SUD Waiver Implementation	Difference
Predicted Average Outcome (May 2019)	16.19* (15.68, 16.70)	17.30* (16.37, 18.24)	1.12* (0.06, 2.18)
Slope	0.13* (0.11, 0.15)	-0.34* (-0.52, -0.17)	-0.47* (-0.65, -0.30)
N	169,183		

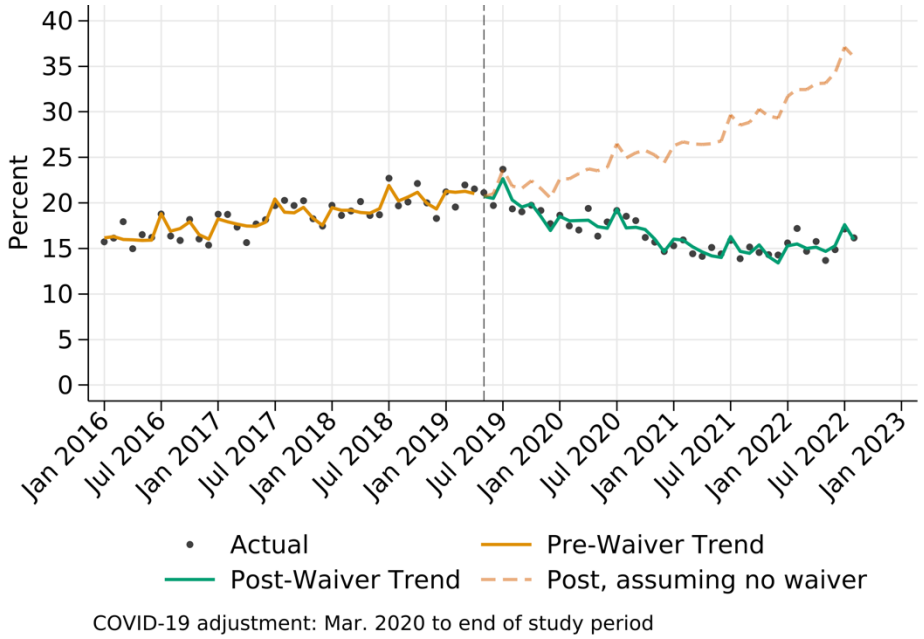
*Notes: 95% confidence intervals in brackets. *=p<0.05. The Predicted Average Outcome (May 2019) represents the difference between the pre- and post-SUD waiver implementation trend lines in May 2019, while slope change represents the difference in*

slopes between the two periods. The SUD Waiver Implementation slope is the sum of the baseline slope and the slope change during the implementation period. Baseline and SUD Waiver Implementation means are the means of the unadjusted outcomes.

Engagement in care for drug use disorders other than alcohol and opioid use disorder reflects the percent of beneficiaries with these disorders who initiated treatment and engaged in on-going treatment within 34 days of the initiation visit. The engagement rate increased from just over 10% to just over 15% during the baseline period. The engagement rate increased on average by 1.1% point during the SUD waiver implementation period, but began trending downward by 0.47% point each month during the post period. The ITS model predicts a substantially higher engagement rate in the absence of the waiver based on the upward trend in the baseline period. The engagement rate for NC was above the national median (12.5%) for this measure for states reporting data in the CMS Medicaid Scorecard prior to the PHE.[13]

3.1.21 The rate of engagement in care for any substance use disorder was above the national median but has decreased over time during the SUD waiver.

Figure 3.1.21. Trends in the rate of engagement in care for any alcohol or drug (AOD) over time



[13] https://www.medicaid.gov/state-overviews/scorecard/initiation-engagement-alcohol-drug-dependence-treatment/index.html

Notes: Baseline and SUD Waiver Implementation trends are predictions from the multivariate interrupted time series model described in Methods. "Post, assuming no waiver" is a prediction from the same ITS model, setting the post-waiver incremental intercept and slope to zero but including trends due to COVID or changing beneficiary characteristics.

Table 3.1.21. Interrupted time series estimates: the rate of engagement in care for any alcohol or drug use disorder

	Baseline	SUD Waiver Implementation	Difference
Predicted Average Outcome (May 2019)	21.64* (21.22, 22.06)	21.65* (20.90, 22.41)	0.01 (-0.84, 0.86)
Slope	0.15* (0.14, 0.17)	-0.36* (-0.50, -0.22)	-0.51* (-0.66, -0.37)
N	322,695		

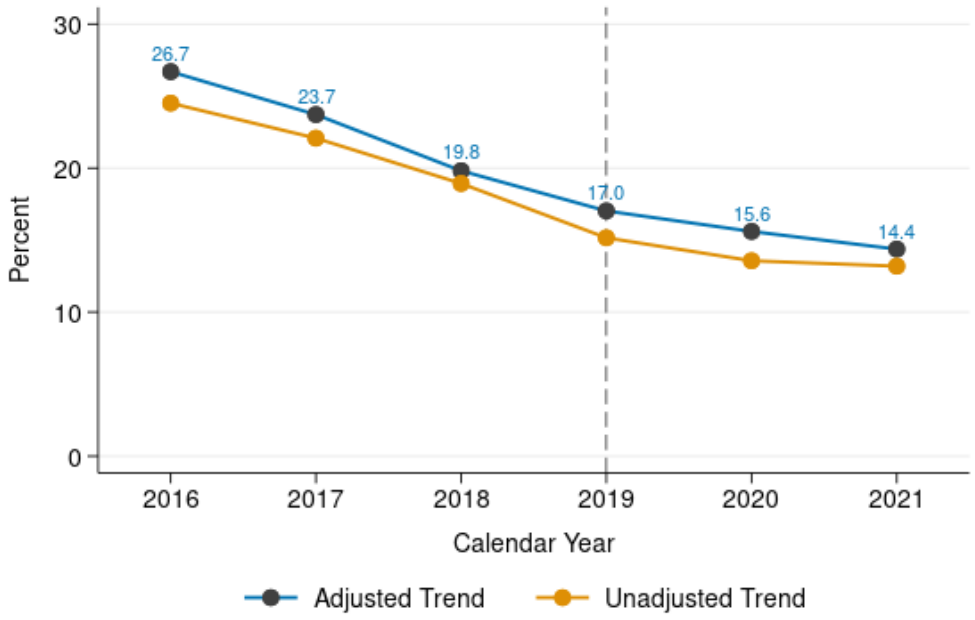
*Notes: 95% confidence intervals in brackets. *=p<0.05. The Predicted Average Outcome (May 2019) represents the difference between the pre- and post-SUD waiver implementation trend lines in May 2019, while slope change represents the difference in slopes between the two periods. The SUD Waiver Implementation slope is the sum of the baseline slope and the slope change during the implementation period. Baseline and SUD Waiver Implementation means are the means of the unadjusted outcomes.*

Engagement in care for any substance use disorder combines the prior three metrics and reflects the percent of beneficiaries with a SUD diagnosis who had initiated treatment and engaged in on-going care within 34 days of the initiation visit. The engagement rate increased from 15% to just over 20% during the baseline period. There was no overall change in the engagement rate during the SUD waiver implementation period, but the engagement rate for any type of SUD service decreased by 0.5% points each month during the post period. The ITS model predicts a higher engagement rate in the absence of the waiver based on the upward trend in the baseline period. The rate of engagement in any type of SUD treatment was higher than the national median (16.0%) reported in the CMS Medicaid Scorecard.[14]

[14] https://www.medicaid.gov/state-overviews/scorecard/initiation-engagement-alcohol-drug-dependence-treatment/index.html

3.1.22 Concurrent Use of Opioids and Benzodiazepines have decreased substantially since the beginning of the baseline period.

Figure 3.1.22. Trends in the Concurrent Use of Opioids and Benzodiazepines.



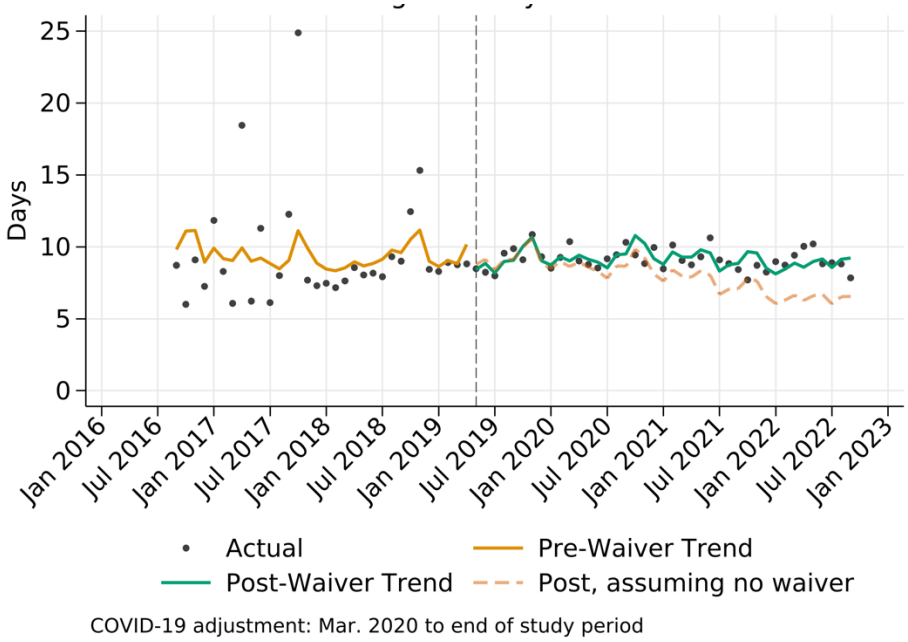
Notes: Adjusted model includes age (quadratic), sex, urban location, race specific indicator variables and the Chronic Illness and Disability Payment System (CDPS + Rx) risk adjustment scores.

The above figure shows that the percent of beneficiaries age 18 and older with concurrent use of prescription opioids and benzodiazepines has decreased substantially among Medicaid beneficiaries with prescription opioid use, excluding beneficiaries with a cancer diagnosis or in hospice. The annual unadjusted rate at the start of the baseline period (2016) indicates that about a quarter of those with a prescription for opioids also had one or more prescriptions for benzodiazepines over the same time period. In 2018, before the SUD waiver was implemented, this rate had decreased to 19.8%. By the end of 2021, the rate had declined to 14%. This decline in this metric is moving in the intended direction, but because the rate of decline is slower since the SUD waiver was implemented, it is hard to determine how much of the decline can be attributed to the waiver. The Medicaid Outcomes Distributed Research Network (MODRN) study tracking medication treatment across 11 states between 2014 and 2018 provides evidence of trends similar to what we observe in NC. Across those 11 states, the measure for

any benzodiazepine fill decreased from 33% to 22% between 2014 and 2018.[15]

3.1.23 The length of stay in Institutes for Mental Disease (IMDs) remained low.

Figure 3.1.23. Trends in the length of stay in IMDs



Notes: Baseline and SUD Waiver Implementation trends are predictions from the multivariate interrupted time series model described in Methods. "Post, assuming no waiver" is a prediction from the same ITS model, setting the post-waiver incremental intercept and slope to zero but including trends due to COVID or changing beneficiary characteristics.

Table 3.1.23. Interrupted time series estimates of the length of time in IMDs

	Baseline	SUD Waiver Implementation	Difference
Predicted Average Outcome (May 2019)	9.14 (8.17, 10.12)	8.79 (8.04, 9.53)	-0.36 (-1.59, 0.88)
Slope	-0.02 (-0.11, 0.08)	0.06 (-0.09, 0.21)	0.08 (-0.09, 0.25)
N	3,822		

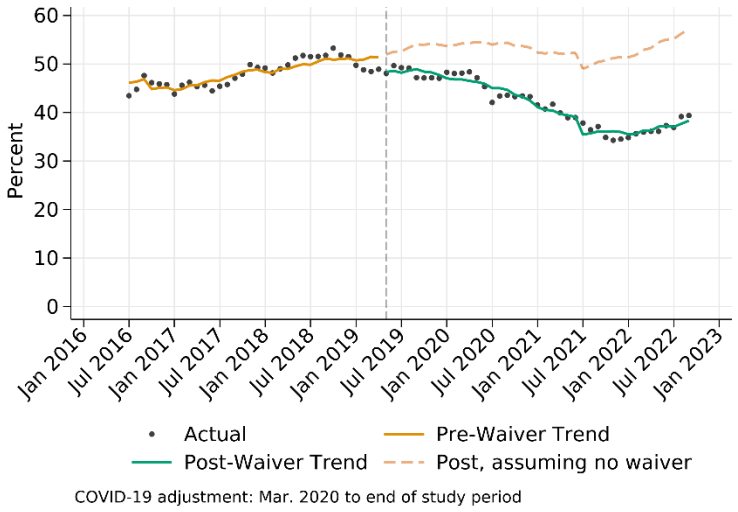
[15] The Medicaid Outcomes Distributed Research Network (MODRN) (2021). Use of Medications for Treatment of Opioid Use Disorder Among US Medicaid Enrollees in 11 States, 2014-2018. JAMA, 326(2), 154-164. doi:10.1001/jama.2021.7374

*Notes: 95% confidence intervals in brackets. *=p<0.05. The Predicted Average Outcome (May 2019) represents the difference between the pre- and post-SUD waiver implementation trend lines in May 2019, while slope change represents the difference in slopes between the two periods. The SUD Waiver Implementation slope is the sum of the baseline slope and the slope change during the implementation period. Baseline and SUD Waiver Implementation means are the means of the unadjusted outcomes.*

The average length of stay among those with IMD use remained low among NC Medicaid beneficiaries, at about 9 days throughout the study period, as seen in Figure 3.22. There was no evidence of a change in the level or the trend in length of study during the SUD implementation period. The average LOS in IMDs is substantially lower than CMS's goal of <30 days.

3.1.24 Behavioral health use among beneficiaries receiving medications for OUD declined considerably during SUD implementation.

Figure 3.1.24 Trends in behavioral health use among individuals receiving medications for OUD (MOUD)



Notes: Baseline and SUD Waiver Implementation trends are predictions from the multivariate interrupted time series model described in Methods. "Post, assuming no waiver" is a prediction from the same ITS model, setting the post-waiver incremental intercept and slope to zero but including trends due to COVID or changing beneficiary characteristics.

Table 3.1.24: Interrupted time series estimates of the receipt of behavioral health services by beneficiaries receiving MOUD

	Baseline	SUD Waiver Implementation	Difference
Predicted Average Outcome (May 2019)	52.59 (51.15, 54.04)	49.00 (47.18, 50.81)	-3.60* (-5.61, -1.58)
Slope	0.24* (0.17, 0.32)	-0.14 (-0.45, 0.17)	-0.383* (-0.712, -0.055)
N	237,076		

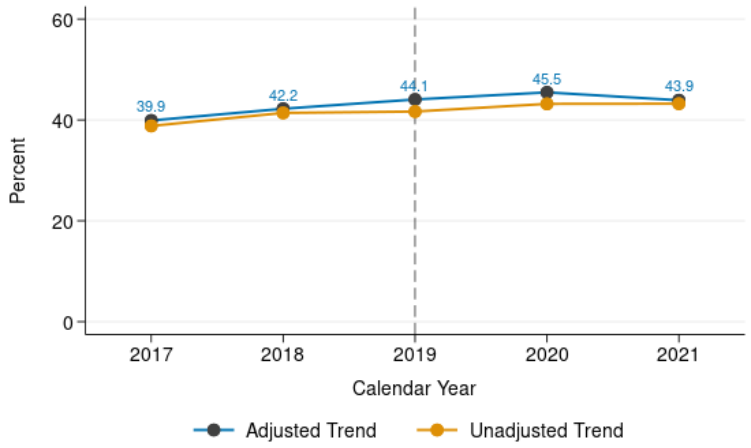
*Notes: 95% confidence intervals in brackets. *=p<0.05. The Predicted Average Outcome (May 2019) represents the difference between the pre- and post-SUD waiver implementation trend lines in May 2019, while slope change represents the difference in slopes between the two periods. The SUD Waiver Implementation slope is the sum of the baseline slope and the slope change during the implementation period. Baseline and SUD Waiver Implementation means are the means of the unadjusted outcomes.*

The evaluation team worked with the NC Division of Health Benefits' (DHB) subject matter experts to develop a measure of access to psychosocial services for beneficiaries newly prescribed medications for opioid use disorder (MOUD). This measure indicates whether beneficiaries in their first 12 months of an MOUD treatment episode received psychosocial services.[16] This rate averaged just under 48% in the baseline period but declined by 3.6% points immediately at the start of the SUD implementation period. In addition, the monthly rate has been declining by 0.4% points per month. The difference between the projected trend in the absence of the waiver and the trend during the SUD waiver period, even controlling for COVID, is striking, with a considerable declining trend in use during the waiver.

[16] Psychosocial services generally follows the approach of Busch and colleagues (2020); "Outpatient Care for Opioid Use Disorder among the Commercially Insured: Use of Medication and Psychosocial Treatment." Journal of Substance Abuse Treatment 115: 108040. https://doi.org/10.1016/j.jsat.2020.108040) with updates to modifiers codes used in NC and excluding MAT.

3.1.25 The continuity of pharmacotherapy for Opioid Use Disorder increased through 2020 but declined in 2021

Figure 3.1.25. Trends in the continuity of pharmacotherapy for opioid use disorder over time



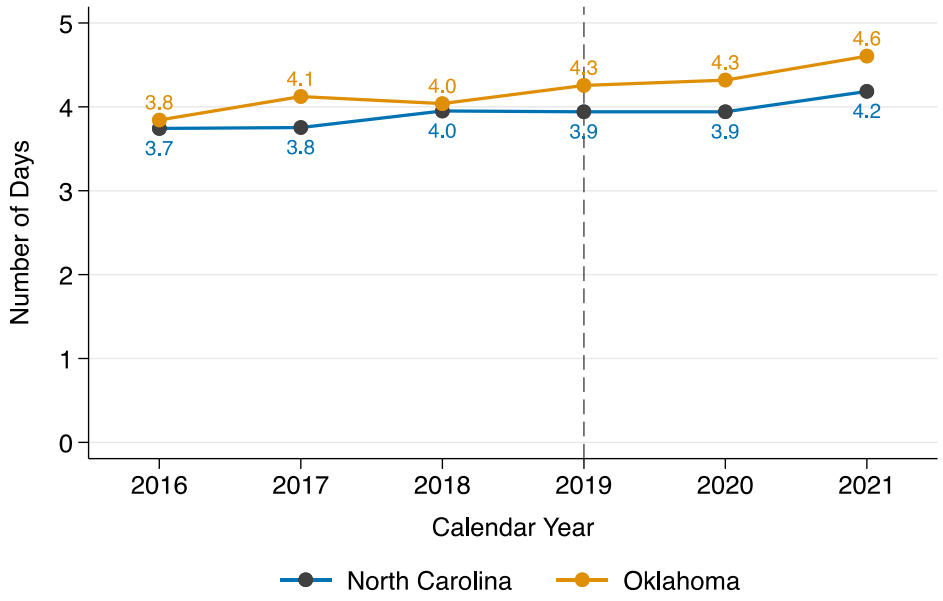
Notes: Adjusted model includes age (quadratic), sex, urban location, race specific indicator variables and the Chronic Illness and Disability Payment System (CDPS + Rx) risk adjustment scores.

The percentage of adult beneficiaries who used pharmacotherapy for OUD and had at least 180 days of continuous treatment increased during the study period from 39.9% in 2017 to 45.5% in 2020. There was a slight decrease in the level for 2021, to 43.9%. The Medicaid Outcomes Distributed Research Network (MODRN) study tracking medication treatment across 11 states between 2014 and 2018 cites the average levels in the region of 56-58% in that period with a variability in trends across individual states.[17]

[17] The Medicaid Outcomes Distributed Research Network (MODRN) (2021). Use of Medications for Treatment of Opioid Use Disorder Among US Medicaid Enrollees in 11 States, 2014-2018. JAMA, 326(2), 154-164. doi:10.1001/jama.2021.7374

3.1.26 The number of reported poor mental health days increased since 2019 but shows a similar pattern as the comparison state

Figure 3.1.26. Trends in the number of poor mental health days in the last 30 days



Notes: Poor mental health days records the response to the following question: "Now thinking about your mental health, which includes stress, depression, and problems with emotions, for how many days during the past 30 days was your mental health not good?"

Source: BRFSS.

Table 3.1.26. Difference-in-differences estimates of the number of poor mental health days in the last 30 days

	North Carolina			Oklahoma			Difference-in-Differences	
	Baseline Waiver	Post-Waiver	Within-group Difference	Baseline Waiver	Post-Waiver	Within-group Difference	Unadjusted	Adjusted
Poor mental health	3.84	4.05	0.21	4.02	4.56	0.54	-0.32 *	-0.18

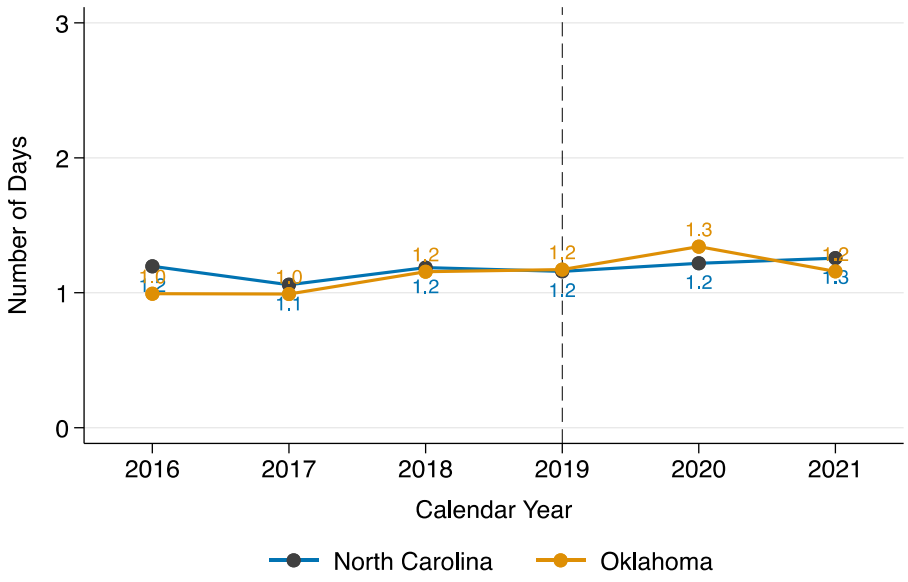
Notes: Adjusted model includes sex, age groups, employment, educational and marital status variables as well as year and state fixed effects. The sample consists of individuals who resided either in North Carolina or Oklahoma and had a valid response to a question (N=62,991). Due to small sample size issues, we did not restrict the sample to only Medicaid beneficiaries. Observations with missing values for covariates were excluded from the sample.

** 0.05*

Using respondents from Oklahoma (OK) to control for other national trends during the study period, we find that the number of poor mental health days increased in both states but more slowly in NC than OK. However, once we controlled for other covariates that may affect the rates of poor mental health, we found no statistically significant difference from Oklahoma.

3.1.27 The number of days binge drinking remained relatively flat in NC.

Figure 3.1.27. Trends in the number of days of binge drinking in the last 30 days



Notes: Binge drinking days records the response to the following question: "Considering all types of alcoholic beverages, how many times during the past 30 days did you have 5 or more drinks for men or 4 or more drinks for women on an occasion?"

Source: BRFSS.

Table 3.1.27. Difference-in-differences estimates of the number of days of binge drinking in the last 30 days

	North Carolina			Oklahoma			Difference-in-Differences	
	Baseline Waiver	Post-Waiver	Within-group Difference	Baseline Waiver	Post-Waiver	Within-group Difference	Unadjusted	Adjusted
Binge drinking	1.137	1.264	0.127	1.053	1.292	0.238	-0.111	-0.078

Notes: Adjusted model includes sex, age groups, employment, educational and marital status variables as well as year and state fixed effects. The sample consists of individuals who resided either in North Carolina or Oklahoma and had a valid response to a question (N=25,280). Due to small sample size issues, we did not restrict the sample to only Medicaid beneficiaries. Observations with missing values for covariates were excluded from the sample.

Using respondents from OK to control for other trends during the study period, we find that the number of binge drinking days in NC was constant from 2018 – 2020 then increased slightly in 2021 but showed no statistically significant difference from OK, controlling for trends from the baseline period.

Hypothesis 3.2: Expanding coverage of SUD services will increase the use of MOUD and other appropriate opioid treatment services and decrease the long-term use of prescription opioids.

We examined the trends in 16 additional metrics reflecting medication and other treatments for OUD and long-term use of opioids in order to test Hypothesis 3.2 (Table 1). Four of the metrics demonstrated appreciable progress since the SUD waiver implementation, one demonstrated no change, and the remaining 11 moved in the opposite direction as the waiver goals. The metrics that indicated appreciable progress during the SUD waiver implementation period included the use of pharmacotherapy for OUD, 30-day follow up after ED visit for mental health among beneficiaries with SUD diagnoses; two metrics reflecting the receipt of opioids from multiple providers. The use of non-medication services for OUD did not change. The eleven metrics that did not demonstrate progress included metrics reflect follow up care after emergency and hospital visits for SUD, use of opioids at high doses, and the rate of ED and inpatient use per 1000 beneficiaries with SUD.

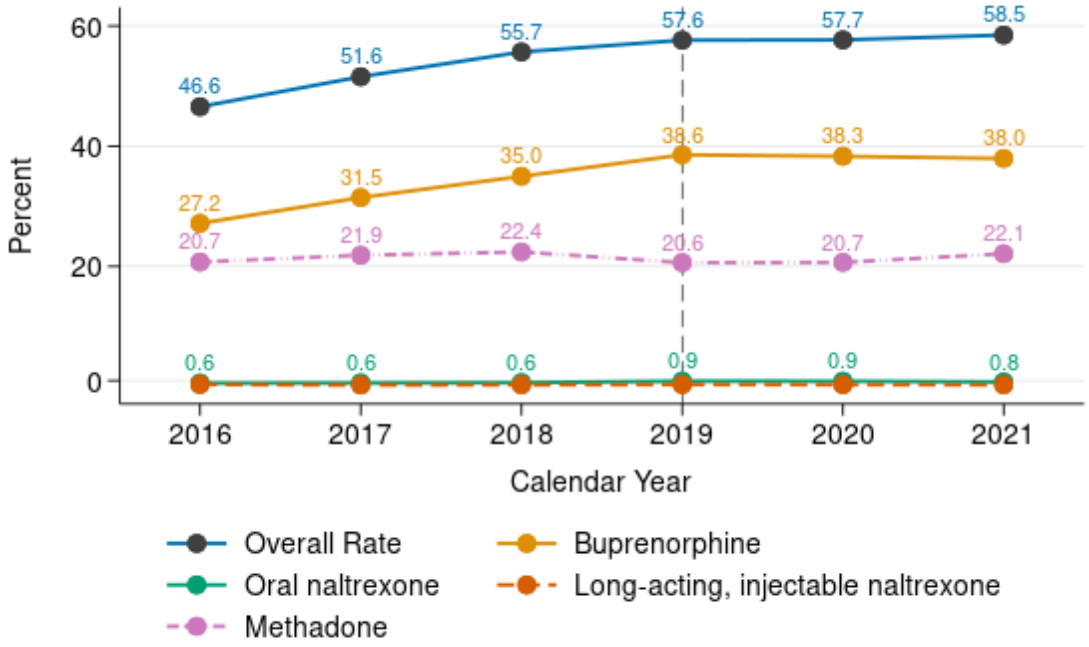
Table 3. Summary of SUD Metric Results for Hypothesis 3.2

#	Measure (Metric abbreviation)	State's demonstration target	Directionality at mid-point (Oct 2021)	Adjusted waiver effects at Sept 2022	Progress * (Yes/No)
3.2.1	Use of Pharmacotherapy for OUD	Increase	NI	Increased	Yes
3.2.2	Follow-Up After Emergency Department Visit for Alcohol and Other Drug Abuse or Dependence (M17.1)	Increase	7-day decreased	7-day decreased	No
3.2.3	Follow-Up After Emergency Department Visit for Alcohol and Other Drug Abuse or Dependence (M17.1)	Increase	30-day increased	30-day decreased	No
3.2.4	Follow-Up After Emergency Department Visit for Mental Illness (M17.2)	Increase	7-day increased	7-day decreased	No

#	Measure (Metric abbreviation)	State's demonstration target	Directionality at mid-point (Oct 2021)	Adjusted waiver effects at Sept 2022	Progress * (Yes/No)
3.2.5	Follow-Up After Emergency Department Visit for Mental Illness (M17.2)	Increase	30-day increased	30-day increased	Yes
3.2.6	Use of Opioids at High Dosage in Persons without Cancer (M18)	Decrease	Decrease	Increase	No
3.2.7	Use of Opioids from Multiple Providers in Persons Without Cancer (M19)	Decrease	NI	Decrease	Yes
3.2.8	Use of Opioids at High Dosage and from Multiple Providers in Persons Without Cancer (M20)	Decrease	NI	Decrease	Yes
3.2.9	Percent of Enrollees Diagnosed with OUD Receiving Non-medication Opioid Treatment Services	Increase	NI	--	--
3.2.10	Emergency Department Utilization for SUD per 1000 beneficiaries (M23)	Decrease	Increase	Increase	No
3.2.11	Inpatient Stays for SUD per 1000 beneficiaries (M24)	Decrease	NI	Increase change	No

3.2.1 The use of medications for OUD increased during the study period.

Figure 3.2.1. Trends in the use of medications for OUD, by type of medication



Notes: Adjusted model includes age (quadratic), sex, urban location, race specific indicator variables and the Chronic Illness and Disability Payment System (CDPS + Rx) risk adjustment scores.

Figure 3.2.1 plots the percentage of Medicaid beneficiaries ages 18 to 64 with an opioid use disorder diagnosis who filled a prescription for or were administered or dispensed an FDA-approved medication for the disorder during the measurement year. The MOUD treatment rate reached almost 59% of Medicaid beneficiaries with OUD in 2021. The Medicaid Outcomes Distributed Research Network (MODRN) study tracking medication treatment across 11 states between 2014 and 2018 provides evidence of trends similar to what we observe in NC. The study authors similarly found that the overall share of enrollees with OUD receiving medication treatment increased from 47.8% to 57.1%, which was largely driven by buprenorphine and naltrexone.[18]

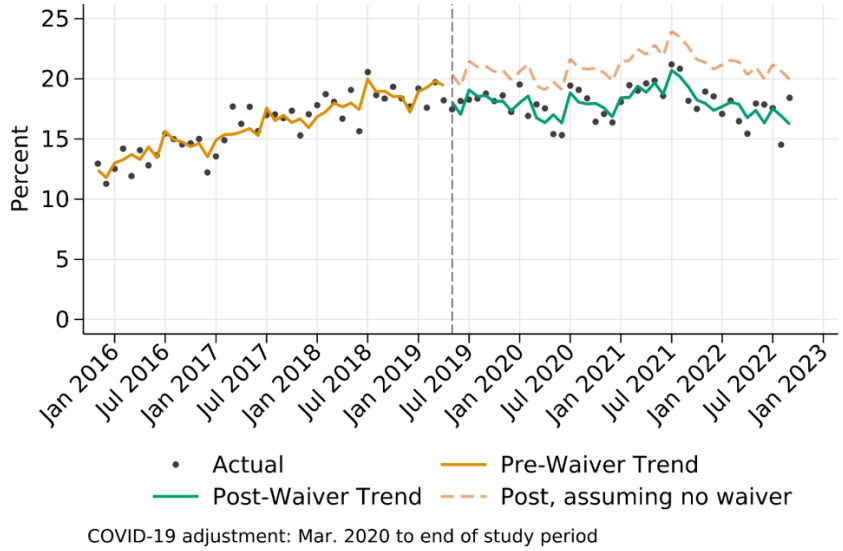
Buprenorphine, typically prescribed by outpatient providers and dispensed in retail pharmacies, comprised more than half of the use of MOUD in NC, although its use has not grown as a percent of

[18] The Medicaid Outcomes Distributed Research Network (MODRN) (2021). Use of Medications for Treatment of Opioid Use Disorder Among US Medicaid Enrollees in 11 States, 2014-2018. JAMA, 326(2), 154-164. doi:10.1001/jama.2021.7374

people with OUD since 2018, remaining at just over 38% use rate. Methadone use had declined from 2018 to 2019-2020, but began to increase again in 2021, possibly due to the additional policy flexibilities granted during the PHE that allowed small amounts of take-home methadone. Naltrexone continues to be seldom used, with fewer than 1% of Medicaid beneficiaries with OUD having a prescription for naltrexone. The results of another study from the MODRN team provide medication-specific prevalence estimates for Medicaid beneficiaries across 11 states in 2016-2017 period among those using MOUD: buprenorphine or buprenorphine/naloxone (59.2% of MOUD users), methadone (27.6%), oral naltrexone (5.9%), naltrexone, intramuscular injection (7.3%).[19]

3.2.2 Follow up care within seven days after emergency department visits for SUD increased during the baseline period but decreased during the SUD implementation period.

Figure 3.2.2. Trends in Follow up care within seven days after emergency department visits for SUD



Notes: Baseline and SUD Waiver Implementation trends are predictions from the multivariate interrupted time series model described in Methods. "Post, assuming no waiver" is a prediction from the same ITS model, setting the post-waiver incremental intercept and slope to zero but including trends due to COVID or changing beneficiary characteristics.

Table 3.2.2. Interrupted time series estimates of the length of follow-up within seven days after an

[19] Burns, M., Tang, L., Chang, C. H., Kim, J. Y., Ahrens, K., Allen, L., Cunningham, P., Gordon, A. J., Jarlenski, M. P., Lanier, P., Mauk, R., McDuffie, M. J., Mohamoud, S., Talbert, J., Zivin, K., & Donohue, J. (2022). Duration of medication treatment for opioid-use disorder and risk of overdose among Medicaid enrollees in 11 states: A retrospective cohort study. *Addiction*, *117*(12), 3079-3088. https://doi.org/10.1111/add.15959

emergency department visit for SUD

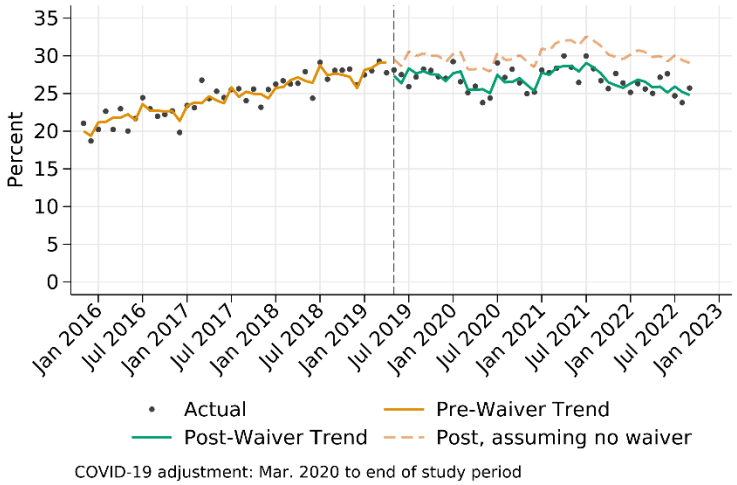
	Baseline	SUD Waiver Implementation	Difference
Predicted Average Outcome (May 2019)	19.81 (19.02, 20.61)	17.50 (16.05, 18.96)	-2.31* (-3.94, -0.69)
Slope	0.16* (0.13, 0.19)	0.13 (-0.15, 0.41)	-0.036* (-0.317, -0.246)
N	83,037		

*Notes: 95% confidence intervals in brackets. *=p<0.05. The Predicted Average Outcome (May 2019) represents the difference between the pre- and post-SUD waiver implementation trend lines in May 2019, while slope change represents the difference in slopes between the two periods. The SUD Waiver Implementation slope is the sum of the baseline slope and the slope change during the implementation period. Baseline and SUD Waiver Implementation means are the means of the unadjusted outcomes.*

The rate of follow up with a community provider within seven days after an emergency department visit grew substantially during the baseline period, from 12% to 18%. It decreased on average by 2.3% points after SUD implementation and the trend flattened out. The rate of follow-up within seven days can be seen in the figure to increase between January and July 2021 and then decline, which could be due to the initial launch of Standard Plans; this issue will be examined further in Chapter 5. Overall, the rate of follow-up within seven days of an emergency department visit for SUD is lower than we would expect in the absence of the waiver.

3.2.3 Follow up care within 30 days after emergency department visits for SUD increased during the baseline period but decreased and flattened out during SUD implementation.

Figure 3.2.3. Trends in Follow up care within 30 days after emergency department visits for SUD



Notes: Baseline and SUD Waiver Implementation trends are predictions from the multivariate interrupted time series model described in Methods. "Post, assuming no waiver" is a prediction from the same ITS model, setting the post-waiver incremental intercept and slope to zero but including trends due to COVID or changing beneficiary characteristics.

Table 3.2.3. Interrupted time series estimates of follow-up care within 30 days after an emergency department visit for SUD

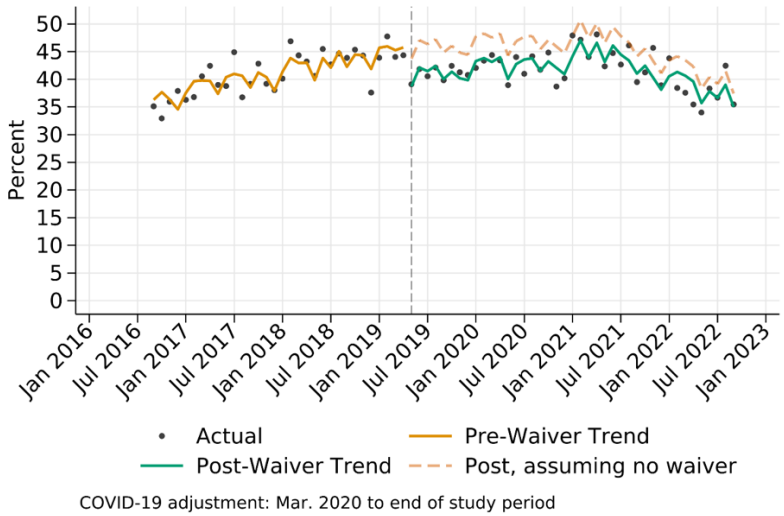
	Baseline	SUD Waiver Implementation	Difference
Predicted Average Outcome (May 2019)	28.94 (28.01, 29.88)	26.77 (25.06, 28.47)	-2.17* (-4.08, -0.27)
Slope	0.20* (0.16, 0.23)	0.15 (-0.18, 0.47)	-0.052 (-0.384, 0.280)
N	83,037		

*Notes: 95% confidence intervals in brackets. *=p<0.05. The Predicted Average Outcome (May 2019) represents the difference between the pre- and post-SUD waiver implementation trend lines in May 2019, while slope change represents the difference in slopes between the two periods. The SUD Waiver Implementation slope is the sum of the baseline slope and the slope change during the implementation period. Baseline and SUD Waiver Implementation means are the means of the unadjusted outcomes.*

The rate of follow up with a community provider within 30 days after an emergency department visit grew substantially during the baseline period, from 20% to almost 30%. It decreased by 2.2% points after SUD implementation and flattened out. Overall, the rate of follow-up within 30 days of an emergency department visit for SUD is lower than we would expect in the absence of the waiver.

3.2.4 Follow up care within seven days after emergency department visits for mental illness among beneficiaries with a SUD increased during the baseline period but declined on average during the SUD implementation period.

Figure 3.2.4. Trends in Follow up care within seven days after emergency department visits for mental illness by beneficiaries with SUD



Notes: Baseline and SUD Waiver Implementation trends are predictions from the multivariate interrupted time series model described in Methods. "Post, assuming no waiver" is a prediction from the same ITS model, setting the post-waiver incremental intercept and slope to zero but including trends due to COVID or changing beneficiary characteristics.

Table 3.2.4. Interrupted time series estimates of follow-up within seven days after an emergency department visit for mental illness among beneficiaries with SUD

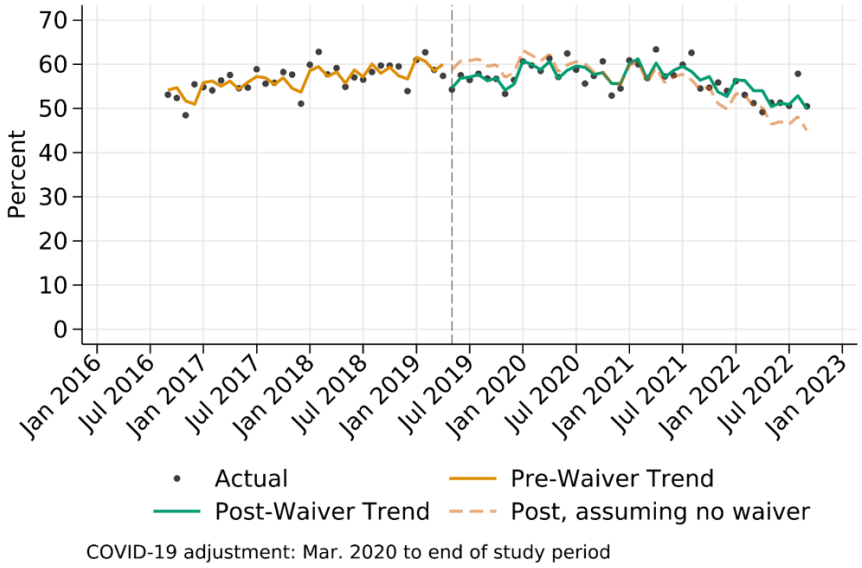
	Baseline	SUD Waiver Implementation	Difference
Predicted Average Outcome (May 2019)	45.02 (43.46, 46.84)	39.99 (38.76, 42.44)	-5.03* (-8.19, -1.88)
Slope	0.23* (0.15, 0.32)	0.30* (0.03, 0.28)	0.067 (-0.466, 0.599)
N	32,184		

*Notes: 95% confidence intervals in brackets. *=p<0.05. The Predicted Average Outcome (May 2019) represents the difference between the pre- and post-SUD waiver implementation trend lines in May 2019, while slope change represents the difference in slopes between the two periods. The SUD Waiver Implementation slope is the sum of the baseline slope and the slope change during the implementation period. Baseline and SUD Waiver Implementation means are the means of the unadjusted outcomes.*

The rate of follow up with a community provider within seven days after an emergency department visit for mental illness grew during the baseline period, from 35% to 45%. It decreased substantially, by 4.6% points after SUD implementation and actually increased slightly faster during SUD implementation than during baseline. Overall, the rate of follow-up within seven days of an emergency department visit for mental illness is lower than we would expect in the absence of the waiver.

3.2.5 Follow up care within 30 days after emergency department visits for mental illness among beneficiaries with a SUD was relatively flat but declined slightly at SUD implementation.

Figure 3.2.5. Trends in Follow up care within 30 days after emergency department visits for mental illness by beneficiaries with SUD



Notes: Baseline and SUD Waiver Implementation trends are predictions from the multivariate interrupted time series model described in Methods. "Post, assuming no waiver" is a prediction from the same ITS model, setting the post-waiver incremental intercept and slope to zero but including trends due to COVID or changing beneficiary characteristics.

Table 3.2.5. Interrupted time series estimates of follow-up within 30 days after an emergency department visit for mental illness among beneficiaries with SUD

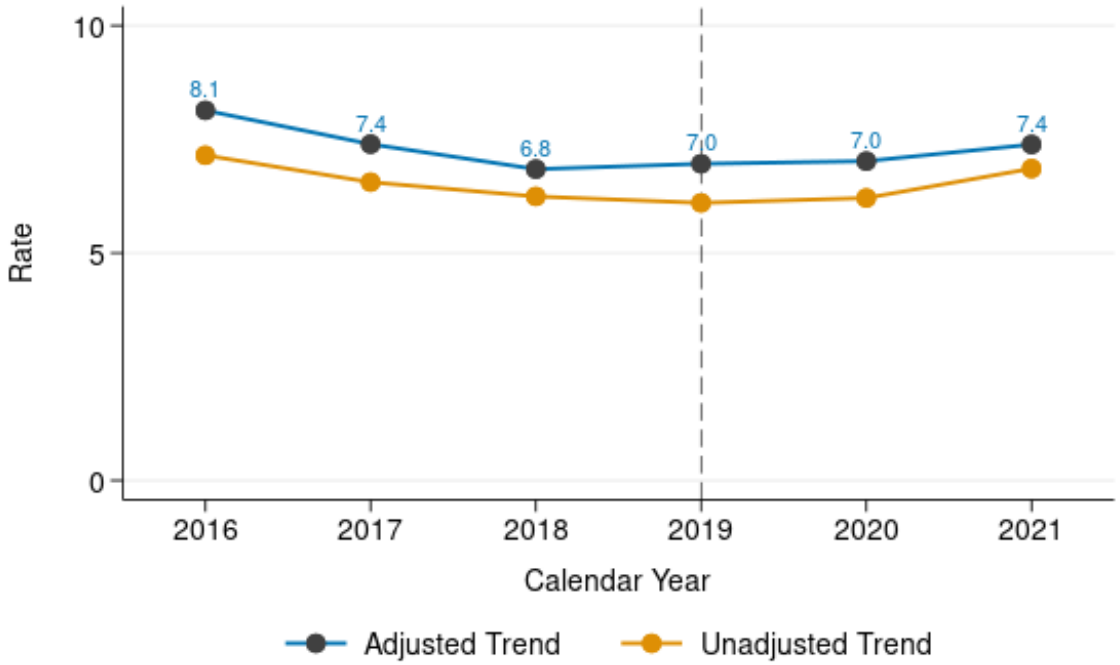
	Baseline	SUD Waiver Implementation	Difference
Predicted Average Outcome (May 2019)	59.29 (57.61, 60.96)	55.10 (52.38, 57.82)	-4.19* (-7.35, -1.02)
Slope	0.15* (0.061, 0.24)	0.38 (-0.15, 0.90)	0.23 (-0.30, 0.76)
N	32,184		

*Notes: 95% confidence intervals in brackets. *=p<0.05. The Predicted Average Outcome (May 2019) represents the difference between the pre- and post-SUD waiver implementation trend lines in May 2019, while slope change represents the difference in slopes between the two periods. The SUD Waiver Implementation slope is the sum of the baseline slope and the slope change during the implementation period. Baseline and SUD Waiver Implementation means are the means of the unadjusted outcomes.*

The rate of follow up with a community provider within 30 days after an emergency department visit for mental illness grew during the baseline period from just over 50% to almost 60%. It decreased by 4.2% points after SUD implementation, then remained flat on average during the SUD implementation period but has been declining since the launch of SPs. Overall, the rate of follow-up within thirty days of an emergency department visit for mental illness is currently slightly higher than we would expect in the absence of the waiver.

3.2.6 The Use of Opioids at High Dosage in Persons without Cancer declined during the baseline period but started increasing during SUD implementation.

Figure 3.2.6: Trends in the Use of Opioids at High Dosage in Persons without Cancer

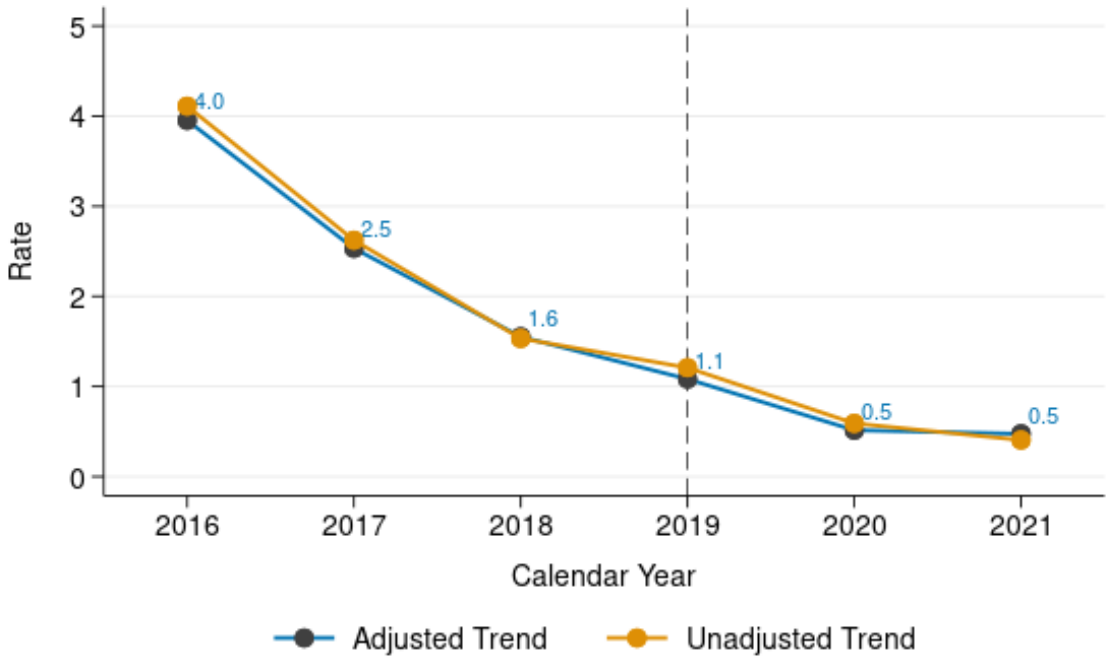


Notes: The adjusted model includes age (quadratic), sex, urban location, race specific indicator variables and the Chronic Illness and Disability Payment System (CDPS + Rx) risk adjustment scores.

The Use of Opioids at High Dosage in Persons without Cancer tracks the percent of beneficiaries aged 18 and older without a diagnosis of cancer who received prescriptions for opioids with a daily dosage greater than 120 morphine milligram equivalents for 90 consecutive days or longer. Beneficiaries with a cancer diagnosis or in hospice are excluded. The rate declined from 8.1% of beneficiaries in 2016 to 7.0% in 2019. The rate started climbing after implementation, with the 2021 rate returning to the level in 2017, at 7.4 per 1000.

3.2.7 The Use of Opioids from Multiple Providers in Persons without Cancer declined substantially during the study period.

Figure 3.2.7. Trends in the Use of Opioids from Multiple Providers in Persons without Cancer

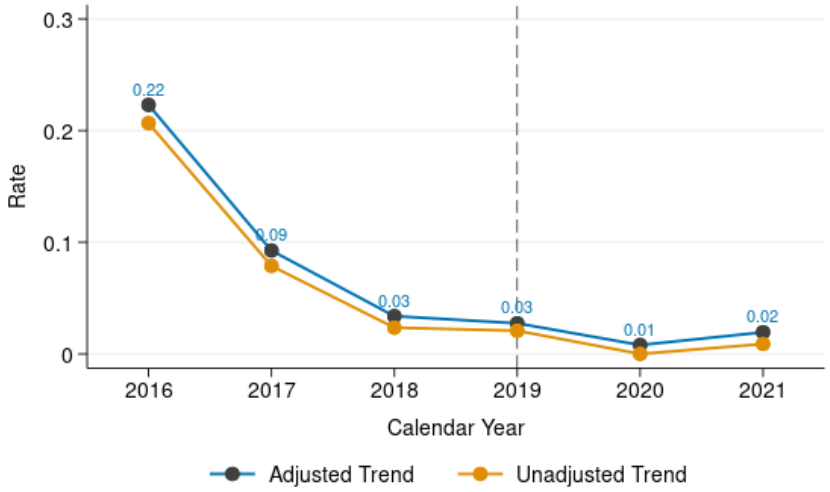


Notes: The adjusted model includes age (quadratic), sex, urban location, race specific indicator variables and the Chronic Illness and Disability Payment System (CDPS + Rx) risk adjustment scores.

The Use of Opioids at from Multiple Providers in Persons without Cancer tracks the rate per 1,000 beneficiaries without cancer who received prescriptions for opioids from four or more prescribers and four or more pharmacies during the measurement year. The rate declined considerably during the baseline period, possibly due to North Carolina's lock-in program, the STOP ACT, the increased use of CSRS or other factors not examined here, and continued to decline to 1 person per 2000 beneficiaries, even during a time with known increases in opioid use during the pandemic.

3.2.8 The Use of Opioids at High Dosage from Multiple Providers in Persons without Cancer declined substantially during the baseline period and remained low.

Figure 3.2.8. Trends in the Use of Opioids at High Dosage from Multiple Providers in Persons without Cancer

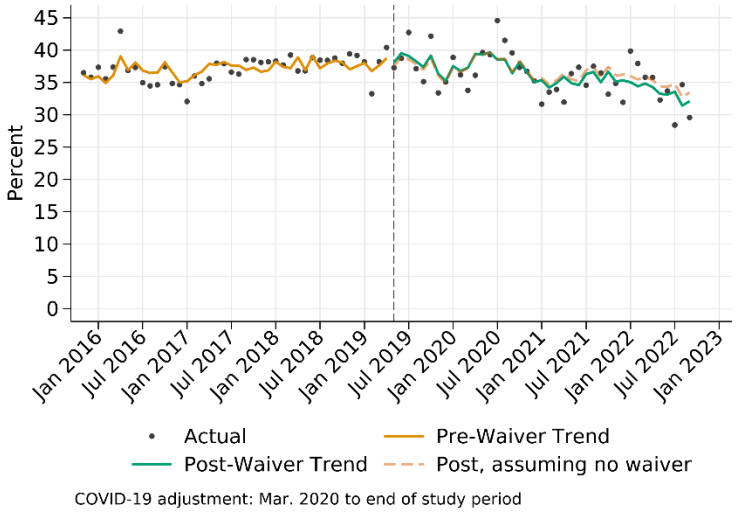


Notes: Adjusted model includes age (quadratic), sex, urban location, race specific indicator variables and the Chronic Illness and Disability Payment System (CDPS + Rx) risk adjustment scores.

The Use of Opioids at High Dosage from Multiple Providers in Persons without Cancer tracks the rate per 1,000 beneficiaries aged 18 and older without a diagnosis of cancer who received prescriptions for opioids with a daily dosage greater than 120 morphine milligram equivalents for 90 consecutive days or longer, from four or more prescribers and four or more pharmacies. Beneficiaries with a cancer diagnosis or in hospice are excluded. The rate declined from 2.2 beneficiaries per 10,000 in 2016 to 3.0 per 10,000 in 2019. The rate in 2020 and 2021 remained below the 2019 levels.

3.2.9 The use of non-medication opioid treatment services for those with an OUD diagnosis increased slightly during the SUD waiver, but then trended downward.

Figure 3.2.9. Trends in the receipt of non-medication opioid treatment services



Notes: Baseline and SUD Waiver Implementation trends are predictions from the multivariate interrupted time series model described in Methods. "Post, assuming no waiver" is a prediction from the same ITS model, setting the post-waiver incremental intercept and slope to zero but including trends due to COVID or changing beneficiary characteristics.

Table 3.2.9. Interrupted time series estimates of non-medication opioid treatment services

	Baseline	SUD Waiver Implementation	Difference
Predicted Average Outcome (May 2019)	38.72 (37.76, 39.67)	39.33 (37.30, 41.37)	0.61 (-1.63, 2.86)
Slope	0.082* (0.047, 0.116)	0.0325 (-0.353, 0.418)	-0.049* (-0.436, -0.339)
N	80,775		

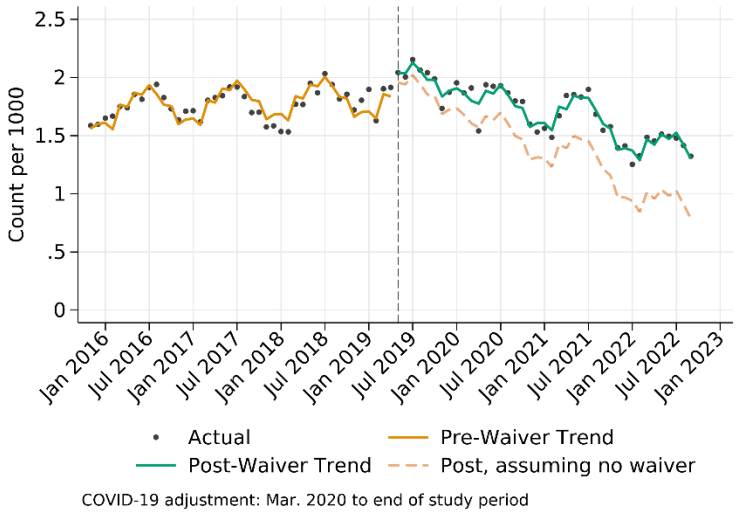
*Notes: 95% confidence intervals in brackets. *=p<0.05. The Predicted Average Outcome (May 2019) represents the difference between the pre- and post-SUD waiver implementation trend lines in May 2019, while slope change represents the difference in slopes between the two periods. The SUD Waiver Implementation slope is the sum of the baseline slope and the slope change during the implementation period. Baseline and SUD Waiver Implementation means are the means of the unadjusted outcomes.*

The percent of adult beneficiaries with opioid use disorder who received non-medication treatment services remained practically unchanged during the baseline period. The average did not change during SUD implementation but the trend declined slightly by 0.05% points per month. By the end of the study period for this report, the rate of non-medication treatment service use was indistinguishable from the

level predicted in the absence of the waiver. The Medicaid Outcomes Distributed Research Network (MODRN) study tracking medication treatment across 11 states between 2014 and 2018 found that the prevalence of any behavioral health counseling (e.g., alcohol or drug counseling, individual psychotherapy) among Medicaid beneficiaries with opioid use disorder diagnosis was on average around 74-84% during the study period with individual states reporting levels in the range between 39% and 90%.[20]

3.2.10 The rate of ED visits for SUD increased during SUD waiver implementation.

Figure 3.2.10. Trends in the rate of ED visits for SUD per 1000 beneficiaries



Notes: Baseline and SUD Waiver Implementation trends are predictions from the multivariate interrupted time series model described in Methods. "Post, assuming no waiver" is a prediction from the same ITS model, setting the post-waiver incremental intercept and slope to zero but including trends due to COVID or changing beneficiary characteristics.

Table 3.2.10. Interrupted time series estimates of the rate of ED visits for SUD per 1000 Beneficiaries

	Baseline	SUD Waiver Implementation	Difference
Predicted Average Outcome (May 2019)	1.83 (1.78, 1.88)	1.92 (1.85, 1.98)	0.086* (0.021, 0.150)
Slope	0.0016* (0.0001, 0.0032)	0.0125* (0.0022, 0.0229)	0.0109* (0.0002, 0.0215)

[20] The Medicaid Outcomes Distributed Research Network (MODRN) (2021). Use of Medications for Treatment of Opioid Use Disorder Among US Medicaid Enrollees in 11 States, 2014-2018. JAMA, 326(2), 154-164. doi:10.1001/jama.2021.7374

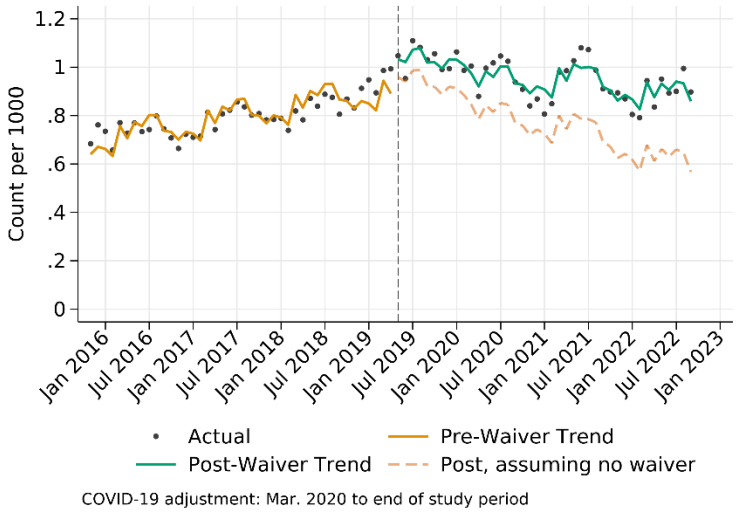
N	164,573,205

*Notes: 95% confidence intervals in brackets. *=p<0.05. The Predicted Average Outcome (May 2019) represents the difference between the pre- and post-SUD waiver implementation trend lines in May 2019, while slope change represents the difference in slopes between the two periods. The SUD Waiver Implementation slope is the sum of the baseline slope and the slope change during the implementation period. Baseline and SUD Waiver Implementation means are the means of the unadjusted outcomes.*

The rate of ED visits for substance use disorder (SUD) was generally flat during the baseline period, with predictable summertime peaks each year. The rate increased by 8.6 visits per 100,000 beneficiaries overall and started trending upward SUD implementation period, controlling for the PHE and SP launch. Because hospital visits have still not returned to normal as of September 2022, the model attributes a substantial decline in use due to COVID-19, yielding a prediction that the level of ED visits for SUD is higher than it would be without the waiver.

3.2.11 The rate of inpatient hospital stays for SUD initially increased at SUD waiver implementation but trended downward.

Figure 3.2.11. Trends in the rate of Inpatient stays for SUD per 1000 beneficiaries



Notes: Baseline and SUD Waiver Implementation trends are predictions from the multivariate interrupted time series model described in Methods. "Post, assuming no waiver" is a prediction from the same ITS model, setting the post-waiver incremental intercept and slope to zero but including trends due to COVID or changing beneficiary characteristics.

Table 3.2.11. Interrupted time series estimates of the rate of Inpatient stays for SUD per 1000 Beneficiaries

	Baseline	SUD Waiver Implementation	Difference
Predicted Average Outcome (May 2019)	0.90 (0.88, 0.92)	0.98 (0.94, 1.01)	0.075* (0.040, 0.110)
Slope	0.0044* (0.0038, 0.0051)	0.0099 (-0.0041, 0.0156)	0.0054 (-0.0004, 0.0113)
N	164,573,205		

*Notes: 95% confidence intervals in brackets. *=p<0.05. The Predicted Average Outcome (May 2019) represents the difference between the pre- and post-SUD waiver implementation trend lines in May 2019, while slope change represents the difference in slopes between the two periods. The SUD Waiver Implementation slope is the sum of the baseline slope and the slope change during the implementation period. Baseline and SUD Waiver Implementation means are the means of the unadjusted outcomes.*

The rate of inpatient stays for substance use disorder (SUD) was slowly trending upwards during the baseline period, from about 6 stays per 10,000 beneficiaries in late 2015 to just under 10 stays per 10,000 beneficiaries just before waiver implementation. The rate increased by 7.5 visits per 100,000 beneficiaries initially, then remained relatively flat. By the end of the study period, SUD waiver implementation is associated with a substantial increase in the rate of inpatient stays for SUD.

Hypothesis 3.3: Expanding coverage of SUD services will result in no changes in total Medicaid and out-of-pocket costs for people with SUD diagnoses and increases in Medicaid costs on SUD IMD services.

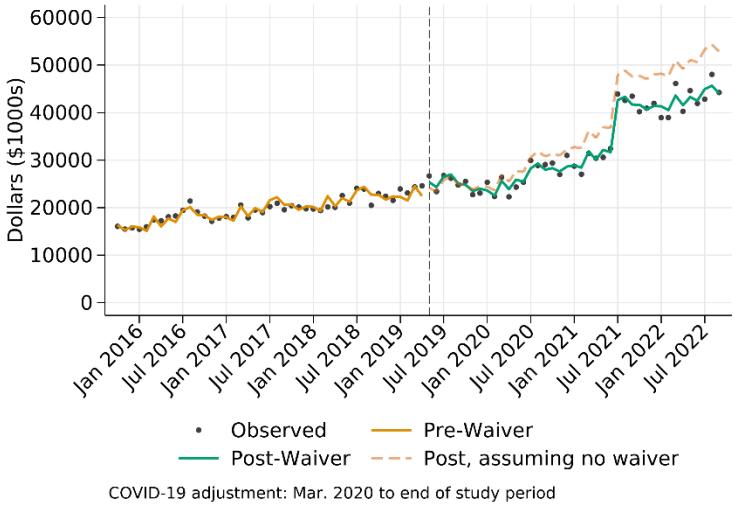
We examined six measures reflecting total spending, per beneficiary spending, and out-of-pocket costs overall for SUD services and specifically for IMD services. We found that total spending on SUD services increased after SUD waiver implementation, as expected. This reflects both the greater number of beneficiaries receiving benefits, especially after the start of the PHE, but also greater spending per capita, even after controlling for changes in case mix. Spending on SUD services in IMDs remained stable, although per capita spending on SUD services in IMDs grew slightly. A somewhat greater percent of beneficiaries with SUD had out-of-pocket spending after the waiver was implemented, affecting 2% of beneficiaries with SUD. However, the average copay among beneficiaries with some out-of-pocket spending declined during the SUD implementation period.

Table 4. Summary of SUD Metric Results for Hypothesis 3.3

#	Measure (Metric abbreviation)	State's demonstration target	Directionality at mid-point (Oct 2021)	Adjusted waiver effects at Sept 2022	Progress * (Yes/No)
3.3.1	Total spending on SUD services (M28)	Increase	NI	Increase	Yes
3.3.2	Total spending on SUD services within IMDs (M29)	Decrease	NI	No change	No
3.3.3	Per capita SUD spending (M30)	Increase	NI	Increase	Yes
3.3.4	Per capita SUD spending within IMDs (M31)	Decrease	NI	Increase	No
3.3.5	Probability of Out-of-pocket Costs to Medicaid Enrollees	No change	NI	Increase	No
3.3.6	Total Amount of Out-of-pocket Costs to Medicaid Enrollees	No change	NI	Increase	No

3.3.1 Total SUD spending grew during the study period but saw no appreciable change during SUD waiver implementation.

Figure 3.3.1. Trends in Total spending on SUD services



Notes: Baseline and SUD Waiver Implementation trends are predictions from the multivariate interrupted time series model described in Methods. "Post, assuming no waiver" is a prediction from the same ITS model, setting the post-waiver incremental intercept and slope to zero but including trends due to COVID or changing beneficiary characteristics.

Table 3.3.1. Interrupted Time Series estimates of total spending on SUD services (in thousands of dollars)

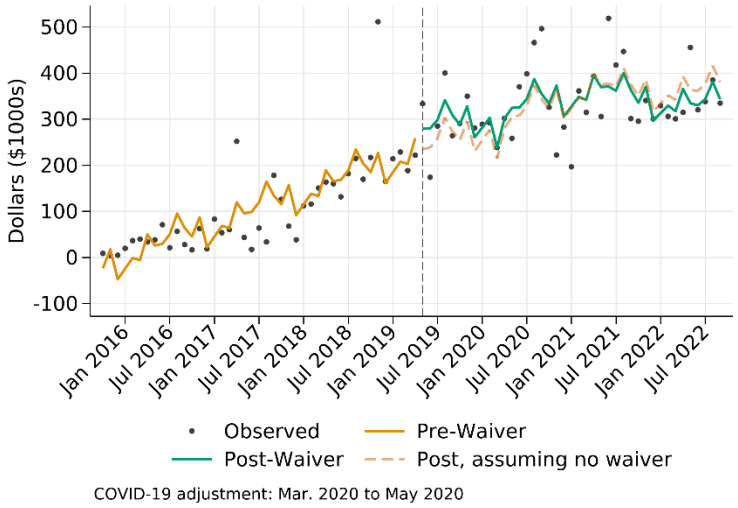
	Baseline	SUD Waiver Implementation	Difference
Predicted Average Outcome (May 2019)	$23,972.13 (22,980.53, 24,603.72)	$25,005.77 (22,584.97, 26,426.58)	$1,213.65 (-1595.11, 743.84)
Slope	$177.63* (149.50, 205.75)	-$74.32 (-361.42, 212.78)	-$251.94 (-542.08, 38.19)
N	84		

*Notes: 95% confidence intervals in brackets. *=p<0.05. The Predicted Average Outcome (May 2019) represents the difference between the pre- and post-SUD waiver implementation trend lines in May 2019, while slope change represents the difference in slopes between the two periods. The SUD Waiver Implementation slope is the sum of the baseline slope and the slope change during the implementation period. Baseline and SUD Waiver Implementation means are the means of the unadjusted outcomes.*

Medicaid total spending on SUD services was about $15M per month at the start of the study period, with a steady increase of $177,630 per month. As per the CMS technical specifications, this measure presents nominal spending, unadjusted for inflation. This measure also does not explicitly control for the increase in the number of beneficiaries during the PHE nor in the intensity of services use; per capita spending is presented below. In addition, SP implementation appears to have substantially affected spending, with an increase to over $40M per month. There was no significant immediate spending change or slope change attributable to the SUD components of the waiver, although SP implementation is associated with a reduction in spending.

3.3.2 Total SUD spending on care in Institutes for Mental Disease consistently grew but was not escalated by the SUD waiver.

Figure 3.3.2. Trends in total spending on care in Institutes for Mental Disease



Notes: Baseline and SUD Waiver Implementation trends are predictions from the multivariate interrupted time series model described in Methods. "Post, assuming no waiver" is a prediction from the same ITS model, setting the post-waiver incremental intercept and slope to zero but including trends due to COVID or changing beneficiary characteristics.

Table 3.3.2. Interrupted Time Series estimates of total care in Institutes for Mental Disease

	Baseline	SUD Waiver Implementation	Difference
Predicted Average Outcome (May 2019)	236.86 (180.30, 293.42)	280.43 (225.38, 335.48)	43.57 (-38.40, 125.53)
Slope	5.80 (3.88, 7.73)	3.80 (-0.93, 8.52)	-2.01 (-6.99, 2.97)
N	84		

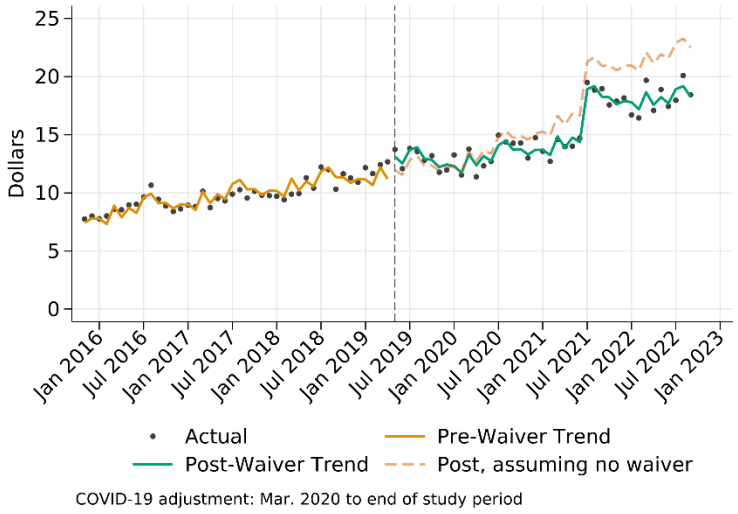
*Notes: 95% confidence intervals in brackets. *=p<0.05. The Predicted Average Outcome (May 2019) represents the difference between the pre- and post-SUD waiver implementation trend lines in May 2019, while slope change represents the difference in slopes between the two periods. The SUD Waiver Implementation slope is the sum of the baseline slope and the slope change during the implementation period. Baseline and SUD Waiver Implementation means are the means of the unadjusted outcomes.*

Total Medicaid spending on SUD services delivered by institutes for mental disease (IMD), the traditional name for state psychiatric hospitals and residential treatment facilities with 16 or more beds, was relatively low prior to the waiver initiation, largely due to the prohibition on using federal dollars from Medicaid to pay for these services from non-elderly adults. Spending after waiver implementation was

just over $200,000 per month prior to SUD waiver implementation. We find no evidence of a difference in the level of spending or the rate of spending growth associated with the SUD waiver.

3.3.3 Per beneficiary spending on SUD services saw an increase then a declining trend associated with the SUD waiver implementation.

Figure 3.3.3. Trends in per capita spending on SUD services (M30)



Notes: Baseline and SUD Waiver Implementation trends are predictions from the multivariate interrupted time series model described in Methods. "Post, assuming no waiver" is a prediction from the same ITS model, setting the post-waiver incremental intercept and slope to zero but including trends due to COVID or changing beneficiary characteristics.

Table 3.3.3. Interrupted Time Series estimates of per capita spending on SUD services

	Baseline	SUD Waiver Implementation	Difference
Predicted Average Outcome (May 2019)	11.94 (11.71, 12.18)	13.08 (12.46, 13.71)	1.14* (0.49, 1.79)
Slope	0.087* (0.079, 0.095)	-0.048 (-0.15, 0.057)	-0.135* (-0.24, -0.029)
N	164,573,205		

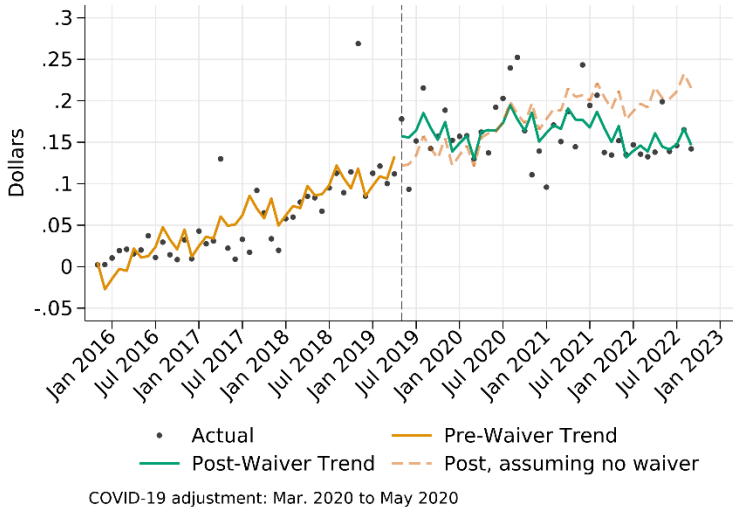
*Notes: 95% confidence intervals in brackets. *=p<0.05. The Predicted Average Outcome (May 2019) represents the difference between the pre- and post-SUD waiver implementation trend lines in May 2019, while slope change represents the difference in slopes between the two periods. The SUD Waiver Implementation slope is the sum of the baseline slope and the slope change during the implementation period. Baseline and SUD Waiver Implementation means are the means of the unadjusted outcomes.*

Average spending on SUD services per Medicaid beneficiary was about $8 at the start of the study period and grew steadily to $13 per person before the waiver. Per capita spending increased by more

than $1 per member per month during the implementation period, with a decreasing trend over time. We again see a relatively large increase in per capita spending with the launch of managed care, but the rate levels out afterwards. Per capita SUD spending is substantially lower than it is predicted to have been in the absence of the SUD waiver.

3.3.4 Per capita SUD spending on care in Institutes for Mental Disease increased then leveled out during the study period

Figure 3.3.4. Trends in per capita spending on care in Institutes for Mental Disease



Notes: Baseline and SUD Waiver Implementation trends are predictions from the multivariate interrupted time series model described in Methods. "Post, assuming no waiver" is a prediction from the same ITS model, setting the post-waiver incremental intercept and slope to zero but including trends due to COVID or changing beneficiary characteristics.

Table 3.3.4. Interrupted Time Series estimates of per capita spending on Institutes for Mental Disease

	Baseline	SUD Waiver Implementation	Difference
Predicted Average Outcome (May 2019)	0.13 (0.10, 0.15)	0.16 (0.14, 0.18)	0.0352* (0.0023, 0.0068)
Slope	0.0031* (0.0022, 0.0040)	0.0005 (-0.0009, 0.0019)	-0.0026* (-0.0042, -0.0010)
N	164,573,205		

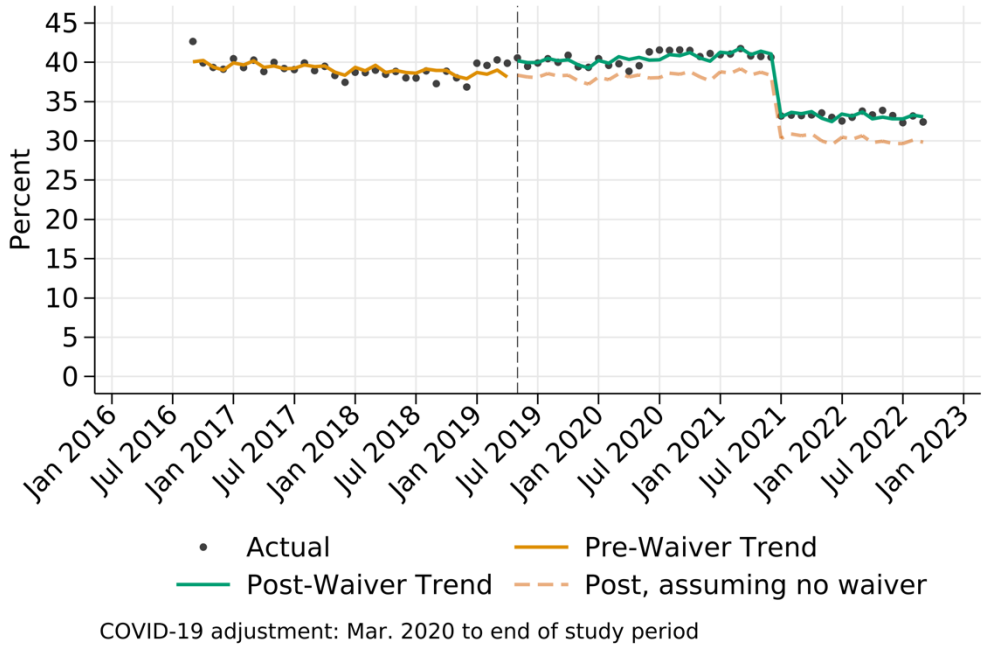
*Notes: 95% confidence intervals in brackets. *=p<0.05. The Predicted Average Outcome (May 2019) represents the difference between the pre- and post-SUD waiver implementation trend lines in May 2019, while slope change represents the difference in slopes between the two periods. The SUD Waiver Implementation slope is the sum of the baseline slope and the slope change*

during the implementation period. Baseline and SUD Waiver Implementation means are the means of the unadjusted outcomes.

Per capita spending on IMD services is a miniscule part of Medicaid spending. Prior to the SUD waiver, IMD spending was only $0.13 per beneficiary. After waiver implementation, per beneficiary IMD spending rose to $0.16, a relatively large increase. This rate has been declining during the implementation period by less than $0.01 per beneficiary per month. Per beneficiary IMD spending is currently lower with the waiver than it is predicted to be without it.

3.3.5 The probability of out-of-pocket costs for beneficiaries with SUD increased during waiver implementation

Figure 3.3.5. Trends in the percent of beneficiaries with SUD with any out-of-pocket costs



Notes: Baseline and SUD Waiver Implementation trends are predictions from the multivariate interrupted time series model described in Methods. "Post, assuming no waiver" is a prediction from the same ITS model, setting the post-waiver incremental intercept and slope to zero but including trends due to COVID or changing beneficiary characteristics.

Table 3.3.5. Interrupted Time Series estimates of the probability of having any out-of-pocket costs for Medicaid beneficiaries with SUD diagnoses

	Baseline	SUD Waiver Implementation	Difference
Predicted Average Outcome (May 2019)	38.47 (38.14, 38.80)	40.28 (39.92, 40.65)	1.82* (1.46, 2.17)

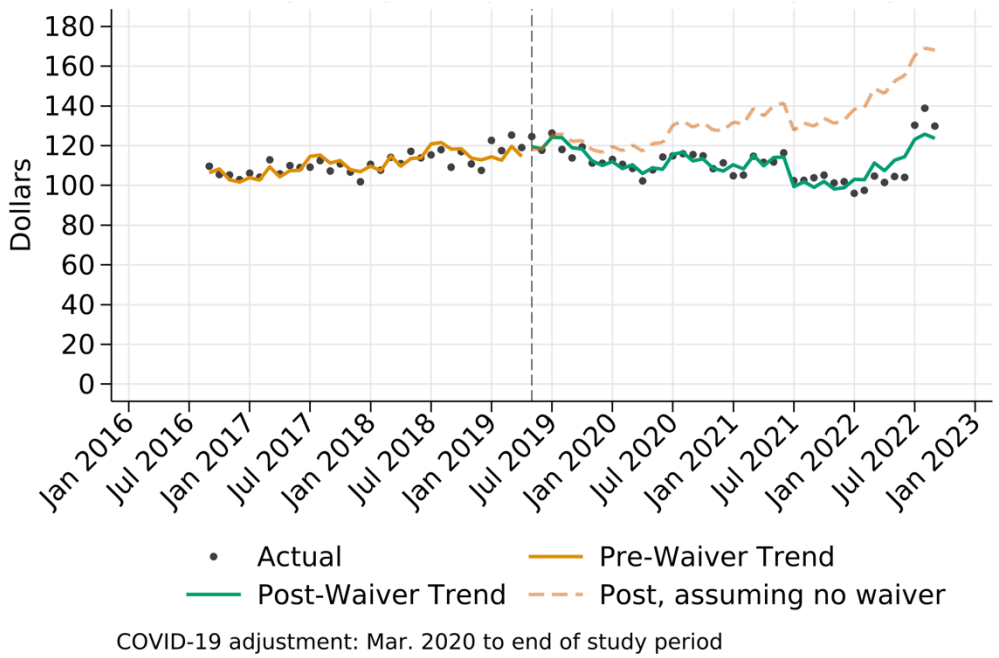
Slope	-0.05* (-0.06, -0.03)	-0.01 (-0.07, 0.04)	0.03 (-0.02, 0.09)
N	3,719,652		

*Notes: 95% confidence intervals in brackets. *=p<0.05. The Predicted Average Outcome (May 2019) represents the difference between the pre- and post-SUD waiver implementation trend lines in May 2019, while slope change represents the difference in slopes between the two periods. The SUD Waiver Implementation slope is the sum of the baseline slope and the slope change during the implementation period. Baseline and SUD Waiver Implementation means are the means of the unadjusted outcomes.*

The percent of beneficiaries with a SUD diagnosis that incurred any out-of-pocket expenses was stable at approximately 40% during the baseline period. This rate jumped up by almost 2 percentage points during the SUD implementation period but remained flat. There was a large decrease in this percentage when SPs were implemented in July 2021, and the rate has stayed closer to 35% since then. It is unclear at this time whether that is due to an explicit policy in the SPs or a limitation in the data source, or even due to an event entirely unrelated to SP implementation. The percent of Medicaid beneficiaries with SUD is projected to be higher with the waiver than it would have been without it.

3.3.6 The total amount of out-of-pocket spending for beneficiaries with SUD among those with copays began trending down during SUD waiver implementation

Figure 3.3.6. Trends in the total amount of out-of-pocket spending for beneficiaries with SUD among those with copays



Notes: Baseline and SUD Waiver Implementation trends are predictions from the multivariate interrupted time series model described in Methods. "Post, assuming no waiver" is a prediction from the same ITS model, setting the post-waiver incremental intercept and slope to zero but including trends due to COVID or changing beneficiary characteristics.

Table 3.3.6. Interrupted Time Series estimates of the total amount of out-of-pocket spending for beneficiaries with SUD among those with copays

	Baseline	SUD Waiver Implementation	Difference
Predicted Average Outcome (May 2019)	116.83 (115.49, 118.16)	118.20 (116.04, 120.36)	1.38 (-0.85, 3.61)
Slope	0.33* (0.27, 0.40)	-0.81* (-1.18, -0.45)	-1.15* (-1.52, -0.77)
N	1,424,251		

*Notes: 95% confidence intervals in brackets. *=p<0.05. The Predicted Average Outcome (May 2019) represents the difference between the pre- and post-SUD waiver implementation trend lines in May 2019, while slope change represents the difference in slopes between the two periods. The SUD Waiver Implementation slope is the sum of the baseline slope and the slope change during the implementation period. Baseline and SUD Waiver Implementation means are the means of the unadjusted outcomes.*

Beneficiaries with SUD diagnoses and some out-of-pocket costs paid an average of $118 per month in spending. This level remained relatively flat during the baseline period and trended down by an average of $0.70 per month after waiver implementation. This amount is estimated to be lower than it would have been without the SUD waiver.

Additional Hypotheses 4.1: The implementation of the SUD waiver will increase access to health care and improve the quality of care and health outcomes.

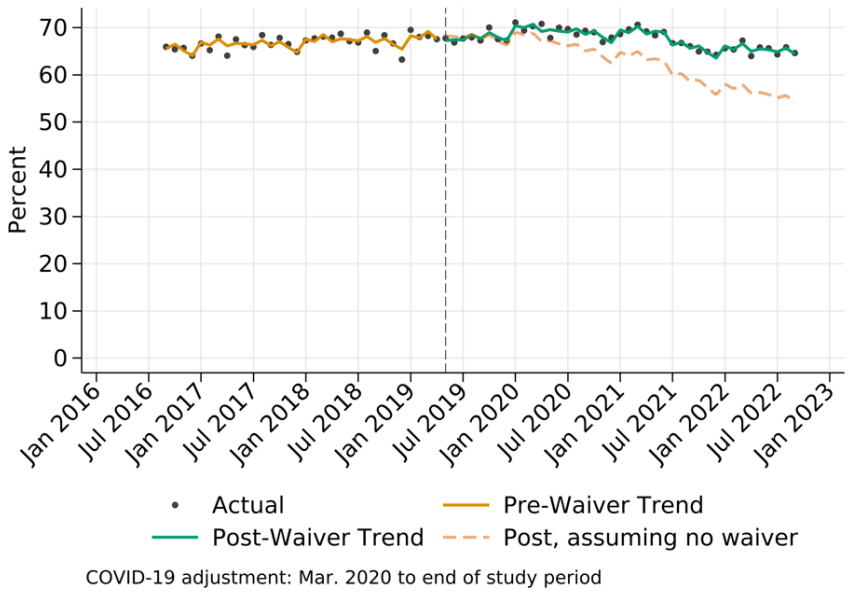
We examined eight measures reflecting general health care quality and health outcomes in order to test the effect of the SUD waiver implementation on overall health. We note that the largest component of the SUD waiver intended to improve overall health among beneficiaries with SUD, Tailored Plans, were intended to launch earlier in the waiver, but have not yet launched, and thus the mechanisms for improving overall health outcomes for people with SUD are not strong. In this set of analyses, we found an improvement in one measure of care – access to ambulatory / preventative visits. We found that three of the measures did not have a measurable effect of the SUD waiver, and four of the measures showed worse outcomes associated with the SUD waiver implementation.

Table 5. Summary of SUD Metric Results for Hypothesis 4.1

#	Measure (Metric abbreviation)	State's demonstration target	Directionality at mid-point (Oct 2021)	Adjusted waiver effects at Sept 2022	Progress * (Yes/No)
4.1.1	Access to Preventive/Ambulatory Health Services for Adult Medicaid Beneficiaries with SUD (M32)	Increase	NI	Increase	Yes
4.1.2	Avoidable or Preventable Emergency Department Visits	Decrease	NI	Increase	No
4.1.3	Readmissions Among Beneficiaries with SUD (M25)	Decrease	Decrease	Increase	No
4.1.4	Connecting Primary Care to SUD Service Offerings (Q2)	Increase	NI	No change	No
4.1.5	Rate of Screening for Pregnancy Risk	Increase	NI	Decrease	No
4.1.6	Annual Dental Visits (ADV)	NA	NI	No change	No
4.1.7	Breast Cancer Screening (BCS)	Increase	NI	No change	No
4.1.8	Cervical Cancer Screening (CCS)	Increase	NI	Decrease	No

4.1.1 Access to Preventative Health Services by people with a SUD diagnosis grew slightly faster during the waiver period.

Figure 4.1.1. Trends in the rate of access to preventative health services



Notes: Baseline and SUD Waiver Implementation trends are predictions from the multivariate interrupted time series model described in Methods. "Post, assuming no waiver" is a prediction from the same ITS model, setting the post-waiver incremental intercept and slope to zero but including trends due to COVID or changing beneficiary characteristics.

Table 4.1.1. Interrupted time series estimates: access to preventative health services

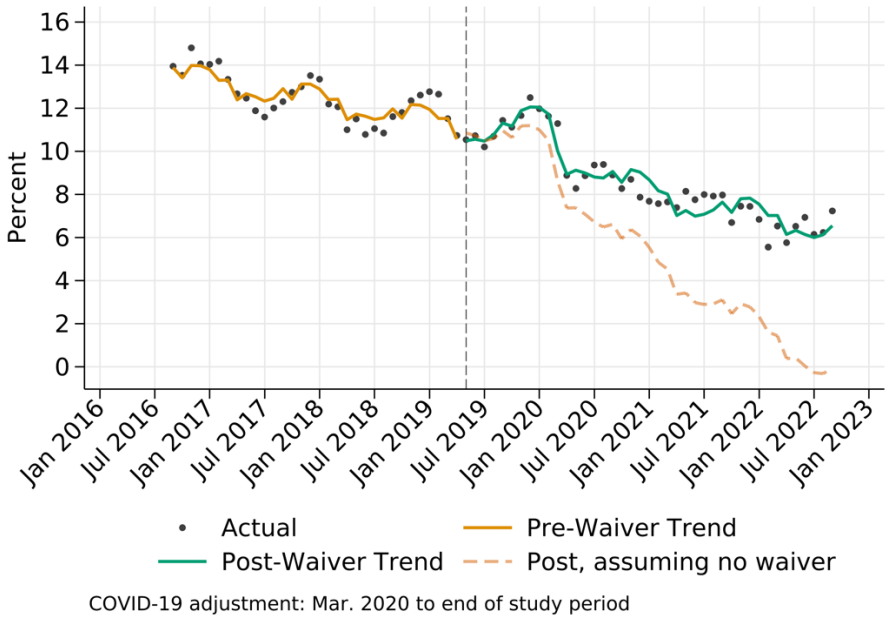
	Baseline	SUD Waiver Implementation	Difference
Predicted Average Outcome (May 2019)	67.68 (67.29, 68.08)	66.71 (66.24, 67.17)	-0.98* (-1.44, -0.51)
Slope	0.03* (0.01, 0.05)	0.31* (0.24, 0.38)	0.28* (0.21, 0.36)
N	1,775,250		

*Notes: 95% confidence intervals in brackets. *=p<0.05. The Predicted Average Outcome (May 2019) represents the difference between the pre- and post-SUD waiver implementation trend lines in May 2019, while slope change represents the difference in slopes between the two periods. The SUD Waiver Implementation slope is the sum of the baseline slope and the slope change during the implementation period. Baseline and SUD Waiver Implementation means are the means of the unadjusted outcomes.*

The rate of preventative care service use was relatively high during both the baseline and SUD implementation period, averaging 68% in both periods. The rate dropped by almost 1% point during SUD implementation but began trending upward by almost 0.3% points per month. Access to preventative care services is estimated to be higher than it would have been without the SUD waiver.

4.1.2 Avoidable emergency department visits continued steady decline.

Figure 4.1.2. Trends in avoidable emergency department visits



Notes: Baseline and SUD Waiver Implementation trends are predictions from the multivariate interrupted time series model described in Methods. "Post, assuming no waiver" is a prediction from the same ITS model, setting the post-waiver incremental intercept and slope to zero but including trends due to COVID or changing beneficiary characteristics.

Table 4.1.2. Interrupted time series estimates of avoidable emergency department visits

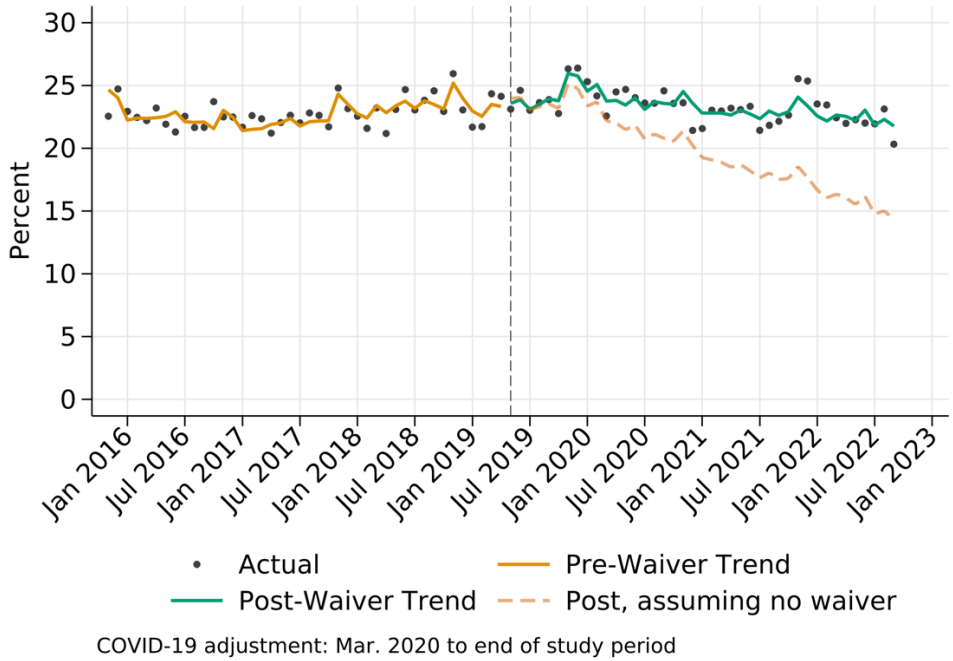
	Baseline	SUD Waiver Implementation	Difference
Predicted Average Outcome (May 2019)	11.18 (10.92, 11.44)	10.83 (10.43, 11.23)	-0.35 (-0.81, 0.12)
Slope	-0.07* (-0.09, -0.06)	0.10* (0.03, 0.18)	0.17* (0.10, 0.25)
N	712,557		

*Notes: 95% confidence intervals in brackets. *=p<0.05. The Predicted Average Outcome (May 2019) represents the difference between the pre- and post-SUD waiver implementation trend lines in May 2019, while slope change represents the difference in slopes between the two periods. The SUD Waiver Implementation slope is the sum of the baseline slope and the slope change during the implementation period. Baseline and SUD Waiver Implementation means are the means of the unadjusted outcomes.*

The percent of emergency department visits classified as avoidable declined markedly during the study period. In 2016, 14% of ED visits were classified as avoidable, while just prior to the PHE this had declined to 12%. A decline occurred during the initial months of the pandemic, which has been subsequently sustained. Our graph shows the model estimates a substantially lower level of avoidable ED visits would have occurred without the waiver, even trending down to zero in 2022, but we do not report this with a great deal of confidence.

4.1.3 All-cause Hospital readmissions for beneficiaries with SUD remained very stable during the full study period.

Figure 4.1.3. Trends in All-cause Hospital readmissions for beneficiaries with SUD



Notes: Baseline and SUD Waiver Implementation trends are predictions from the multivariate interrupted time series model described in Methods. "Post, assuming no waiver" is a prediction from the same ITS model, setting the post-waiver incremental intercept and slope to zero but including trends due to COVID or changing beneficiary characteristics.

Table 4.1.3. Interrupted Time Series estimates of all-cause Hospital readmissions for beneficiaries with SUD

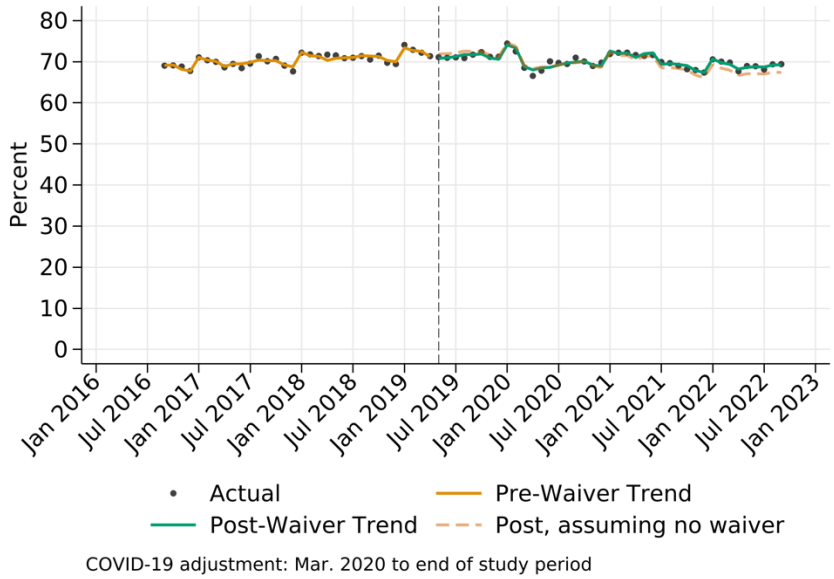
	Baseline	SUD Waiver Implementation	Difference
Predicted Average Outcome (May 2019)	23.27 (22.51, 24.03)	22.90 (21.77, 24.03)	-0.37 (-1.61, 0.86)
Slope	0.05* (0.02, 0.08)	0.25* (0.05, 0.45)	0.20 (-0.01, 0.40)
N	225,920		

*Notes: 95% confidence intervals in brackets. *=p<0.05. The Predicted Average Outcome (May 2019) represents the difference between the pre- and post-SUD waiver implementation trend lines in May 2019, while slope change represents the difference in slopes between the two periods. The SUD Waiver Implementation slope is the sum of the baseline slope and the slope change during the implementation period. Baseline and SUD Waiver Implementation means are the means of the unadjusted outcomes.*

The all-cause readmission rate was very stable at 23% of hospitalizations resulting in a readmission within 30 days among Medicaid beneficiaries with SUD diagnoses. There was no effect of the SUD waiver on either the rate or trends in the rate during the implementation period. Because of a higher upward trend observed prior to the PHE, the model predictions that the readmission rate for people with SUD diagnosis is higher waiver than it would have been without it.

4.1.4 Access to primary care visits within 30 days of using a SUD service was high but declined slightly during the SUD implementation period.

Figure 4.1.4. Trends in primary care visits within 30 days of using a SUD service



Notes: Baseline and SUD Waiver Implementation trends are predictions from the multivariate interrupted time series model described in Methods. "Post, assuming no waiver" is a prediction from the same ITS model, setting the post-waiver incremental intercept and slope to zero but including trends due to COVID or changing beneficiary characteristics.

Table 4.1.4. Interrupted Time Series estimates of the rate of primary care visits within 30 days of using a SUD service

	Baseline	SUD Waiver Implementation	Difference
Predicted Average Outcome (May 2019)	71.92 (71.53, 72.30)	70.86 (70.39, 71.34)	-1.05* (-1.53, -0.57)
Slope	0.07* (0.05, 0.08)	0.14* (0.06, 0.21)	0.07 (-0.01, 0.15)
N	1,693,475		

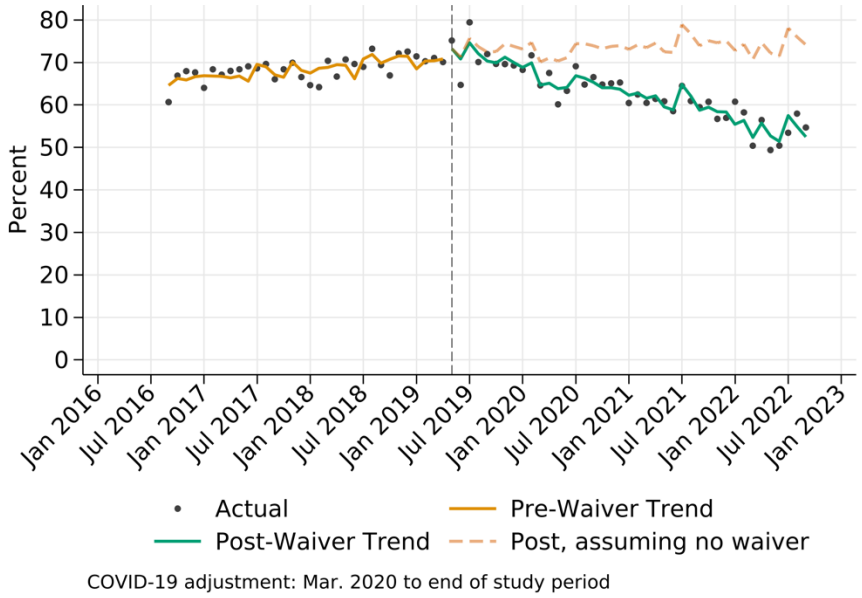
*Notes: 95% confidence intervals in brackets. *=p<0.05. The Predicted Average Outcome (May 2019) represents the difference between the pre- and post-SUD waiver implementation trend lines in May 2019, while slope change represents the difference in slopes between the two periods. The SUD Waiver Implementation slope is the sum of the baseline slope and the slope change during the implementation period. Baseline and SUD Waiver Implementation means are the means of the unadjusted outcomes.*

Approximately 70% of SUD visits had a follow up within 30 days with a primary care provider, a potential

indicator of connectedness between primary care and specialty addiction services. This rate declined by about 1.1% points during SUD waiver implementation overall with no change in trend during the implementation period.

4.1.5 Pregnancy risk screening among people with a SUD diagnosis declined during SUD waiver implementation but the limited sample size makes it difficult to attribute to the waiver over other events.

Figure 4.1.5. Trends in rate of screening for pregnancy risk.



Notes: Baseline and SUD Waiver Implementation trends are predictions from the multivariate interrupted time series model described in Methods. "Post, assuming no waiver" is a prediction from the same ITS model, setting the post-waiver incremental intercept and slope to zero but including trends due to COVID or changing beneficiary characteristics.

Table 4.1.5. Interrupted Time Series estimates of screening for pregnancy risk

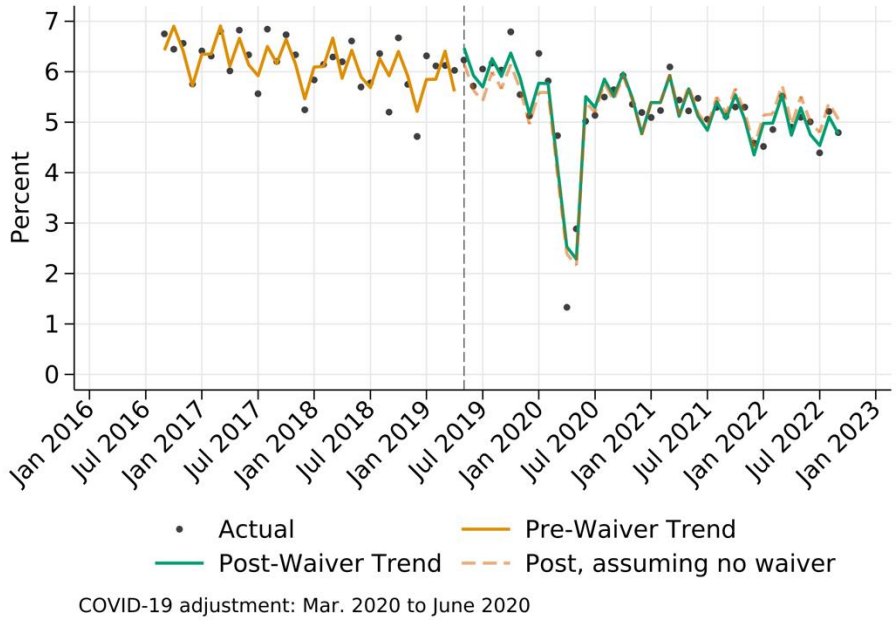
	Baseline	SUD Waiver Implementation	Difference
Predicted Average Outcome (May 2019)	71.57 (69.81, 73.33)	71.61 (68.56, 74.67)	0.05 (-3.54, 3.63)
Slope	0.16* (0.07, 0.26)	-0.38 (-0.97, 0.22)	-0.54 (-1.14, 0.05)
N	22,243		

*Notes: 95% confidence intervals in brackets. *=p<0.05. The Predicted Average Outcome (May 2019) represents the difference between the pre- and post-SUD waiver implementation trend lines in May 2019, while slope change represents the difference in slopes between the two periods. The SUD Waiver Implementation slope is the sum of the baseline slope and the slope change during the implementation period. Baseline and SUD Waiver Implementation means are the means of the unadjusted outcomes.*

Approximately 68% of pregnant Medicaid beneficiaries with SUD were screened for pregnancy risk using a standardized tool prior to SUD waiver implementation as determined from claims and encounter data. There was no immediate change in this rate upon SUD waiver implementation, but the screening rate has been declining by 5.4 people screened per 1000 pregnancy beneficiaries with SUD each month since waiver implementation, although this trend was not statistically different from the trend during baseline. The current screening rate is substantially below what our model predicts would have occurred in the absence of the waiver.

4.1.6 The rate of dental use by people with SUD diagnoses continued to decline, unaffected by SUD waiver services.

Figure 4.1.6. Trends in Annual Dental Visits among beneficiaries with SUD diagnoses



Notes: Baseline and SUD Waiver Implementation trends are predictions from the multivariate interrupted time series model described in Methods. "Post, assuming no waiver" is a prediction from the same ITS model, setting the post-waiver incremental intercept and slope to zero but including trends due to COVID or changing beneficiary characteristics.

Table 4.1.6. Interrupted Time Series estimates of the rate of primary care visits within 30 days of using a SUD service

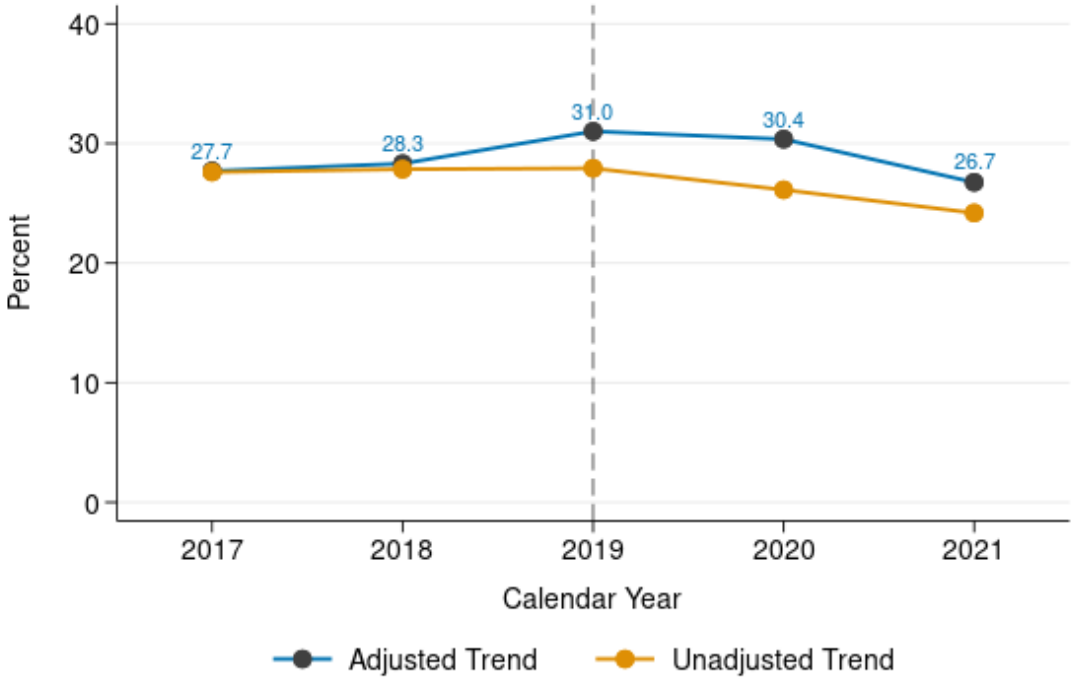
	Baseline	SUD Waiver Implementation	Difference
Predicted Average Outcome (May 2019)	5.82 (5.73, 5.92)	6.13 (6.03, 6.23)	0.30* (0.18, 0.43)
Slope	-0.02* (-0.03, -0.02)	-0.03* (-0.04, -0.03)	-0.01* (-0.02, -0.01)
N	5,244,429		

*Notes: 95% confidence intervals in brackets. *=p<0.05. The Predicted Average Outcome (May 2019) represents the difference between the pre- and post-SUD waiver implementation trend lines in May 2019, while slope change represents the difference in slopes between the two periods. The SUD Waiver Implementation slope is the sum of the baseline slope and the slope change during the implementation period. Baseline and SUD Waiver Implementation means are the means of the unadjusted outcomes.*

Even though NC Medicaid covers dental services, fewer than 7% of beneficiaries with SUD diagnoses received Medicaid-paid dental services during the study period. This rate began declining before SUD waiver implementation and continued its decline during the full study period. We estimated that about 3 people per 1000 beneficiaries with SUD had increased access to dental services after waiver implementation, but the rate of decline has also accelerated. Overall, we find no difference between the rate of Medicaid-paid dental service use for beneficiaries with SUD diagnoses due to the SUD waiver.

4.1.7 The rate of breast cancer screening among female beneficiaries with SUD diagnoses increased during the first two years of the waiver and then declined in 2021.

Figure 4.1.7. Trends in the annual rate of breast cancer screening among female beneficiaries with SUD

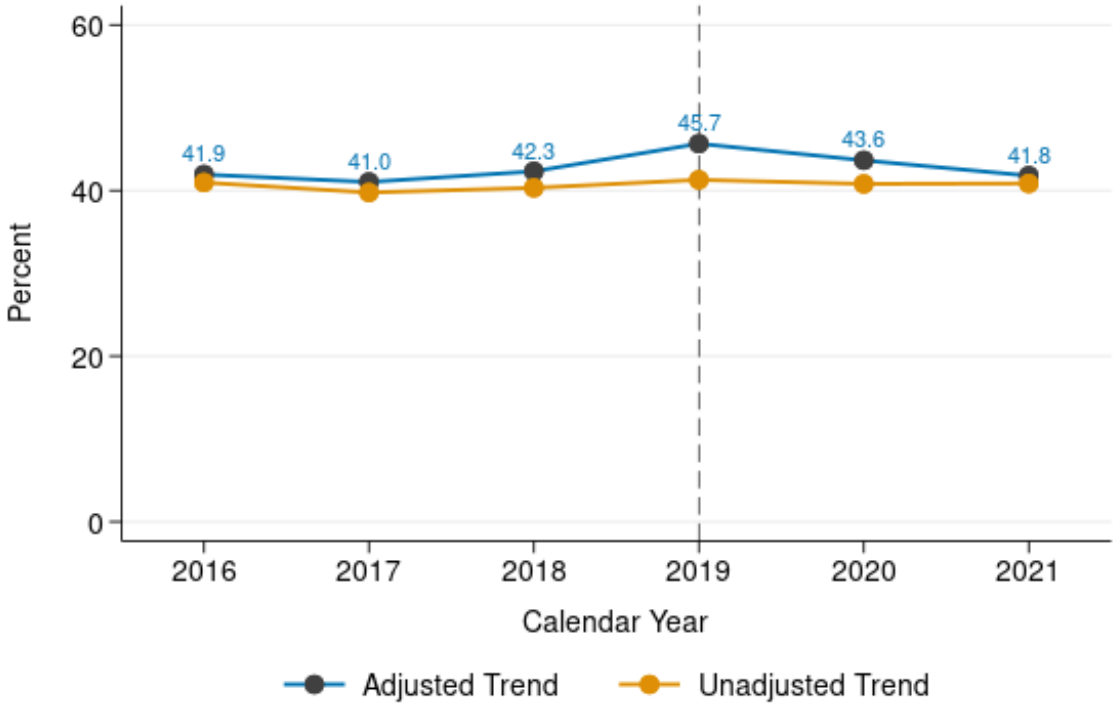


Notes: Adjusted model includes age (quadratic), urban location, race specific indicator variables and the Chronic Illness and Disability Payment System (CDPS + Rx) risk adjustment scores.

Among women ages 50 to 74 with SUD diagnoses, less than one-third had a mammogram to screen for breast cancer throughout the entire study period. The rate increased from 2018 to 2019, but then started trending back down.

4.1.8 The rate of cervical cancer screening among women with SUD diagnoses increased in 2019, then began to decline in 2020 and 2021.

Figure 4.1.8. Trends in the rate of cervical cancer screening among women with SUD diagnoses



Notes: Adjusted model includes age (quadratic), sex, urban location, race specific indicator variables and the Chronic" "Illness and Disability Payment System (CDPS + Rx) risk adjustment scores.

Just over 40% of women ages 24 to 64 with SUD diagnoses were screened (using cervical cytology or hrHPV test among those age 30 or older) for cervical cancer during the study period. This rate trended upward before SUD implementation and reached a peak in 2019. It began trending downward in 2020 and continued to decline in 2021.

Additional Hypothesis 4.2: The implementation of Medicaid managed care will increase the rate of use of behavioral health services at the appropriate level of care and improve the quality of behavioral health care received.

This section mostly focuses on the impact of the SUD waiver on mental health measures. A high proportion of people with substance use disorders also qualify for mental health diagnoses. We tested hypothesis 4.2

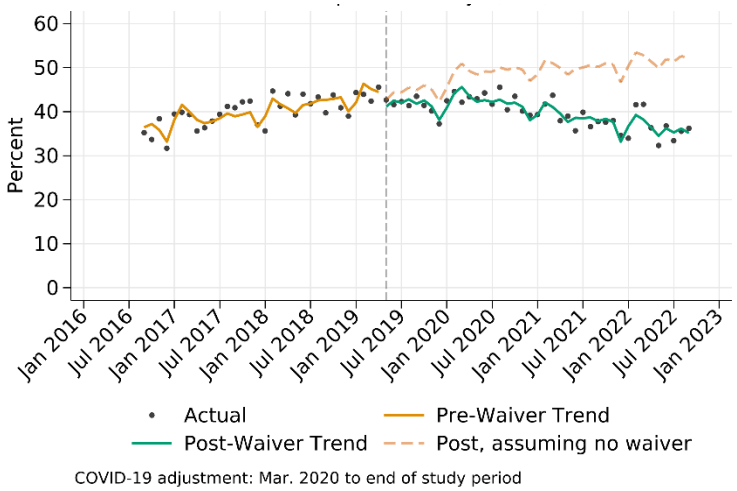
on access to and quality of behavioral health care for beneficiaries with SUD diagnoses using 18 measures, including 13 that had been used in prior hypotheses (see Table 1). One of the measures was unaffected by the Medicaid SUD transformation (antidepressant management during the acute phase), while all remaining 17 measures declined during SUD implementation. These estimates attempt to control for trends observed during the COVID-19 PHE in the Medicaid beneficiary population without SUD and not transitioned to standard plans, but these adjustments are not without limitations due to the differences in these populations.

Table 6. Summary of SUD Metric Results for Hypothesis 1.2

	Measure (Metric abbreviation)	State's demonstration target or expected outome	Directionality at mid-point (Oct 2021)	Adjusted waiver effects at Sept 2022	Progress * (Yes/No)
4.2.1	Follow-up After Hospitalization for Mental Illness (FUH): 7 days after discharge	Increase	NI	Decrease	No
4.2.2	Follow-up After Hospitalization for Mental Illness (FUH): 30 days after discharge	Increase	NI	Increase	Yes
4.2.3	Use of Behavioral Health Care for People with SMI/SUD/SED	Increase	NI	No change	No
4.2.4	Antidepressant Medication Management During Acute Phase (AMM)	Increase	NI	No change	No
4.2.5	Antidepressant Medication Management During Continuation Phase (AMM)	Increase	NI	No change	No

4.2.1 The rate of follow-up within 7 days of a hospitalization for mental illness by people with a SUD diagnosis had been increasing during baseline but declined during the SUD waiver implementation.

Figure 4.2.1. Trends in the rate of follow-up within 7 days after a hospitalization for mental illness by people with a SUD diagnosis



Notes: Baseline and SUD Waiver Implementation trends are predictions from the multivariate interrupted time series model described in Methods. "Post, assuming no waiver" is a prediction from the same ITS model, setting the post-waiver incremental intercept and slope to zero but including trends due to COVID or changing beneficiary characteristics.

Table 4.2.1. Interrupted time series estimates of the rate of follow-up within 7 days after a hospitalization for mental illness by people with a SUD diagnosis

	Baseline	SUD Waiver Implementation	Difference
Predicted Average Outcome (May 2019)	44.02 (42.47, 45.57)	42.51 (40.21, 44.81)	-1.51 (-4.29, 1.26)
Slope	0.25* (0.17, 0.33)	-0.14* (-0.58, 0.31)	-0.38* (-0.84, 0.071)
N	44,519		

*Notes: 95% confidence intervals in brackets. *=p<0.05. The Predicted Average Outcome (May 2019) represents the difference between the pre- and post-SUD waiver implementation trend lines in May 2019, while slope change represents the difference in slopes between the two periods. The SUD Waiver Implementation slope is the sum of the baseline slope and the slope change during the implementation period. Baseline and SUD Waiver Implementation means are the means of the unadjusted outcomes.*

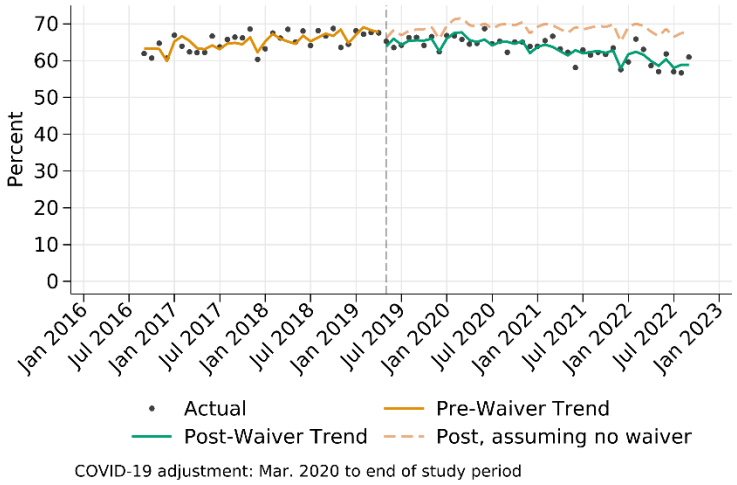
The rate of follow-up within seven days with a mental health specialist, a primary care provider, or through the receipt of enhanced behavioral health services after discharge from a psychiatric hospitalization had been slowly increasing during the baseline period, ranging from 30% to 45%. We do not find evidence of immediate changes from the SUD waiver implementation, but the rate began trending downward during SUD waiver implementation. The current rate of follow up returned to the levels observed in 2016-2017. Overall, we estimate that the rate of follow-up within 7 days was lower during the waiver than it would have been without it. While we do not report age-stratified results, the latest available data on the CMS Medicaid Scorecard indicates that the national median for a similar measure is 45.6% and 33.1% for children (ages 6 to 17) and adults (ages 18 and older), respectively.[21] Using a modified version of the measure and data from 2018-2019, researchers from the Medicaid Outcomes Distributed Research Network (MODRN) found that the rate of follow-up within a 7-day period was 16.6% across 10 states.[22]

[21] https://www.medicaid.gov/state-overviews/scorecard/follow-up-after-hospitalization-mental-illness-age-18/index.html

[22] Cole, E. S., Allen, L., Austin, A., Barnes, A., Chang, C. H., Clark, S., Crane, D., Cunningham, P., Fry, C. E., Gordon, A. J., Hammerslag, L., Idala, D., Kennedy, S., Kim, J. Y., Krishnan, S., Lanier, P., Mahakalanda, S., Mauk, R., McDuffie, M. J., … Donohue, J. M. (2022). Outpatient follow-up and use of medications for opioid use disorder after residential treatment among Medicaid enrollees in 10 states. *Drug and Alcohol Dependence*, *241*, 109670. https://doi.org/10.1016/j.drugalcdep.2022.109670

4.2.2 The rate of follow-up within 30 days of a hospitalization for mental illness by people with a SUD diagnosis remained stable during the SUD implementation period.

Figure 4.2.2. Trends in the rate of follow-up within 30 days after a hospitalization for mental illness by people with a SUD diagnosis



Notes: Baseline and SUD Waiver Implementation trends are predictions from the multivariate interrupted time series model described in Methods. "Post, assuming no waiver" is a prediction from the same ITS model, setting the post-waiver incremental intercept and slope to zero but including trends due to COVID or changing beneficiary characteristics.

Table 4.2.2. Interrupted time series estimates of the rate of follow-up within 30 days after a hospitalization for mental illness by people with a SUD diagnosis

	Baseline	SUD Waiver Implementation	Difference
Predicted Average Outcome (May 2019)	67.57 (66.09, 69.05)	65.32 (63.09, 67.55)	-2.25 (-4.93, 0.44)
Slope	0.160* (0.081, 0.243)	-0.0007 (-0.4312, 0.4298)	-0.16 (-0.60, 0.27)
N	44,519		

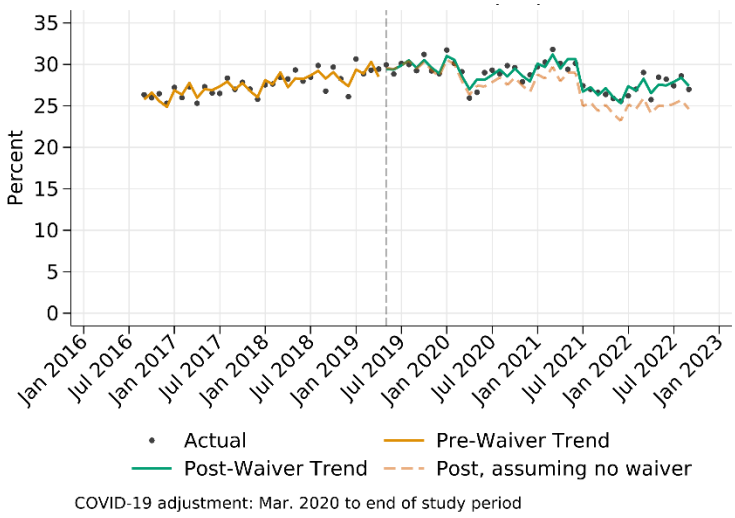
*Notes: 95% confidence intervals in brackets. *=p<0.05. The Predicted Average Outcome (May 2019) represents the difference between the pre- and post-SUD waiver implementation trend lines in May 2019, while slope change represents the difference in slopes between the two periods. The SUD Waiver Implementation slope is the sum of the baseline slope and the slope change during the implementation period. Baseline and SUD Waiver Implementation means are the means of the unadjusted outcomes.*

The rate of follow-up within 30 days with a mental health specialist, a primary care provider, or through the receipt of enhanced behavioral health services after discharge from a psychiatric hospitalization showed a similar but flatter trend as the 7-day follow up. The rate of follow up ranges between 60-70% at baseline.

We again do not find evidence of immediate changes from the SUD waiver implementation. While we do not report age-stratified results, the latest available data on the CMS Medicaid Scorecard for a similar measure indicates that the national median for this measure is 66.0% and 54.7% for children (ages 6 to 17) and adults (ages 18 and older), respectively.[23] Using a modified version of the measure and data from 2018-2019, researchers from the Medicaid Outcomes Distributed Research Network (MODRN) found that the rate of follow-up within a 30-day period was 16.8% across 10 states.[24]

4.2.3 The behavioral health services used by people with SUD diagnosis has grown since baseline and the rate of growth increased after SUD implementation.

Figure 4.2.3. Trends in the use of behavioral health care services for beneficiaries with SUD diagnoses



Notes: Baseline and SUD Waiver Implementation trends are predictions from the multivariate interrupted time series model described in Methods. "Post, assuming no waiver" is a prediction from the same ITS model, setting the post-waiver incremental intercept and slope to zero but including trends due to COVID or changing beneficiary characteristics.

Table 4.2.3. Interrupted Time Series Estimates of behavioral health services by people with SUD

[23] https://www.medicaid.gov/state-overviews/scorecard/follow-up-after-hospitalization-mental-illness-age-18/index.html

[24] Cole, E. S., Allen, L., Austin, A., Barnes, A., Chang, C. H., Clark, S., Crane, D., Cunningham, P., Fry, C. E., Gordon, A. J., Hammerslag, L., Idala, D., Kennedy, S., Kim, J. Y., Krishnan, S., Lanier, P., Mahakalanda, S., Mauk, R., McDuffie, M. J., … Donohue, J. M. (2022). Outpatient follow-up and use of medications for opioid use disorder after residential treatment among Medicaid enrollees in 10 states. *Drug and Alcohol Dependence*, *241*, 109670. https://doi.org/10.1016/j.drugalcdep.2022.109670

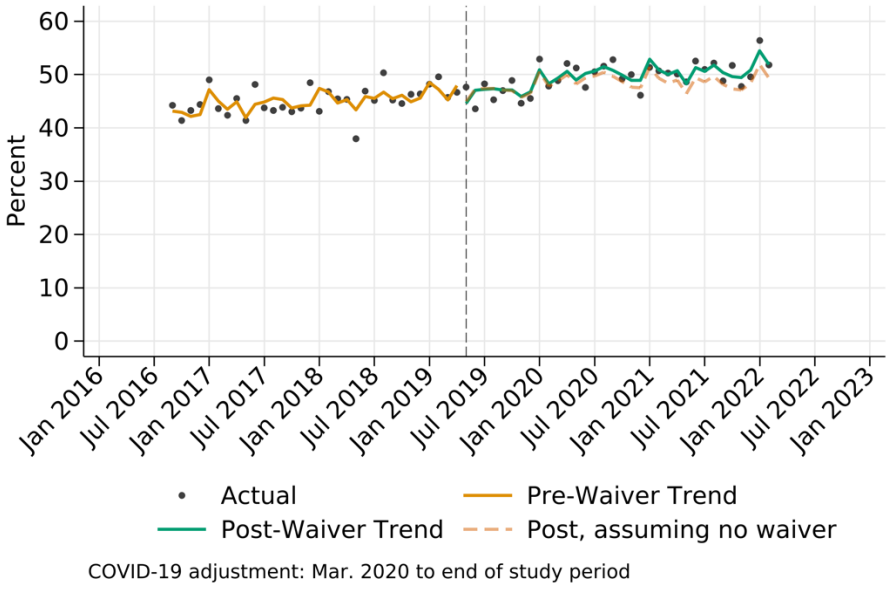
	Baseline	SUD Waiver Implementation	Difference
Predicted Average Outcome (May 2019)	29.30 (29.04, 29.56)	29.15 (28.85, 29.45)	-0.15 (-0.44, 0.15)
Slope	0.104* (0.092, 0.115)	0.18* (0.13, 0.22)	0.073* (0.026, 0.121)
N	5,074,019		

*Notes: 95% confidence intervals in brackets. *=p<0.05. The Predicted Average Outcome (May 2019) represents the difference between the pre- and post-SUD waiver implementation trend lines in May 2019, while slope change represents the difference in slopes between the two periods. The SUD Waiver Implementation slope is the sum of the baseline slope and the slope change during the implementation period. Baseline and SUD Waiver Implementation means are the means of the unadjusted outcomes.*

The use of behavioral health services by people with SUD diagnoses grew during the baseline period from 25-30%. We estimate that there was no overall difference in this rate after SUD waiver implementation but rate is trending upward faster than it was during the baseline period.

4.2.4 Antidepressant management during the acute phase of treatment has been slowly increasing but was not affected by the SUD waiver.

Figure 4.2.4. Trends in the Rate of Antidepressant Medication Management during Acute Phase Treatment



Notes: Baseline and SUD Waiver Implementation trends are predictions from the multivariate interrupted time series model described in Methods. "Post, assuming no waiver" is a prediction from the same ITS model, setting the post-waiver incremental intercept and slope to

zero but including trends due to COVID or changing beneficiary characteristics.

Table 4.2.4. Interrupted Time Series estimates of the Rate of Antidepressant Medication Management during Acute Phase Treatment

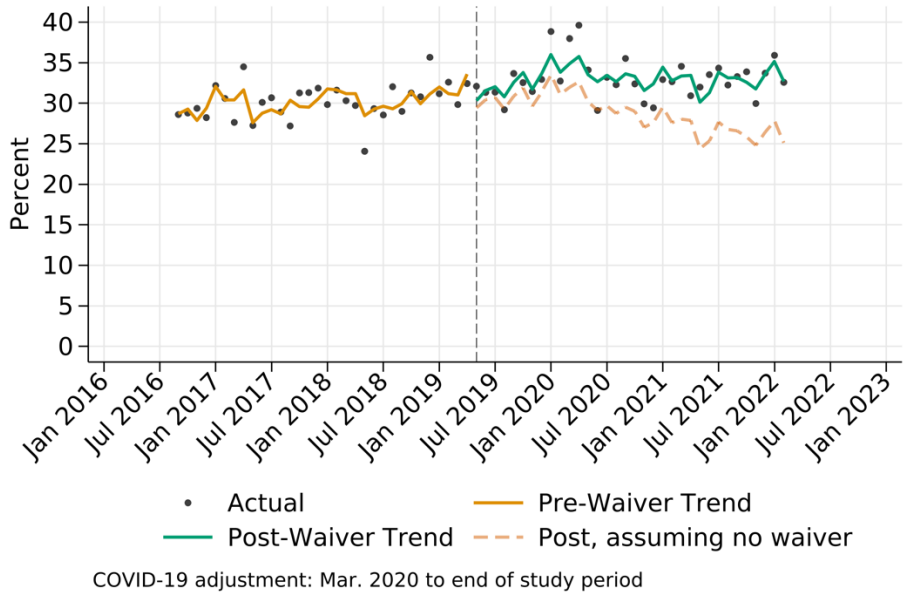
	Baseline	SUD Waiver Implementation	Difference
Predicted Average Outcome (May 2019)	46.32* (44.57, 48.07)	45.98* (43.26, 48.70)	-0.34 (-3.60, 2.92)
Slope	0.08 (-0.01, 0.17)	0.17 (-0.37, 0.71)	0.09 (-0.46, 0.64)
N	31,871		

*Notes: 95% confidence intervals in brackets. *=p<0.05. The Predicted Average Outcome (May 2019) represents the difference between the pre- and post-SUD waiver implementation trend lines in May 2019, while slope change represents the difference in slopes between the two periods. The SUD Waiver Implementation slope is the sum of the baseline slope and the slope change during the implementation period. Baseline and SUD Waiver Implementation means are the means of the unadjusted outcomes.*

The percent of adult Medicaid beneficiaries newly prescribed antidepressants who remained on those medications for at least 84 days has been increasing steadily throughout the study period, from just over 40% to over 50% in 2022. We find no evidence that the SUD waiver implementation affected this measure of antidepressant management during the acute phase of treatment.

4.2.5 Antidepressant management during the continuation phase of treatment has been slowly increasing but was not affected by the SUD waiver.

Figure 4.2.5. Trends in the Rate of Antidepressant Medication Management during Continuation Phase Treatment



Notes: Baseline and SUD Waiver Implementation trends are predictions from the multivariate interrupted time series model described in Methods. "Post, assuming no waiver" is a prediction from the same ITS model, setting the post-waiver incremental intercept and slope to zero but including trends due to COVID or changing beneficiary characteristics.

Table 4.2.5. Interrupted Time Series estimates of the Rate of Antidepressant Medication Management during Continuation Phase Treatment

	Baseline	SUD Waiver Implementation	Difference
Predicted Average Outcome (May 2019)	30.26 (28.66, 31.86)	31.16 (28.64, 33.68)	0.90 (-2.11, 3.91)
Slope	0.03 (-0.05, 0.11)	0.23 (-0.27, 0.74)	0.20 (-0.31, 0.71)
N	31,871		

*Notes: 95% confidence intervals in brackets. *=p<0.05. The Predicted Average Outcome (May 2019) represents the difference between the pre- and post-SUD waiver implementation trend lines in May 2019, while slope change represents the difference in slopes between the two periods. The SUD Waiver Implementation slope is the sum of the baseline slope and the slope change during the implementation period. Baseline and SUD Waiver Implementation means are the means of the unadjusted outcomes.*

The percent of adult Medicaid beneficiaries newly prescribed antidepressants who remained on those medications for at least six months, referred to as the continuation phase, remained relatively constant throughout the study period, ranging from 30% to 35%. We find no evidence that the SUD waiver implementation affected this measure of antidepressant management during continuation phase of treatment.

Qualitative Results

SUD-related Results from 2020-2021 (prior to implementation of the managed care model)

For hypothesis 3.1, we interviewed representatives of 40 provider organizations between December 2020 and May 2021 to understand the perceptions of provider organizations about the transition from fee-for-service to a managed care model, including the quality of care for beneficiaries with SUD. The 40 participating provider organizations included 11 behavioral health practices, 14 adult or pediatric primary care practices, 3 Obstetrics and Gynecology practices, 4 health systems, 4 health system affiliated practices, and 4 FQHCs. Twelve participating organizations treated patients with SUD and 14 referred beneficiaries with SUD to an appropriate level of care. Table 1 shows the characteristics of provider organizations with SUD services.

Table 4.2.6: Characteristics of participants providing SUD services

Type of Organization providing SUD services	N=12
Behavioral health specialists	7
Family/Internal Medicine	3
OB/GYN	1
FQHC	1
Participant role within those organizations	
Leadership	4
Behavioral Health Specialist	3
Administrative Staff	5

These organizations provided assessments, Medications for Opioid Use Disorder (MOUD), and other intensive outpatient SUD services.

The perception about the impact of the transformation on the quality of SUD services varied. A few participants described that the transformation—particularly the integration of primary care and behavioral health services with care coordination—would improve access to services and the overall quality of services. According to one behavioral health specialist:

> "With the transformation, I think we will look into providing more services for our patients because noncompliance is a big barrier for us. The population that we serve isn't always compliant. The more services we can get into—in one place, the better off—the better chance that the patient is going to comply with their treatment plan. If they can get their therapy and treatment here, if they can get their physical things taken care of here as much as possible, as much as we can get into one

place, let's do that because they trust their primary care doctors." (Subject 001, Behavioral Health Specialist)

However, some participants expressed doubts about whether there would be any change in the quality of SUD services or shared that they had not yet seen enough information about what the new model would involve to assess its potential impact.

> "I'm not 100 percent certain about the impact. I think it's the tailored plans, right, that are related to mental health and substance abuse. I feel like that's kind of like a unicorn - like you hear a lot about it but not a lot of details, so I'm hoping that—and maybe they are sharing a little bit more about the tailored plans and what that's going to look like. I don't know if they're still going to do a staggered rollout or if it'll all go in together." (Subject 14, Senior Administrator, Obstetrics and Gynecology Practice)

Provider organizations that referred SUD patients did not foresee any changes in the referral process because of the transformation. Two of the fourteen organizations that referred SUD patients for treatment planned to integrate SUD services at the time of the interview.

Some participants described problems about the fee-for-service model, which they anticipated being addressed under the transformation. These included provider abuse of the reimbursement system and tedious credentialling and auditing processes. When asked about the relationship between provider organizations and LME/MCOs, a few described having access to knowledgeable representatives and effective working relationships. Some found it hard to work with a subset of LME/MCOs, mainly due to their restrictions on the level of care, narrow networks, and inconsistency in LME/MCO operations. One leader at a behavioral health organization described some of these challenges as follows:

> "Well, because I'm in behavioral health, we operate under managed care organizations, and they are quite challenging to work with. One is because I believe the goal is to reduce the network and providers. The MCO decides what services you can provide and what services you cannot provide. So, we offer a whole array of services, and our current MCOs say we only need this service and this service. So, our scope with them is very limited. However, we have patients who need higher levels of care than we provide, but we're not a provider for that MCO. So, then we have to transfer that patient out to services. Or patients call us, and they say, "No, we want to work with you," but we're not with their MCO. And that MCO won't let us in the network. So I think those are some of the

challenges. Clients don't get/have client choice, really for behavioral health." (Subject, 20, Executive Director, Behavioral Health organization)

SUD-related results from 2022 (first year of the transition to managed care)

Due to the delay in the implementation of tailored plans, interviews conducted during the first year of the transition to managed care focused on understanding the awareness and preparation of provider organizations toward tailored plan implementation. We interviewed 41 participants from 26 provider organizations between March and July 2022, which included 10 independent adult or pediatric primary care practices, 5 FQHCs, 4 health systems, 4 local health departments, and 3 health-system affiliated practices. Twelve participating practices and health systems were unsure about whether they would participate in the BH/IDD tailored plans, and four had no intent to participate due to their experience of implementing standard plans. Six were either gathering information or had contracts underway. Most participants favored further delay in implementing tailored plans. They described the need for more information and clarity about the processes and the role of each entity involved.

We anticipate conducting additional semi-structured interviews with provider organizations about the implementation of tailored plans and provider experiences with SUD services, including MOUD, after the implementation of BH/IDD tailored plans.

Chapter 4: Disparities in care across subpopulations

In this chapter, we present subgroup ITS analyses for selected metrics to assess the effect of the SUD waiver on health equity for NC Medicaid beneficiaries with SUD. We assess differences in waiver effects by age group (<18, 18-64, 65+), sex, race, ethnicity, rurality, and disability status.

We extend the ITS models discussed in Chapter 2 by sequentially interacting each subgroup variable with the SUD implementation variable and the SUD implementation/time trend interaction. Each level of the subgroup variable can be associated with a distinct immediate effect and time trend effect of the SUD waiver, and we test for differences in these effects by subgroup membership. We also test the hypothesis that the SUD waiver had no differential effect by subgroup on the outcome in the last study period (September 2022 for most metrics). We use the modal category for each metric as reference. We summarize the metrics analyzed and the presence of differences in the effects of the SUD waiver by subgroups in the table below, followed by a presentation of results for each metric. The effect reported is a difference in SUD waiver effects in September 2022.

4.1 Medicaid Beneficiaries with SUD Diagnosis (M3)

The first metric we examined by stratified group is the proportion of beneficiaries of each subgroup that had received a diagnosis of SUD in the past 12 months. Each row in the table below presents the results of a model where we test the hypothesis of no difference in the impact of SUD waiver implementation on the overall rate of diagnosis and on changes in the trend in the SUD diagnosis rate. Below the table we present figures that show the stratified trends by subgroups.

For this metric, we find:

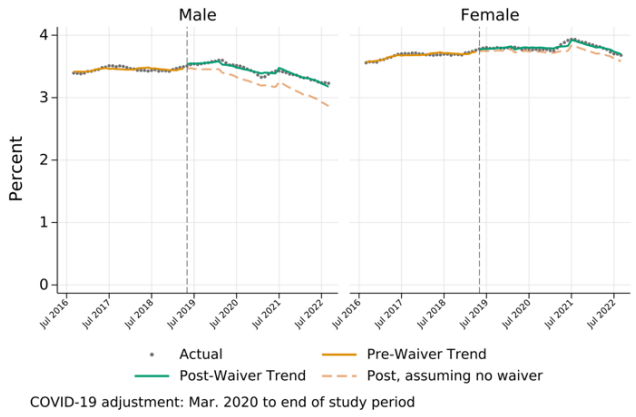
- The two groups with the largest positive effect of the waiver were AIAN (versus not-AIAN) and non-elderly adults versus children. For both groups we estimate that SUD waiver implementation was associated with about a 0.5% point increase in the rate of diagnoses in contrast with their referent group.
- We also see greater effects in non-White (vs. White) beneficiaries and disabled vs non-disabled populations.
- We estimate that the trends in the rate of diagnoses are increasing faster in men vs women, elderly adults vs kids, kids vs. non-elderly adults, Hispanic vs not-Hispanic, not-AIAN vs AIAN, and not disabled vs disabled populations.

- Overall, we estimate that the difference in the rate of diagnosis is greater on September 2022 for men vs. women, kids vs. non-elderly adults, elderly beneficiaries vs kids, and Hispanic vs not-Hispanic.

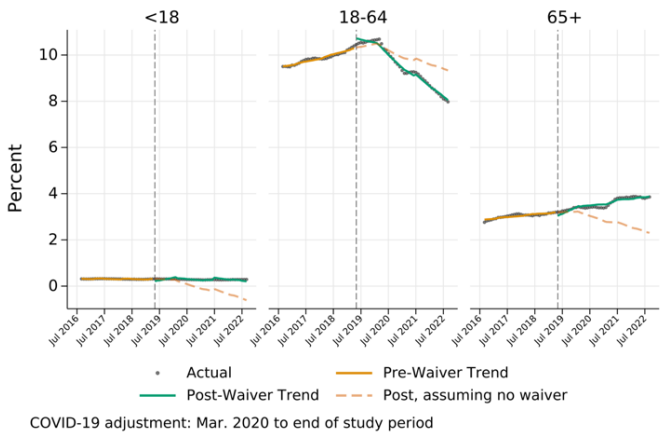
Table 4.1 Medicaid Beneficiaries with SUD Diagnosis

Comparison groups	Difference in the overall effect of the SUD waiver	Difference in the Trend by subpopulations	Avg. Outcome, Sept 2022 (Diff.)
Male vs. Female	0.0412 (-0.0076, 0.0900)	0.0039* (0.0008, 0.0069)	0.1957* (0.0587, 0.3327)
18-64 vs. <18	0.50* (0.42, 0.57)	-0.065* (-0.069, -0.060)	-2.10* (-2.30, -1.90)
65+ vs. <18	-0.06 (-0.15, 0.04)	0.020* (0.014, 0.026)	0.76* (0.49, 1.03)
Hispanic vs. Not Hispanic	-0.0495 (-0.0895, -0.0095)	0.0041* (0.0016, 0.0065)	0.1127* (0.0021, 0.2234)
Not White vs. White	0.068* (0.018, 0.117)	-0.0024 (-0.0055, 0.0006)	-0.03 (-0.17, 0.11)
Black vs. Not Black	0.0276 (-0.022, 0.077)	-0.0011 (-0.0042, 0.0019)	-0.02 (-0.16, 0.12)
AAPI vs. Not AAPI	-0.051 (-0.130, 0.028)	-0.0039 (-0.0086, 0.0008)	-0.2065 (-0.4198, 0.0068)
AIAN vs. Not AIAN	0.49* (0.28, 0.70)	-0.0185* (-0.0313, -0.0057)	-0.249 (-0.8295, 0.3314)
Disabled vs. Not Disabled	0.25* (0.14, 0.35)	-0.0077* (-0.0142, -0.0012)	-0.06 (-0.35, 0.23)
Rural vs. Urban	0.030 (-0.020, 0.080)	0.0019 (-0.0011, 0.0050)	0.107 (-0.033, 0.247)

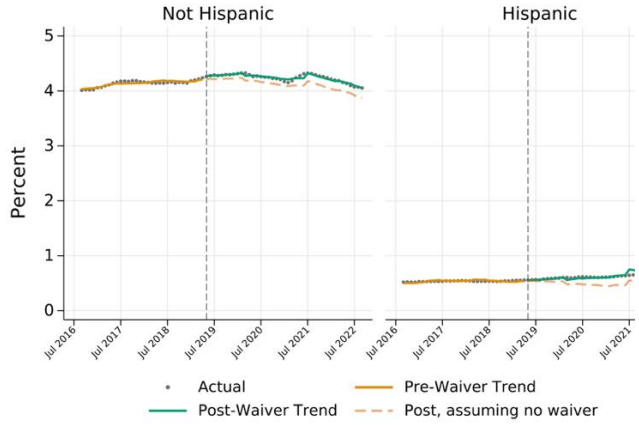
Sex



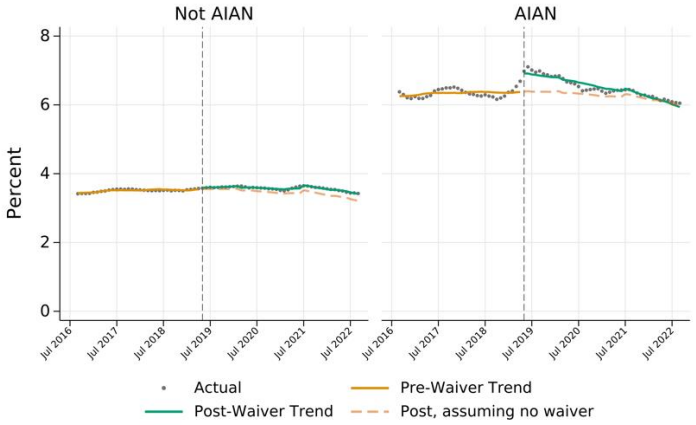
Age



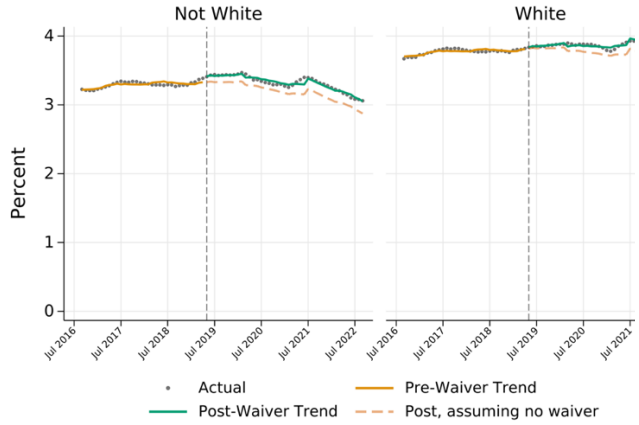
Race/Ethnicity



COVID-19 adjustment: Mar. 2020 to end of study period



COVID-19 adjustment: Mar. 2020 to end of study period



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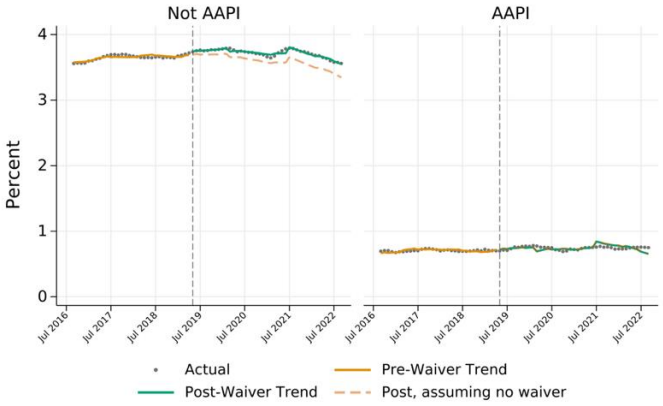
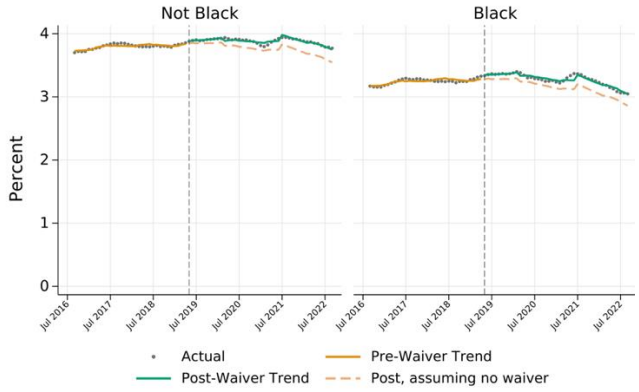
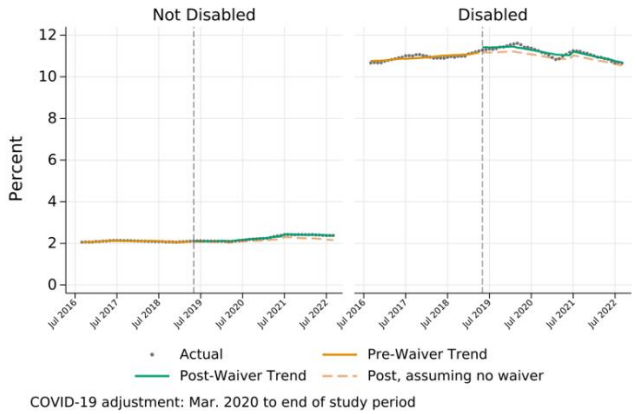


COVID-19 adjustment: Mar. 2020 to end of study period

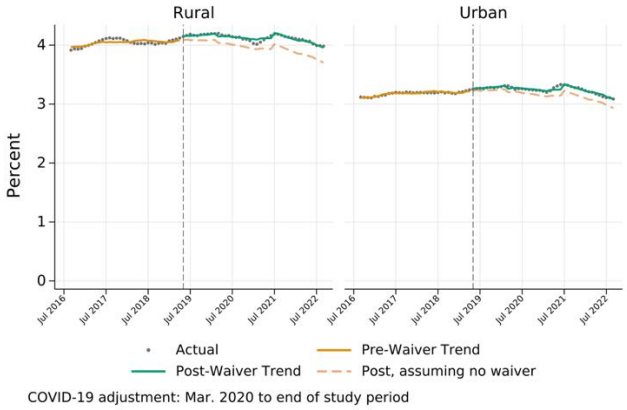


COVID-19 adjustment: Mar. 2020 to end of study period

Disability



Urban/Rural



4.1 Percent Medicaid Beneficiaries with a SUD Diagnosis who receive any type of SUD treatment

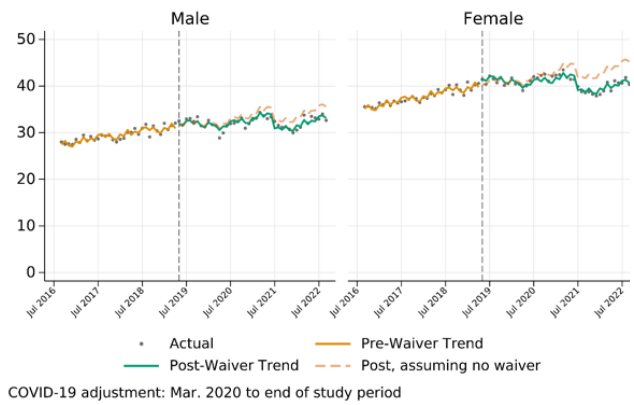
In examining the effect of the SUD waiver implementation on the percent of beneficiaries diagnosed with SUD who receive any treatment, we find:

- The two groups with the largest positive effect of the waiver were non-elderly adults versus children and women versus men. We estimate that SUD waiver implementation was associated with a 3.2%-point increase in the treatment rate for non-elderly adults versus children. We also estimate that the SUD waiver was associated with an increase of 0.72% points for women vs. men.
- None of the other subgroups showed any statistically significant differences in overall effects of the waiver.
- We find several groups where there were differences in the relative trends in the treatment rate since the SUD waiver was implemented. We find greater increases in the treatment rate for men vs women, children vs non-elderly adults, elderly adults vs non-elderly adults, non-White racial groups vs White race, Black vs. non-Black, and disabled vs. non-disabled beneficiaries with SUD.
- Overall, we estimate that the difference in the treatment rate is greater on September 2022 for men vs. women, kids vs. non-elderly adults, elderly beneficiaries vs non-elderly adults, non-White vs White, Black vs. non-Black, and disabled vs. non-disabled beneficiaries.

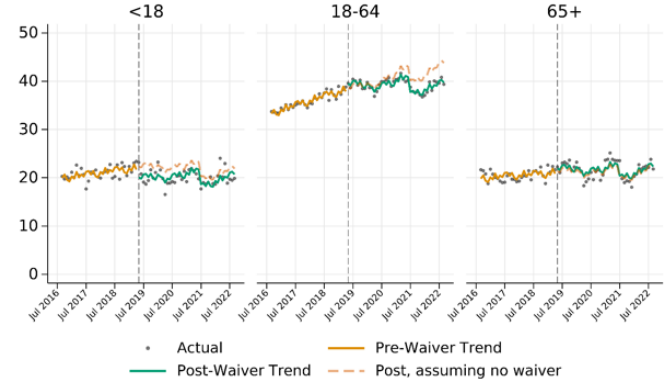
Table 4.2 Percent Medicaid Beneficiaries with a SUD Diagnosis who receive any type of SUD treatment

Comparison groups	Difference in the overall effect of the SUD waiver	Difference in the Trend by subpopulations	Avg. Outcome, Sept 2022 (Diff.)
Male vs. Female	-0.72* (-1.27, -0.17)	0.070* (0.039, 0.102)	2.09* (0.63, 3.55)
<18 vs. 18-64	-3.18* (-4.28, -2.08)	0.15* (0.10, 0.21)	2.93* (0.17, 5.70)
65+ vs. 18-64	-0.36 (-1.30, 0.58)	0.12* (0.06, 0.17)	4.42* (1.87, 6.98)
Hispanic vs. Not Hispanic	0.01 (-1.68, 1.70)	-0.02 (-0.11, 0.07)	-0.88 (-5.21, 3.44)
Not White vs. White	0.39 (-0.16, 0.93)	0.12* (0.09, 0.15)	5.10* (3.67, 6.53)
Black vs. Not Black	0.50 (-0.05, 1.05)	0.13* (0.10, 0.16)	5.59* (4.16, 7.02)
AAPI vs. Not AAPI	-0.60 (-4.34, 3.15)	0.09 (-0.13, 0.32)	3.17 (-7.24, 13.58)
AIAN vs. Not AIAN	-0.59 (-1.98, 0.79)	-0.019 (-0.098, 0.060)	-1.35 (-5.05, 2.34)
Disabled vs. Not Disabled	-0.91 (-1.47, -0.35)	0.12* (0.09, 0.15)	3.83* (2.35, 5.32)
Rural vs. Urban	-0.53 (-1.08, 0.03)	0.007 (-0.025, 0.039)	-0.26 (-1.74, 1.22)

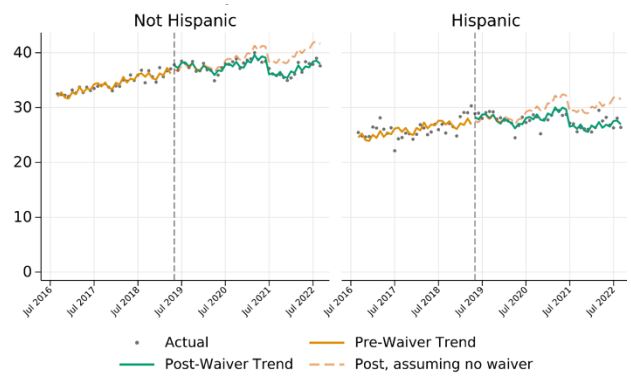
Sex



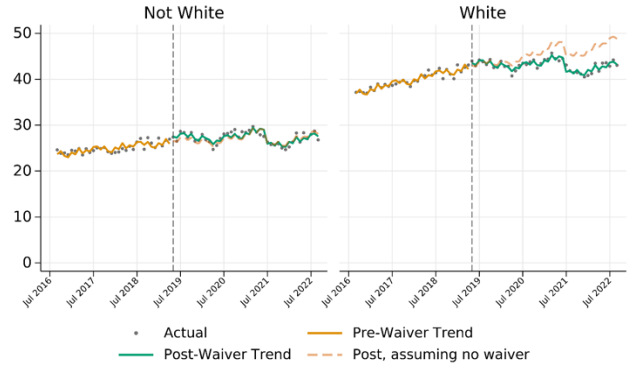
Age



Race/Ethnicity



COVID-19 adjustment: Mar. 2020 to end of study period



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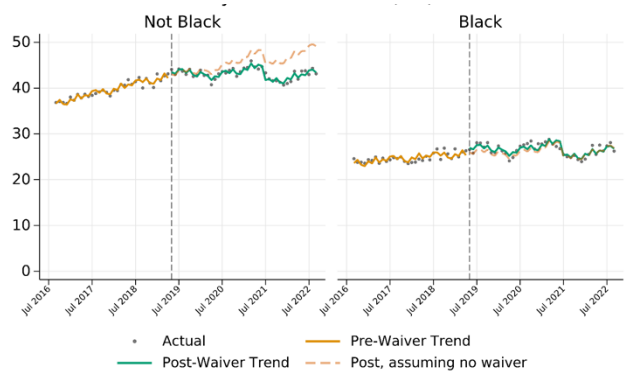

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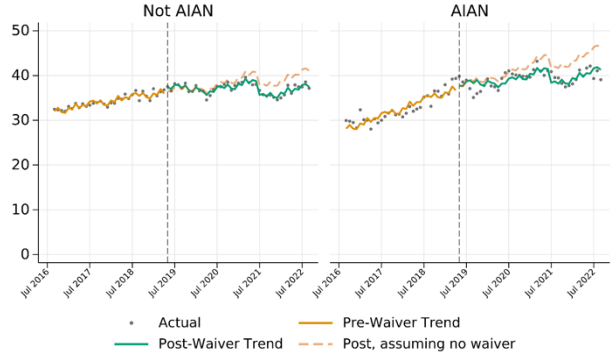

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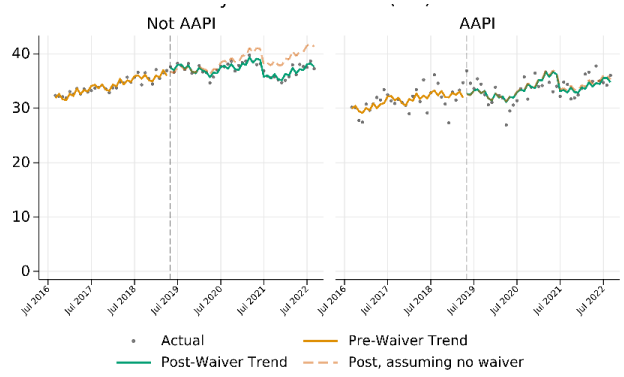
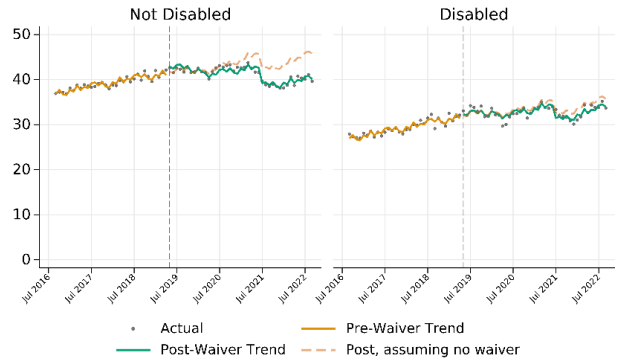


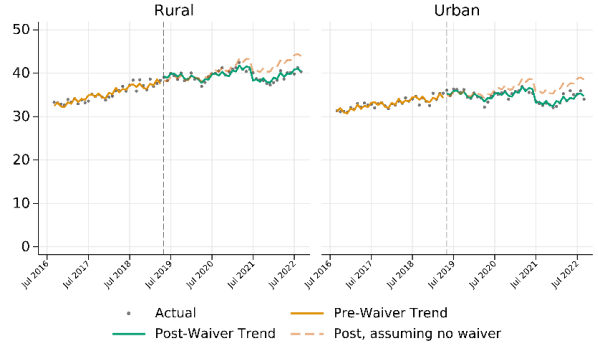
COVID-19 adjustment: Mar. 2020 to end of study period

Disability



COVID-19 adjustment: Mar. 2020 to end of study period

Urban/Rural



COVID-19 adjustment: Mar. 2020 to end of study period

4.3 Outpatient Services for SUD (M8)

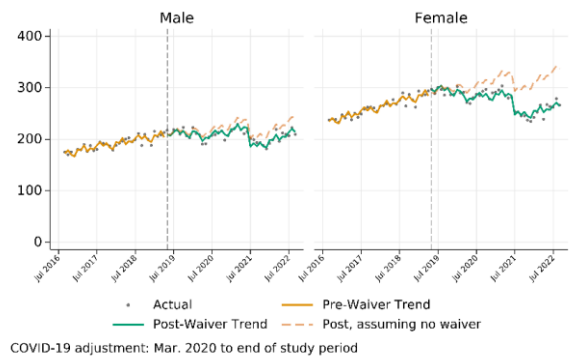
We examined differences in the effect of SUD waiver implementation on the percent of beneficiaries diagnosed with SUD who receive outpatient services. We found:

- Relatively large differences in the effects of the SUD waiver between men and women, by age group and by urban vs rural location, but few differences by race, ethnicity or disability.
- We estimate that SUD waiver implementation was associated with a 6.4% point higher rate of outpatient treatment for women over men, and greater outpatient treatment rates for non-elderly adults vs either children or elderly beneficiaries. We also estimate that the SUD waiver had a 10.6% point greater effect for urban beneficiaries over their rural counterparts.
- None of the other subgroups showed any statistically significant differences in overall effects of the waiver.
- We find several groups where there were differences in the relative trends in the outpatient treatment rate since the SUD waiver was implemented. We find greater increases in the treatment rate for men vs women, children vs non-elderly adults, elderly adults vs non-elderly adults, non-White racial groups vs White race, Black vs. non-Black, and disabled vs. non-disabled beneficiaries with SUD.
- Combining these results, we estimate that the difference in the outpatient treatment rate is proportionately greater on September 2022 for men vs. women, kids vs. non-elderly adults, elderly beneficiaries vs non-elderly adults, non-White vs White, Black vs. non-Black, and disabled vs. non-disabled beneficiaries.

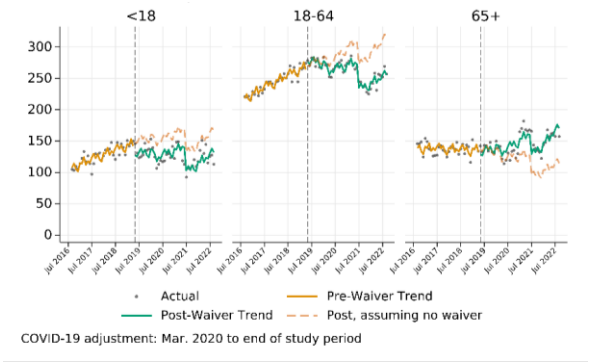
Table 4.3 Outpatient Services for SUD

Comparison groups	Difference in the overall effect of the SUD waiver	Difference in the Trend by subpopulations	Avg. Outcome, Sept 2022 (Diff.)
Male vs. Female	-6.35* (-11.38, -1.32)	1.38* (1.09, 1.68)	48.94* (35.35, 62.52)
<18 vs. 18-64	-26.36* (-35.83, -16.88)	1.32* (0.81, 1.82)	26.34* (2.48, 50.21)
65+ vs. 18-64	-12.87* (-20.98, -4.76)	3.24* (2.75, 3.72)	116.58* (93.97, 139.19)
Hispanic vs. Not Hispanic	-5.95 (-20.89, 8.98)	0.14 (-0.70, 0.98)	-0.18 (-39.63, 39.27)
Not White vs. White	0.83 (-4.13, 5.79)	2.65* (2.36, 2.94)	106.88* (93.61, 120.16)
Black vs. Not Black	0.83 (-4.12, 5.77)	2.66* (2.38, 2.95)	107.37* (94.14, 120.60)
AAPI vs. Not AAPI	-2.56 (-36.06, 30.93)	0.24 (-1.75, 2.23)	6.98 (-86.55, 100.50)
AIAN vs. Not AIAN	1.79 (-11.36, 14.95)	0.67 (-0.08, 1.43)	28.77 (-6.24, 63.79)
Disabled vs. Not Disabled	-4.18 (-9.32, 0.96)	2.47* (2.16, 2.77)	94.43* (80.54, 108.33)
Rural vs. Urban	-10.64* (-15.75, -5.53)	0.07 (-0.23, 0.37)	-7.75 (-21.54, 6.05)

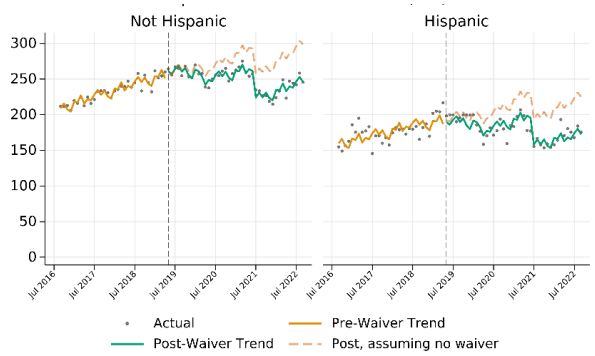
Sex



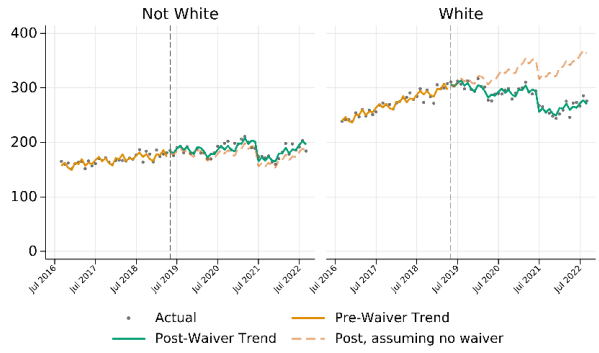
Age



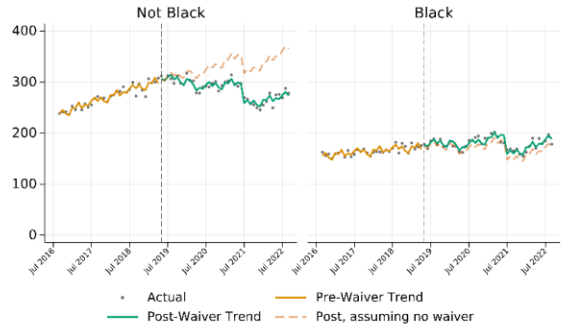
Race/Ethnicity



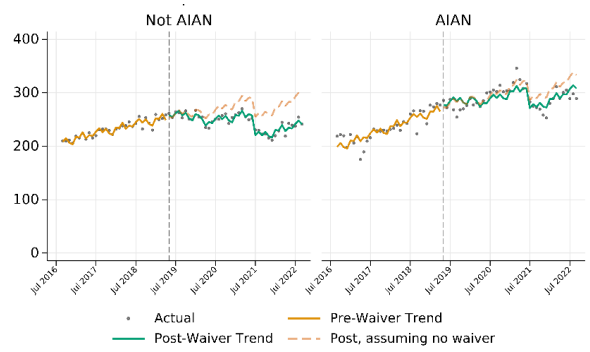
COVID-19 adjustment: Mar. 2020 to end of study period



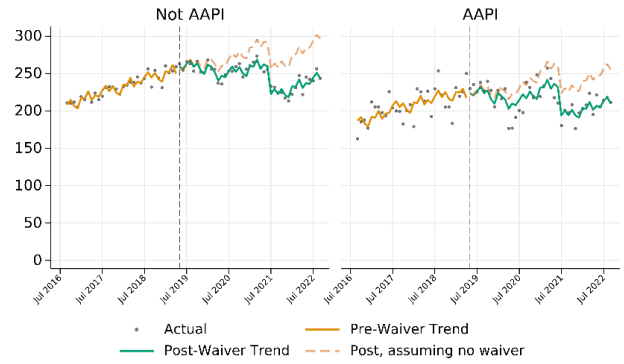
COVID-19 adjustment: Mar. 2020 to end of study period



COVID-19 adjustment: Mar. 2020 to end of study period

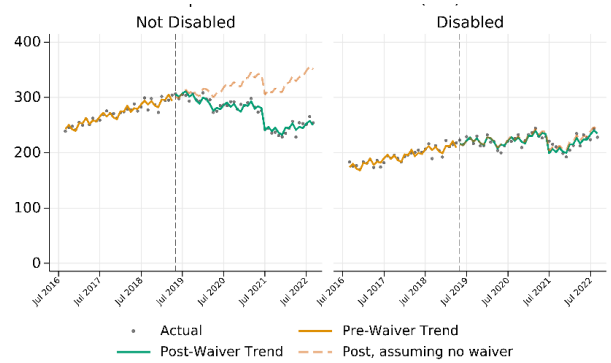


COVID-19 adjustment: Mar. 2020 to end of study period



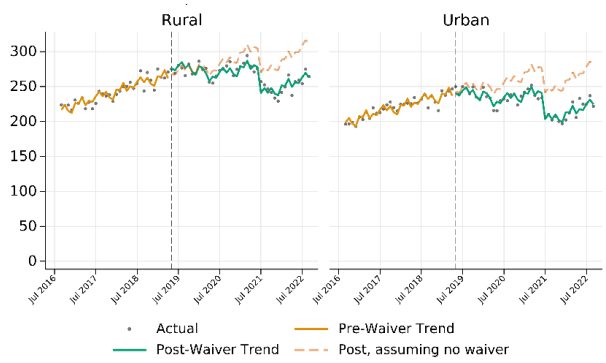
COVID-19 adjustment: Mar. 2020 to end of study period

Disability



COVID-19 adjustment: Mar. 2020 to end of study period

Urban/Rural



COVID-19 adjustment: Mar. 2020 to end of study period

4.4 Medication-Assisted Treatment (M12)

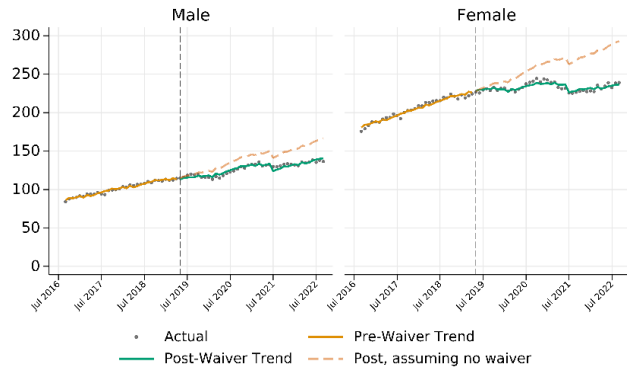
We examined differences in the effect of SUD waiver implementation on the percent of beneficiaries diagnosed with SUD who receive MAT. We found:

- SUD waiver implementation was associated with a larger effects on MAT non-elderly adults vs children (9.0% point difference) and non-disabled over disabled beneficiaries (6.0% points) or elderly beneficiaries.
- None of the other subgroups showed any statistically significant differences in overall effects of the waiver.
- We find several groups with differences in relative trends in MAT since the SUD waiver was implemented. We find greater increases in the treatment rate for men vs women, children vs non-elderly adults, non-White vs White, Black vs. non-Black, non-AIAN vs. AIAN, disabled vs. non-disabled, and rural vs. urban beneficiaries with SUD.
- Combining these results, we estimate that the difference in MAT is proportionately greater on September 2022 for men vs. women, kids vs. non-elderly adults, non-White vs White, Black vs. non-Black, non-AIAN vs AIAN, and disabled vs. non-disabled beneficiaries.

Table 4.4 Medication-Assisted Treatment

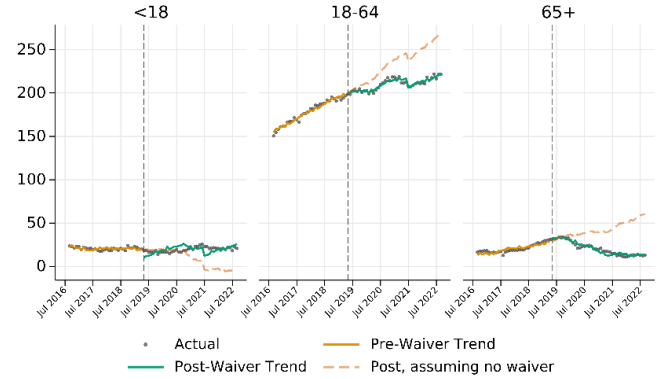
Comparison groups	Difference in the overall effect of the SUD waiver	Difference in the Trend by subpopulations	Avg. Outcome, Sept 2022 (Diff.)
Male vs. Female	-2.17 (-6.49, 2.14)	0.83* (0.55, 1.11)	30.91* (18.35, 43.46)
<18 vs. 18-64	-8.97* (-15.08, -2.86)	2.16* (1.78, 2.55)	77.56* (59.76, 95.37)
65+ vs. 18-64	3.63 (-1.83, 9.08)	-0.10 (-0.49, 0.28)	-0.53 (-17.18, 16.12)
Hispanic vs. Not Hispanic	5.64 (-6.81, 18.10)	-0.25 (-1.01, 0.50)	-4.53 (-39.36, 30.30)
Not White vs. White	-0.47 (-4.46, 3.52)	0.97* (0.71, 1.23)	38.29* (26.74, 49.84)
Black vs. Not Black	0.18 (-3.75, 4.11)	1.19* (0.94, 1.45)	47.90* (36.54, 59.27)
AAPI vs. Not AAPI	12.71 (-17.63, 43.06)	0.30 (-1.54, 2.15)	24.75 (-59.06, 108.57)
AIAN vs. Not AIAN	-5.62 (-17.04, 5.80)	-1.38* (-2.11, -0.65)	-60.68* (-93.38, -27.99)
Disabled vs. Not Disabled	-5.97* (-10.52, -1.42)	1.42* (1.13, 1.71)	50.91* (37.76, 64.05)
Rural vs. Urban	-3.97 (-8.47, 0.53)	0.33* (0.04, 0.62)	9.31 (-3.74, 22.36)

Sex



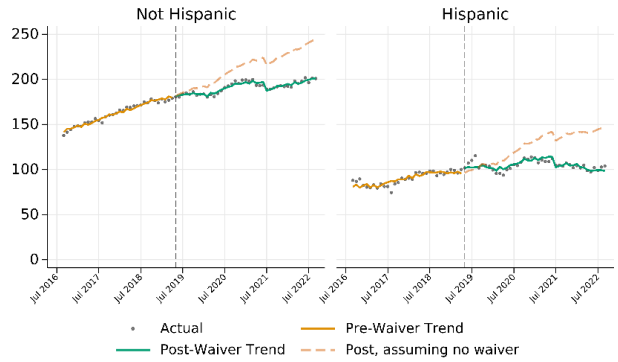
COVID-19 adjustment: Mar. 2020 to end of study period

Age

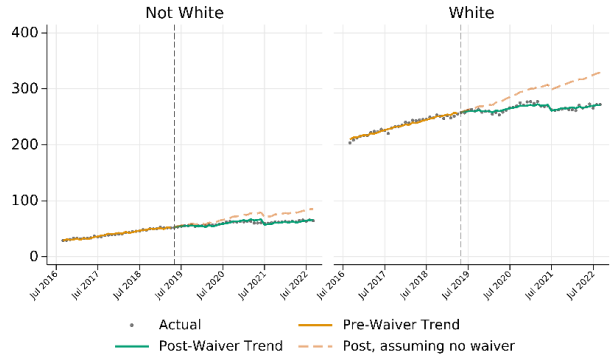


COVID-19 adjustment: Mar. 2020 to end of study period

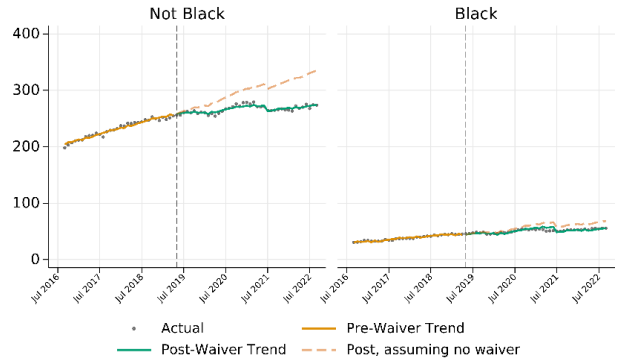
Race/Ethnicity



COVID-19 adjustment: Mar. 2020 to end of study period



COVID-19 adjustment: Mar. 2020 to end of study period



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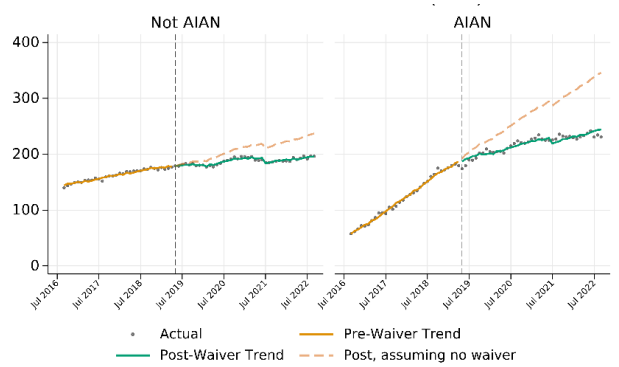

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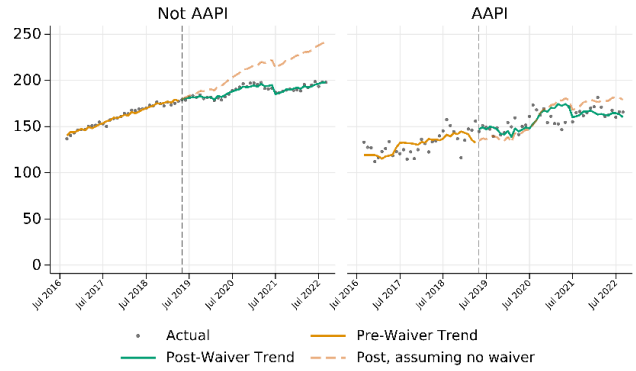
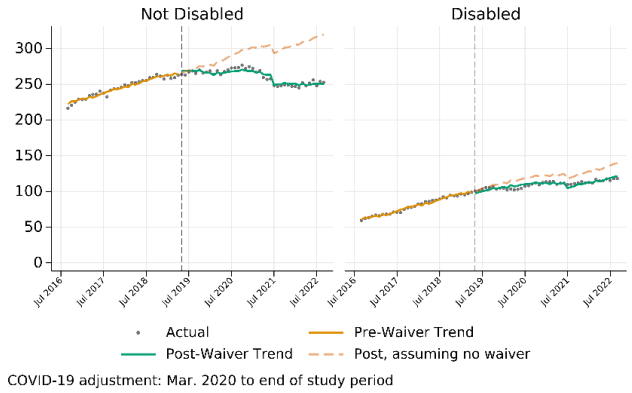


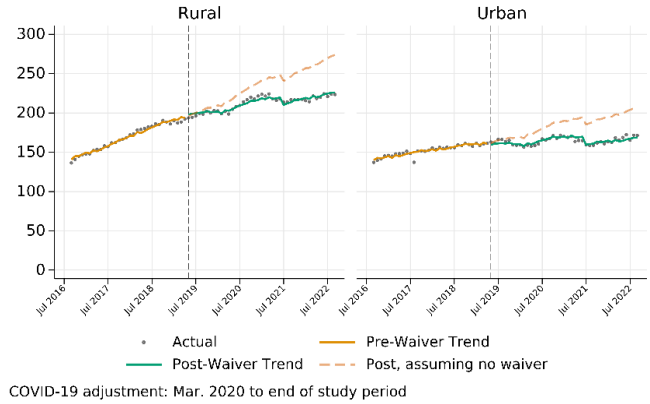
COVID-19 adjustment: Mar. 2020 to end of study period

Disability



COVID-19 adjustment: Mar. 2020 to end of study period

Urban/Rural



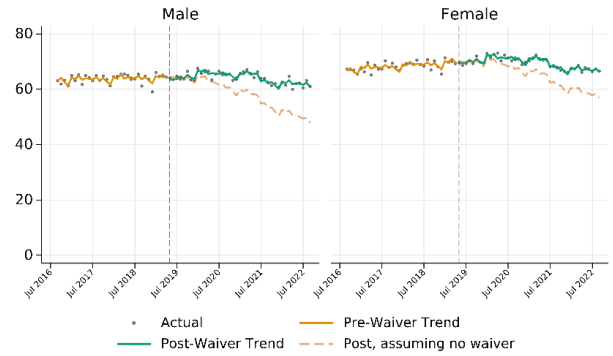
COVID-19 adjustment: Mar. 2020 to end of study period

4.5 Access to Preventive/Ambulatory Health Services for Adult Medicaid Beneficiaries with SUD (M32)

Table 4.5 Access to Preventive/Ambulatory Health Services for Adult Medicaid Beneficiaries with SUD

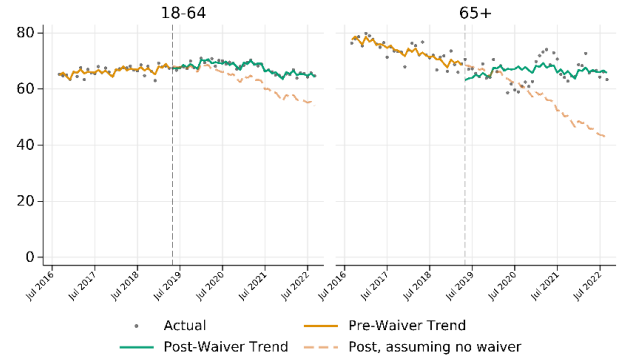
Comparison groups	Difference in the overall effect of the SUD waiver	Difference in the Trend by subpopulations	Avg. Outcome, Sept 2022 (Diff.)
Male vs. Female	-0.3296 (-1.1288, 0.4696)	0.1012 (0.0520, 0.1504)	3.7165 (1.4503, 5.9826)
<18 vs. 18-64			
65+ vs. 18-64	-4.4938 (-6.3329, -2.6548)	0.4527 (0.3423, 0.5631)	13.6138 (8.5278, 18.6998)
Hispanic vs. Not Hispanic	0.8856 (-2.2740, 4.0452)	0.0007 (-0.1877, 0.1892)	0.9154 (-7.8624, 9.6932)
Not White vs. White	-1.5508 (-2.3949, -0.7067)	0.3262 (0.2756, 0.3768)	11.4982 (9.1649, 13.8316)
Black vs. Not Black	-1.7968 (-2.6531, -0.9406)	0.2918 (0.2407, 0.3429)	9.8759 (7.5207, 12.2310)
AAPI vs. Not AAPI	-3.8149 (-9.4038, 1.7740)	-0.3447 (-0.6595, -0.0299)	-17.6041 (-31.7033, -3.5049)
AIAN vs. Not AIAN	1.8945 (-0.0414, 3.8303)	0.2917 (0.1717, 0.4117)	13.5624 (7.9873, 19.1374)
Disabled vs. Not Disabled	-1.0427 (-1.8115, -0.2740)	0.3133 (0.2661, 0.3605)	11.4894 (9.3156, 13.6631)
Rural vs. Urban	-0.5156 (-1.2904, 0.2591)	0.0392 (-0.0085, 0.0870)	1.0543 (-1.1447, 3.2533)

Sex



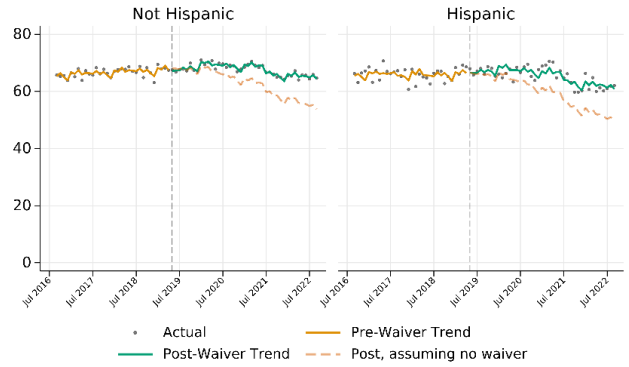
COVID-19 adjustment: Mar. 2020 to end of study period

Age

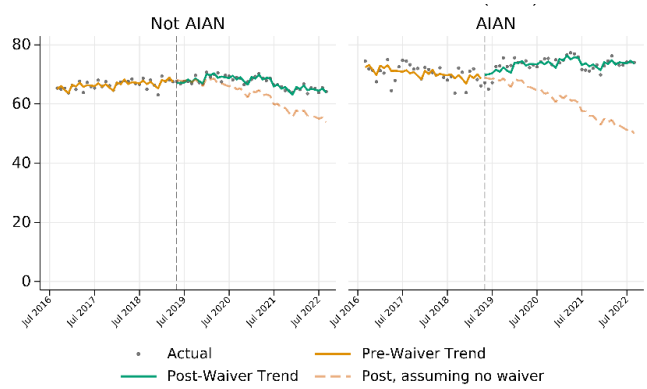


COVID-19 adjustment: Mar. 2020 to end of study period

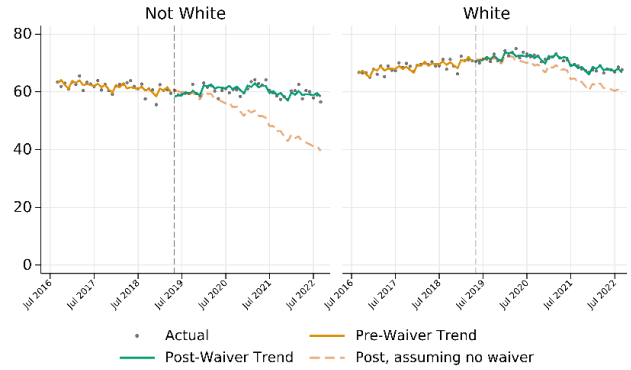
Race/Ethnicity



COVID-19 adjustment: Mar. 2020 to end of study period



COVID-19 adjustment: Mar. 2020 to end of study period



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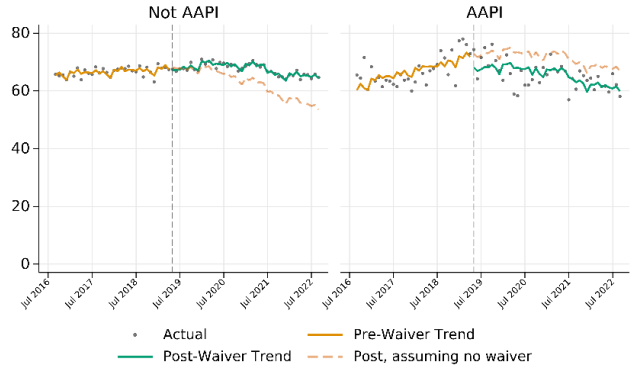

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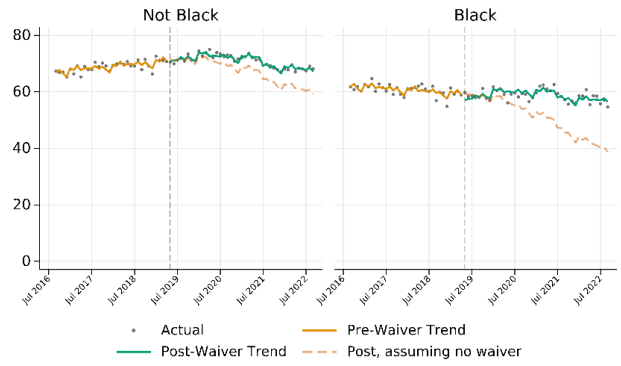
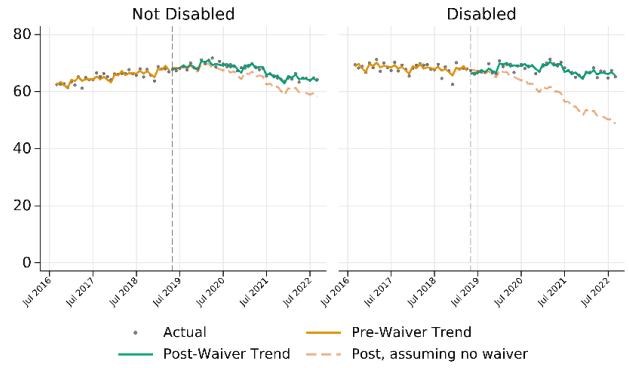


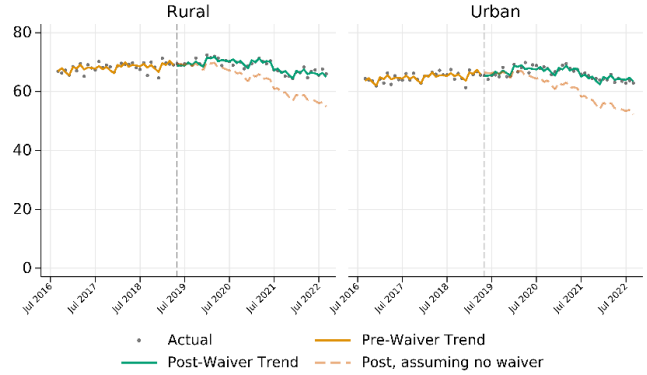
COVID-19 adjustment: Mar. 2020 to end of study period

Disability



COVID-19 adjustment: Mar. 2020 to end of study period

Urban/Rural



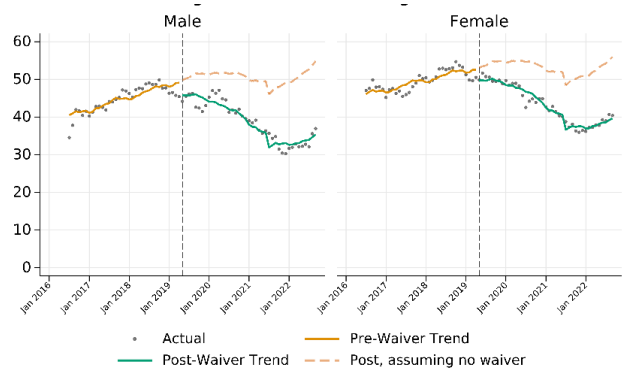
COVID-19 adjustment: Mar. 2020 to end of study period

4.6 Percent of Individuals Receiving MOUD who are also Receiving Counseling and Behavioral Therapies to Treat Substance Use Disorders (Q3)

Table 4.6 Percent of Individuals Receiving MOUD who are also Receiving Counseling and Behavioral Therapies to Treat Substance Use Disorders

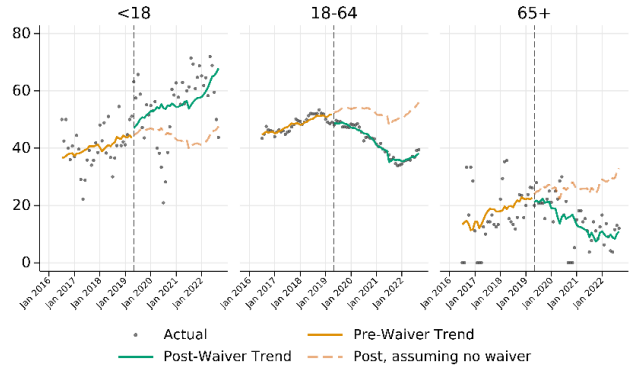
Comparison groups	Difference in the overall effect of the SUD waiver	Difference in the Trend by subpopulations	Avg. Outcome, Sept 2022 (Diff.)
Male vs. Female	-0.6507 (-4.4706, 3.1692)	-0.063 (-0.2716, 0.1456)	-3.1715 (-13.0986, 6.7555)
<18 vs. 18-64	5.9957 (-7.3913, 19.3828)	0.8016 (0.0921, 1.5112)	38.0608 (6.0480, 70.0736)
65+ vs. 18-64	0.9204 (-15.4977, 17.3385)	-0.1305 (-1.1877, 0.9268)	-4.2976 (-55.1835, 46.5882)
Hispanic vs. Not Hispanic	4.5339 (-10.3844, 19.4522)	-0.2327 (-0.9544, 0.4890)	-4.7744 (-40.6858, 31.1371)
Not White vs. White	2.2624 (-2.5256, 7.0503)	0.002 (-0.2691, 0.2731)	2.3437 (-10.4926, 15.1800)
Black vs. Not Black	1.0433 (-4.1728, 6.2593)	-0.0189 (-0.3102, 0.2723)	0.2853 (-13.5167, 14.0873)
AAPI vs. Not AAPI	2.9405 (-23.0115, 28.8926)	-0.0751 (-1.5583, 1.4080)	-0.0646 (-72.6209, 72.4917)
AIAN vs. Not AIAN	2.5871 (-4.7082, 9.8825)	-0.1757 (-0.6127, 0.2613)	-4.4404 (-25.1079, 16.2271)
Disabled vs. Not Disabled	-1.2609 (-4.9563, 2.4344)	-0.034 (-0.2394, 0.1714)	-2.6208 (-12.3228, 7.0812)
Rural vs. Urban	-4.5336 (-8.1165, -0.9507)	-0.361 (-0.5533, -0.1687)	-18.972 (-28.1074, -9.8367)

Sex



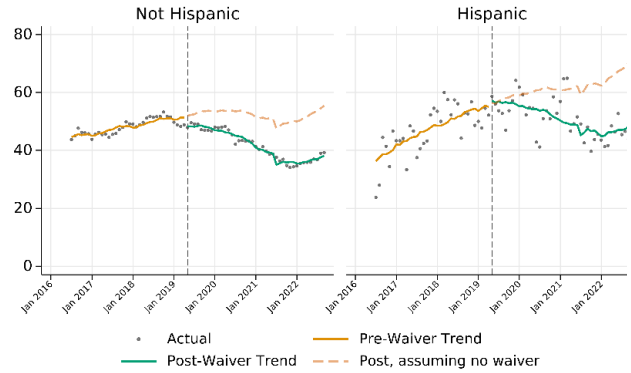
COVID-19 adjustment: Mar. 2020 to end of study period

Age

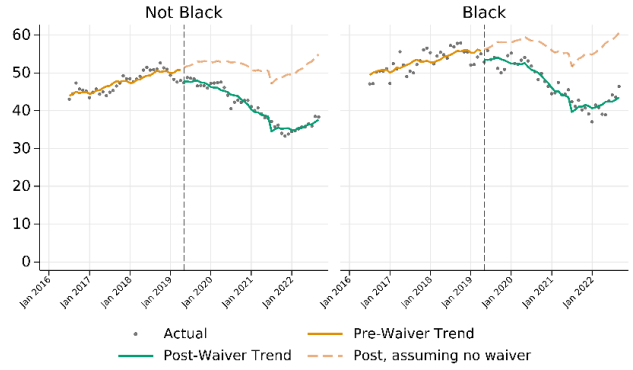


COVID-19 adjustment: Mar. 2020 to end of study period

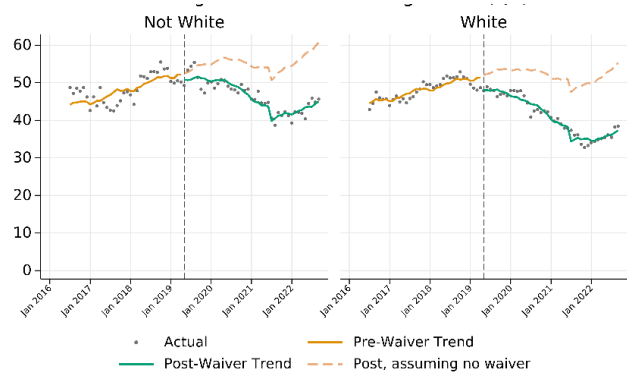
Race/Ethnicity



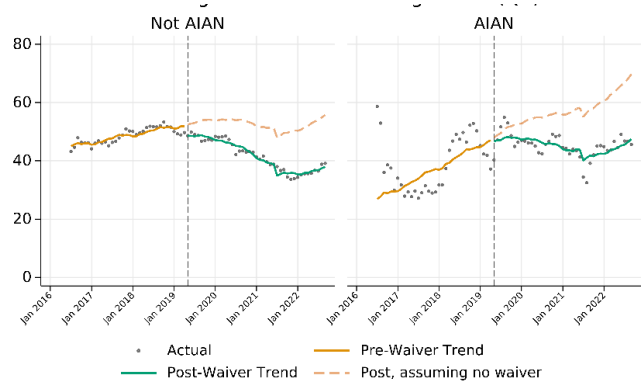
COVID-19 adjustment: Mar. 2020 to end of study period



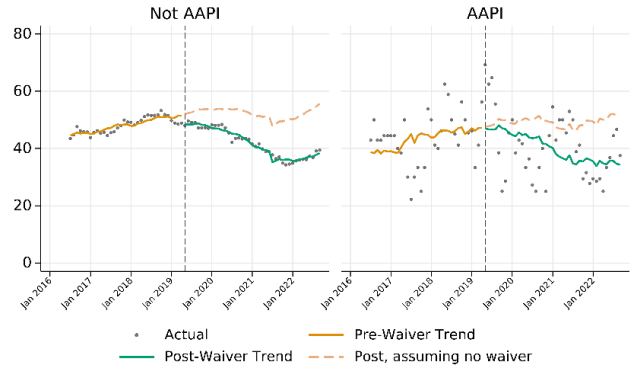
COVID-19 adjustment: Mar. 2020 to end of study period



COVID-19 adjustment: Mar. 2020 to end of study period

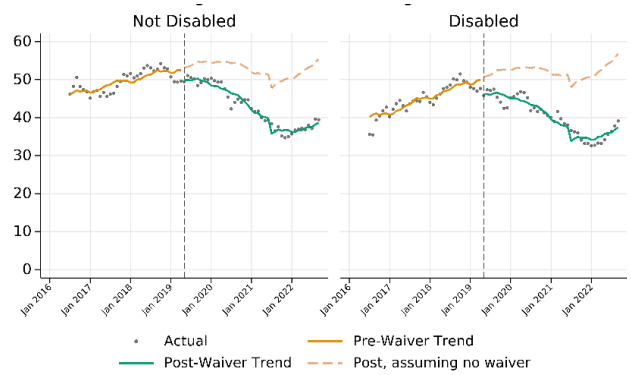


COVID-19 adjustment: Mar. 2020 to end of study period



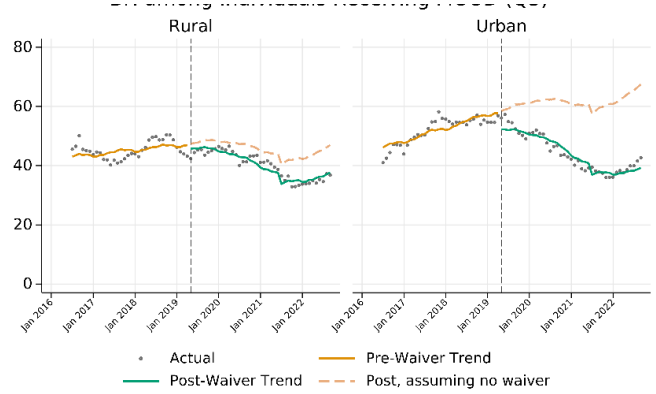
COVID-19 adjustment: Mar. 2020 to end of study period

Disability



COVID-19 adjustment: Mar. 2020 to end of study period

Urban/Rural



COVID-19 adjustment: Mar. 2020 to end of study period

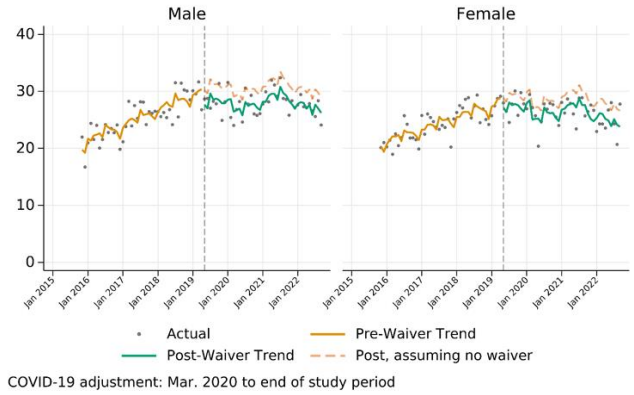
4.7 30-Day Follow-Up After Emergency Department Visit for Alcohol and Other Drug Abuse or Dependence (M17.1)

Table 4.7 30-Day Follow-Up After Emergency Department Visit for Alcohol and Other Drug Abuse or Dependence

Comparison groups	Difference in the overall effect of the SUD waiver	Difference in the Trend by subpopulations	Avg. Outcome, Sept 2022 (Diff.)
Male vs. Female	0.8845 (-1.6798, 3.4489)	-0.0234 (-0.1360, 0.0892)	-0.0516 (-5.1275, 5.0243)
Hispanic vs. Not Hispanic	2.4605 (-5.6664, 10.5875)	-0.0925 (-0.4612, 0.2762)	-1.2389 (-19.3342, 16.8564)
Not White vs. White	-0.6315 (-3.1937, 1.9307)	0.0476 (-0.0659, 0.1611)	1.2724 (-3.8414, 6.3861)

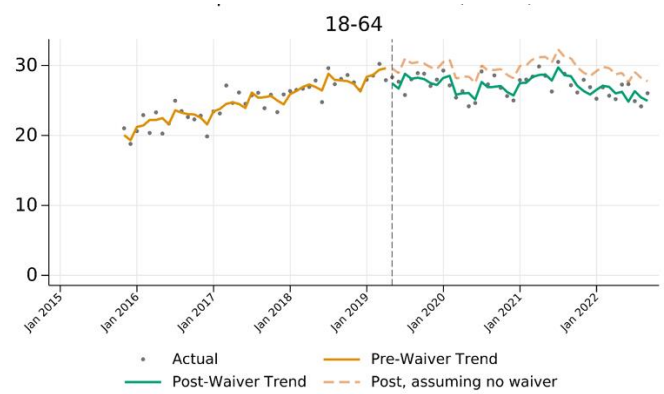
Comparison groups	Difference in the overall effect of the SUD waiver	Difference in the Trend by subpopulations	Avg. Outcome, Sept 2022 (Diff.)
Black vs. Not Black	-0.8669 (-3.4346, 1.7007)	-0.0474 (-0.1609, 0.0660)	-2.7638 (-7.8897, 2.3622)
AAPI vs. Not AAPI	17.9758 (-0.2371, 36.1888)	0.1235 (-0.6361, 0.8831)	22.9145 (-13.5987, 59.4277)
AIAN vs. Not AIAN	-4.2858 (-10.5341, 1.9626)	0.4584 (0.1803, 0.7365)	14.0492 (1.6945, 26.4039)
Disabled vs. Not Disabled	0.8493 (-1.7879, 3.4864)	0.097 (-0.0169, 0.2108)	4.7276 (-0.4279, 9.8831)
Rural vs. Urban	0.1706 (-2.3904, 2.7315)	0.2302 (0.1184, 0.3421)	9.3805 (4.3407, 14.4203)

Sex



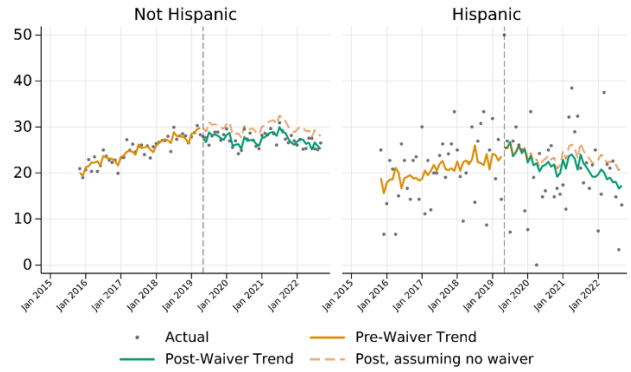
COVID-19 adjustment: Mar. 2020 to end of study period

Age

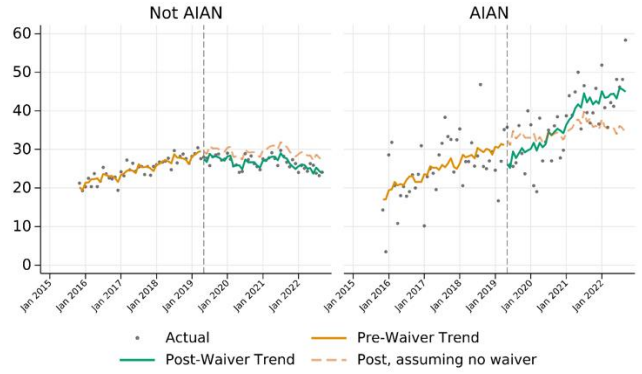


COVID-19 adjustment: Mar. 2020 to end of study period

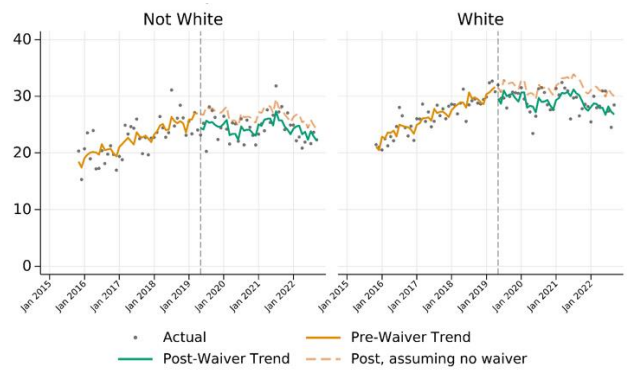
Race/Ethnicity



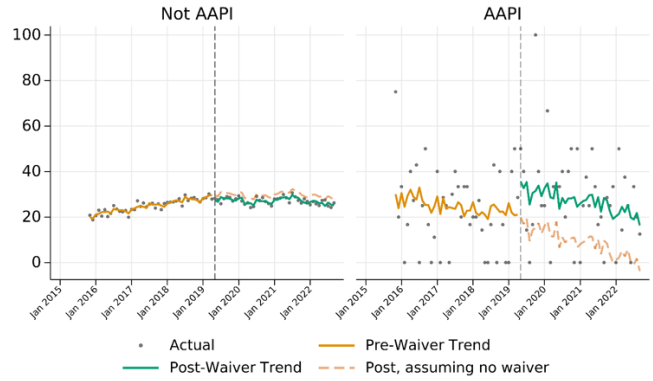
COVID-19 adjustment: Mar. 2020 to end of study period



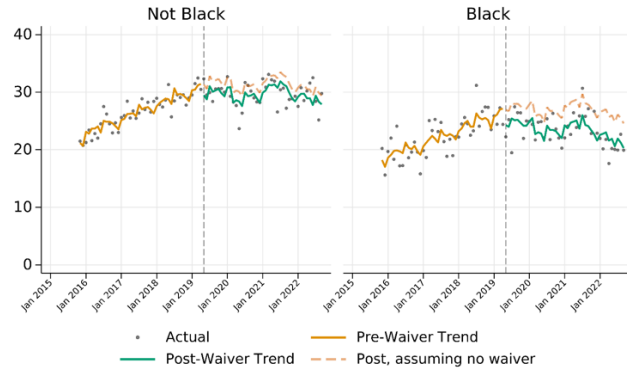
COVID-19 adjustment: Mar. 2020 to end of study period



COVID-19 adjustment: Mar. 2020 to end of study period

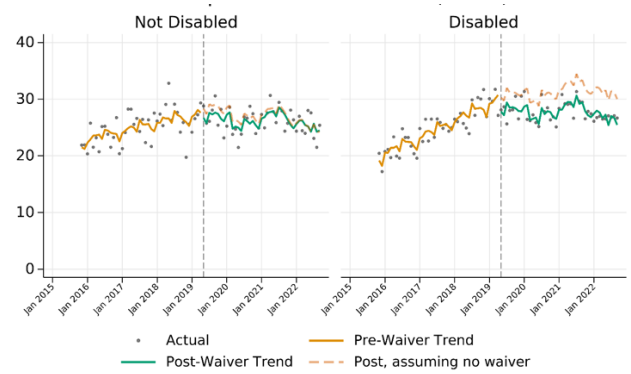


COVID-19 adjustment: Mar. 2020 to end of study period



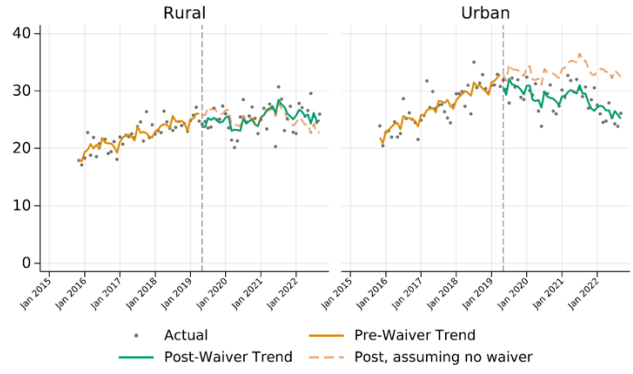
COVID-19 adjustment: Mar. 2020 to end of study period

Disability



COVID-19 adjustment: Mar. 2020 to end of study period

Urban/Rural



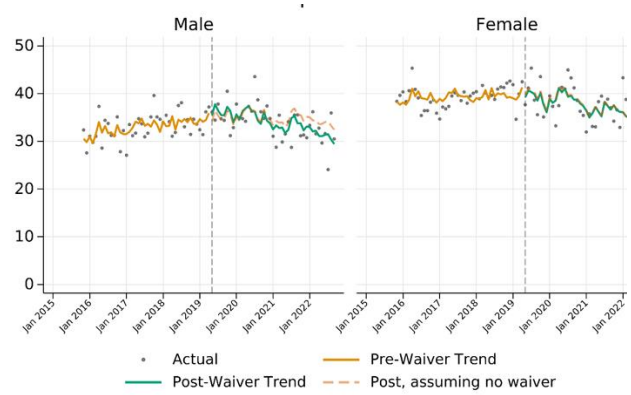
COVID-19 adjustment: Mar. 2020 to end of study period

4.8 Percent of Enrollees Diagnosed with OUD Receiving Non-medication Opioid Treatment Services

Table 4.8 Percent of Enrollees Diagnosed with OUD Receiving Non-medication Opioid Treatment Services

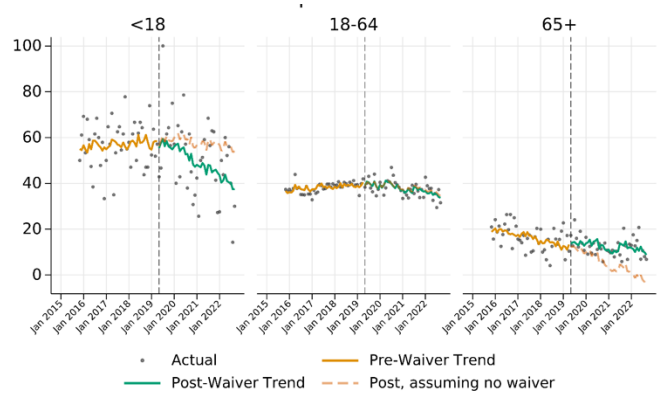
Comparison groups	Difference in the overall effect of the SUD waiver	Difference in the Trend by subpopulations	Avg. Outcome, Sept 2022 (Diff.)
Male vs. Female	1.7842 (-1.1102, 4.6785)	-0.1215 (-0.2377, -0.0054)	-3.0769 (-8.2062, 2.0525)
<18 vs. 18-64	-0.8301 (-10.5421, 8.8819)	-0.3697 (-0.7635, 0.0240)	-15.6188 (-33.7099, 2.4723)
65+ vs. 18-64	1.259 (-3.0016, 5.5196)	0.32 (0.1466, 0.4934)	14.0593 (6.1739, 21.9448)
Hispanic vs. Not Hispanic	0.8755 (-9.5280, 11.2791)	-0.1127 (-0.5210, 0.2956)	-3.6322 (-22.4732, 15.2088)
Not White vs. White	-2.3465 (-5.5308, 0.8378)	-0.2101 (-0.3383, -0.0820)	-10.7519 (-16.4660, -5.0379)
Black vs. Not Black	-3.1669 (-6.4502, 0.1165)	-0.1764 (-0.3083, -0.0445)	-10.2242 (-16.1282, -4.3201)
AAPI vs. Not AAPI	-11.1346 (-30.4283, 8.1590)	0.2472 (-0.5282, 1.0226)	-1.2462 (-37.2424, 34.7499)
AIAN vs. Not AIAN	3.0002 (-3.5983, 9.5986)	-0.2609 (-0.5350, 0.0132)	-7.4358 (-19.4682, 4.5966)
Disabled vs. Not Disabled	-0.5439 (-3.3471, 2.2592)	-0.0847 (-0.1976, 0.0283)	-3.9315 (-8.8868, 1.0238)
Rural vs. Urban	-5.7272 (-8.5489, -2.9055)	0.0288 (-0.0844, 0.1420)	-4.5736 (-9.5725, 0.4253)

Sex



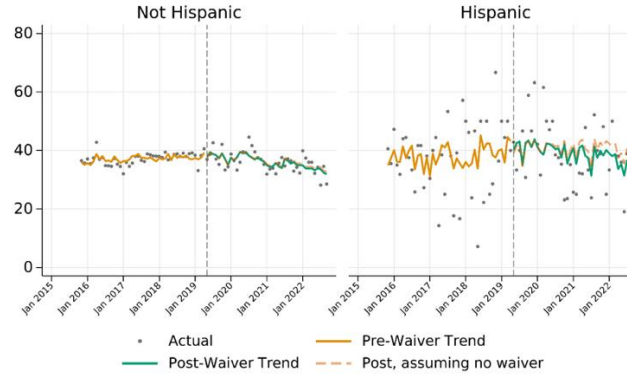
COVID-19 adjustment: Mar. 2020 to end of study period

Age

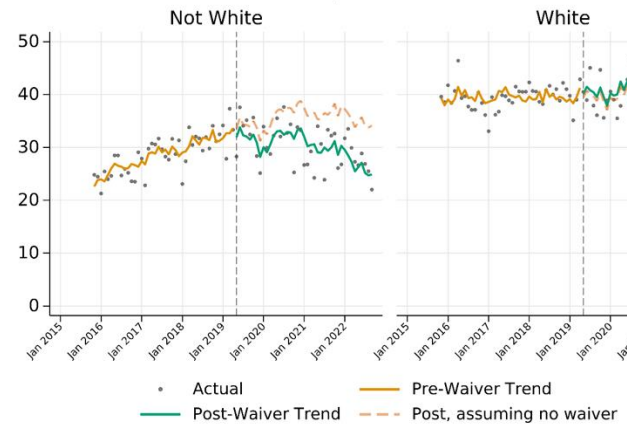


COVID-19 adjustment: Mar. 2020 to end of study period

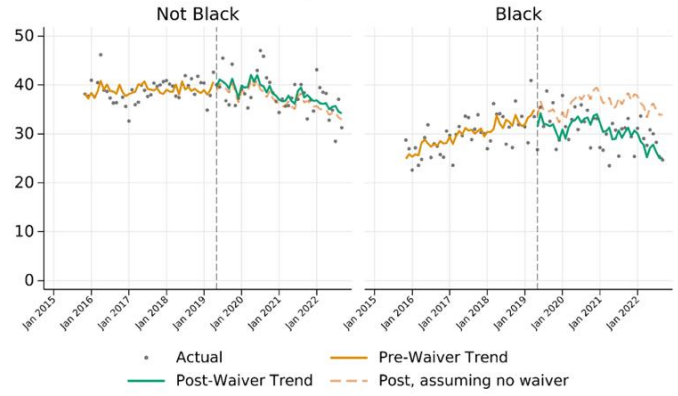
Race/Ethnicity



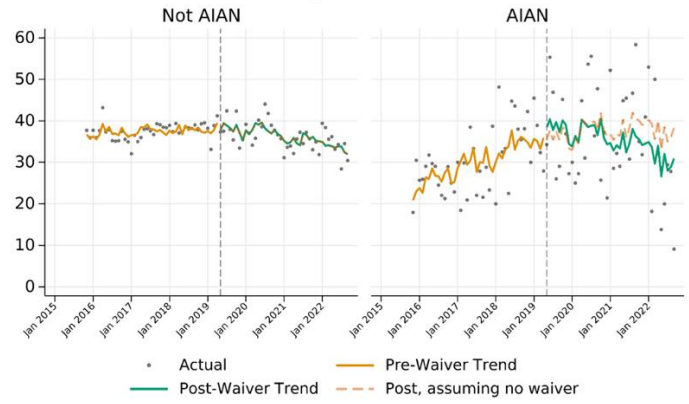
COVID-19 adjustment: Mar. 2020 to end of study period



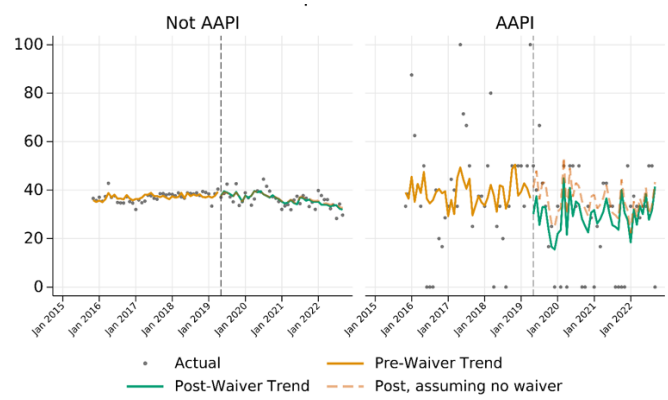
COVID-19 adjustment: Mar. 2020 to end of study period



COVID-19 adjustment: Mar. 2020 to end of study period

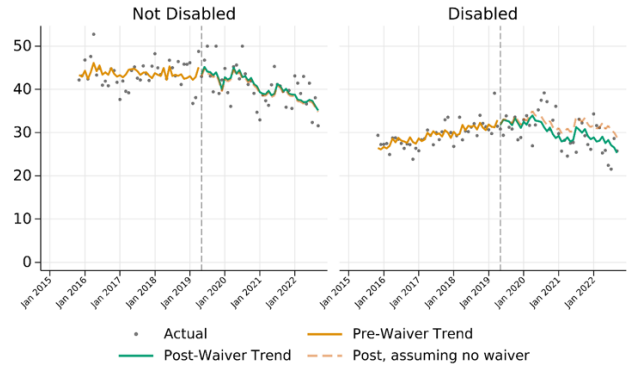


COVID-19 adjustment: Mar. 2020 to end of study period



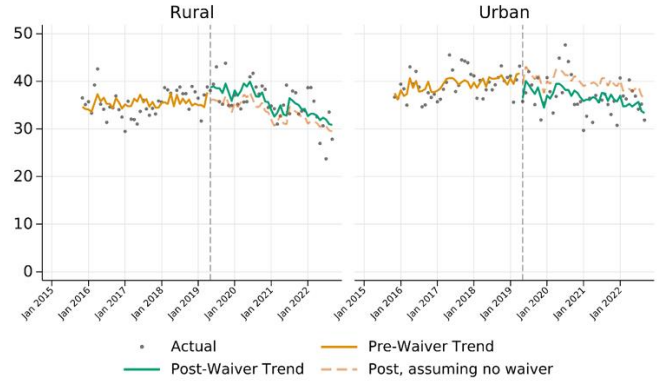
COVID-19 adjustment: Mar. 2020 to end of study period

Disability



COVID-19 adjustment: Mar. 2020 to end of study period

Urban/Rural



COVID-19 adjustment: Mar. 2020 to end of study period

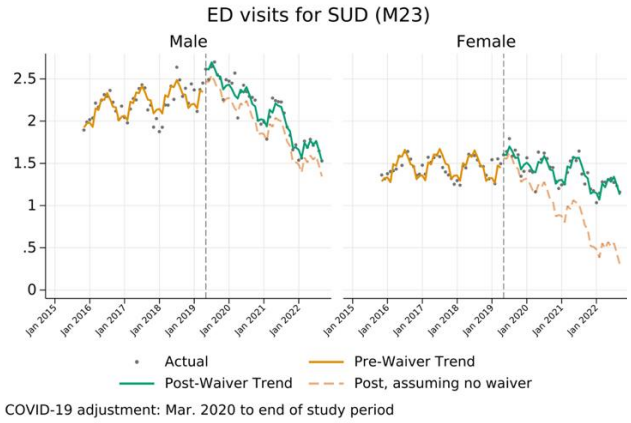
4.9 Emergency Department Utilization for SUD per 1000 beneficiaries (M23)

Table 4.9 Emergency Department Utilization for SUD per 1000 beneficiaries

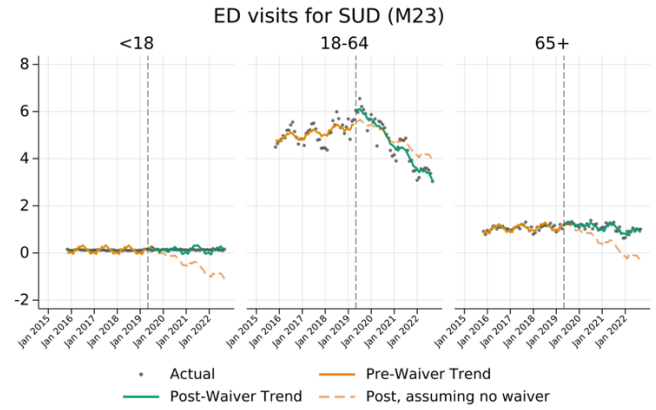
Comparison groups	Difference in the overall effect of the SUD waiver	Difference in the Trend by subpopulations	Avg. Outcome, Sept 2022 (Diff.)
Male vs. Female	0.1187 (0.0155, 0.2219)	-0.0191 (-0.0241, -0.0141)	-0.6457 (-0.8809, -0.4106)
<18 vs. 18-64	0.6328 (0.4828, 0.7829)	-0.0672 (-0.0742, -0.0602)	-2.0557 (-2.3863, -1.7250)
65+ vs. 18-64	0.1065 (-0.0183, 0.2314)	-0.0024 (-0.0085, 0.0037)	0.0109 (-0.2616, 0.2833)
Hispanic vs. Not Hispanic	-0.2154 (-0.2870, -0.1438)	0.0182 (0.0148, 0.0215)	0.5117 (0.3538, 0.6695)
Not White vs. White	-0.0079 (-0.1066, 0.0908)	-0.0066 (-0.0114, -0.0018)	-0.272 (-0.4940, -0.0500)

Comparison groups	Difference in the overall effect of the SUD waiver	Difference in the Trend by subpopulations	Avg. Outcome, Sept 2022 (Diff.)
Black vs. Not Black	0.0066 (-0.0923, 0.1055)	-0.0077 (-0.0126, -0.0029)	-0.3031 (-0.5254, -0.0808)
AAPI vs. Not AAPI	-0.2542 (-0.4444, -0.0640)	0.0077 (-0.0017, 0.0171)	0.0547 (-0.4495, 0.5590)
AIAN vs. Not AIAN	-0.1846 (-0.5610, 0.1917)	0.0028 (-0.0145, 0.0201)	-0.0723 (-0.8245, 0.6799)
Disabled vs. Not Disabled	0.6659 (0.4060, 0.9257)	-0.085 (-0.0978, -0.0722)	-2.7343 (-3.3319, -2.1367)
Rural vs. Urban	-0.062 (-0.1568, 0.0328)	0.0171 (0.0124, 0.0217)	0.6206 (0.4059, 0.8353)

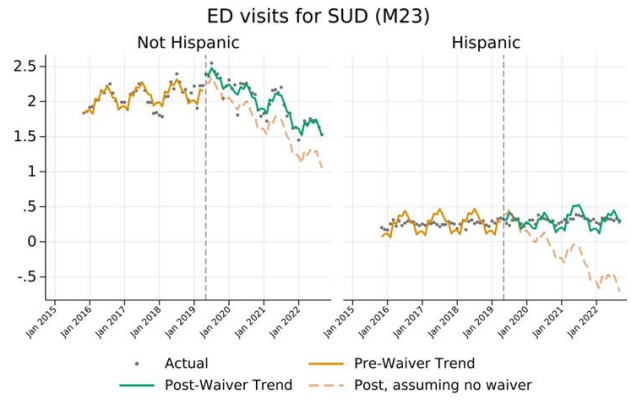
Sex



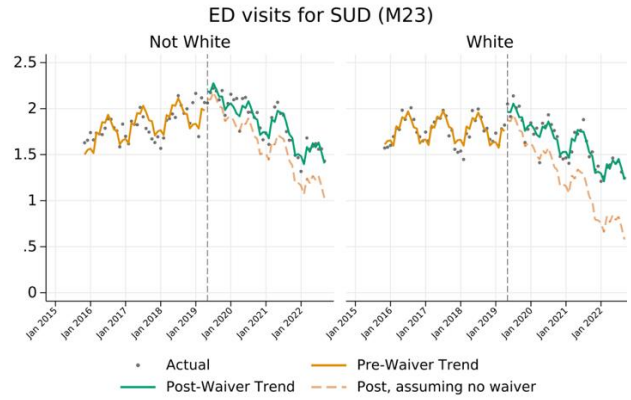
Age



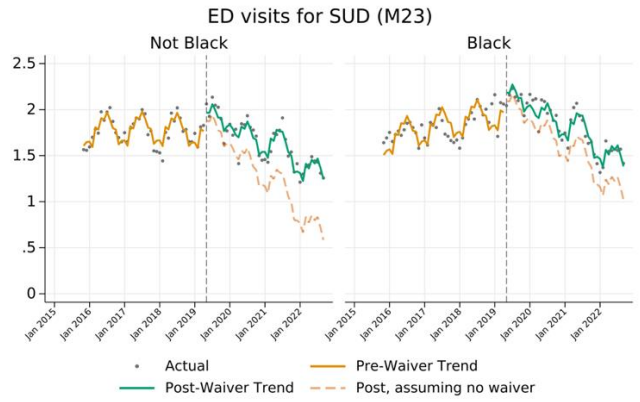
Race/Ethnicity



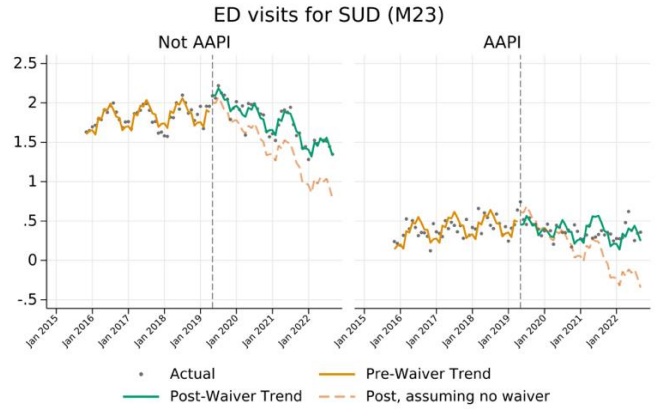
COVID-19 adjustment: Mar. 2020 to end of study period



COVID-19 adjustment: Mar. 2020 to end of study period



COVID-19 adjustment: Mar. 2020 to end of study period



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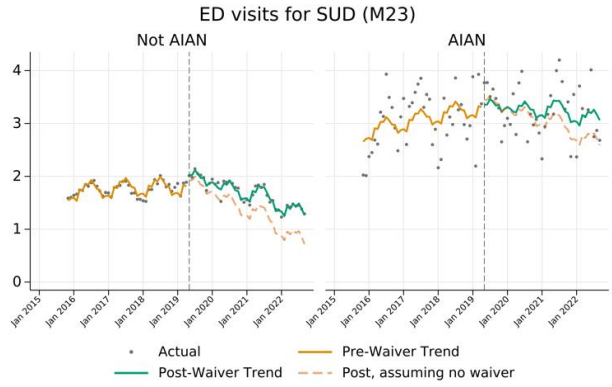
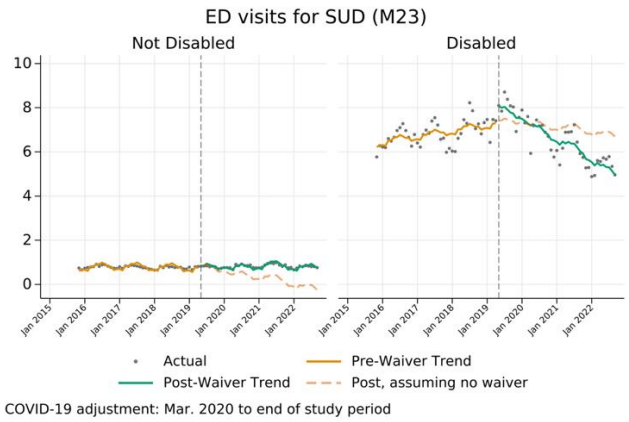
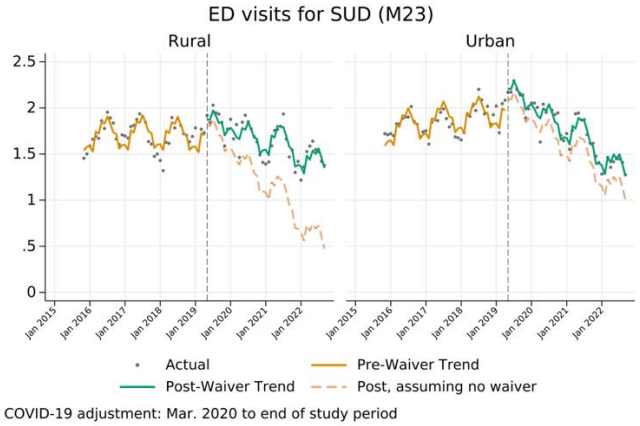


COVID-19 adjustment: Mar. 2020 to end of study period

Disability



Urban/Rural

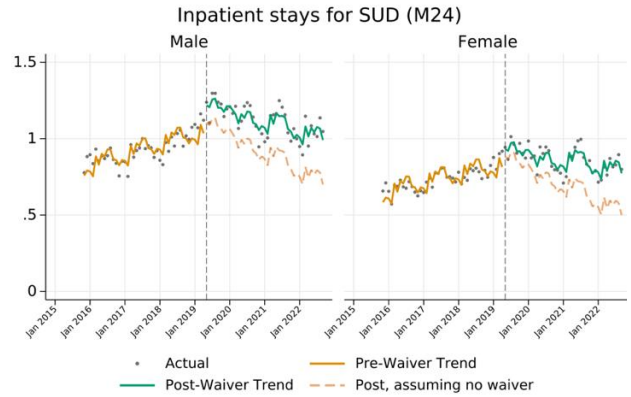


4.10 Inpatient Stays for SUD per 1000 beneficiaries (M24)

Table 4.10

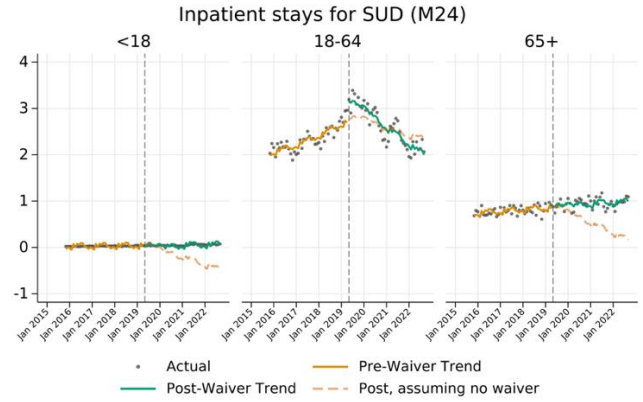
Comparison groups	Difference in the overall effect of the SUD waiver	Difference in the Trend by subpopulations	Avg. Outcome, Sept 2022 (Diff.)
Male vs. Female	0.0643 (0.0162, 0.1124)	-0.0011 (-0.0033, 0.0011)	0.0192 (-0.0770, 0.1154)
<18 vs. 18-64	0.4237 (0.3522, 0.4953)	-0.0328 (-0.0359, -0.0296)	-0.8872 (-1.0265, -0.7480)
65+ vs. 18-64	0.035 (-0.0402, 0.1102)	0.006 (0.0026, 0.0094)	0.2743 (0.1228, 0.4258)
Hispanic vs. Not Hispanic	-0.1072 (-0.1411, -0.0733)	0.0068 (0.0053, 0.0084)	0.1662 (0.0968, 0.2357)
Not White vs. White	-0.0239 (-0.0715, 0.0237)	0.0008 (-0.0014, 0.0029)	0.0065 (-0.0879, 0.1009)
Black vs. Not Black	-0.0241 (-0.0718, 0.0237)	0.0008 (-0.0014, 0.0030)	0.0077 (-0.0873, 0.1026)
AAPI vs. Not AAPI	-0.0584 (-0.1371, 0.0203)	0.0043 (0.0010, 0.0077)	0.1155 (-0.0325, 0.2635)
AIAN vs. Not AIAN	-0.0723 (-0.2703, 0.1256)	-0.005 (-0.0133, 0.0033)	-0.272 (-0.6441, 0.1001)
Disabled vs. Not Disabled	0.3384 (0.2201, 0.4566)	-0.0188 (-0.0244, -0.0133)	-0.415 (-0.6548, -0.1753)
Rural vs. Urban	-0.0203 (-0.0673, 0.0266)	0.0058 (0.0036, 0.0079)	0.2099 (0.1160, 0.3037)

Sex



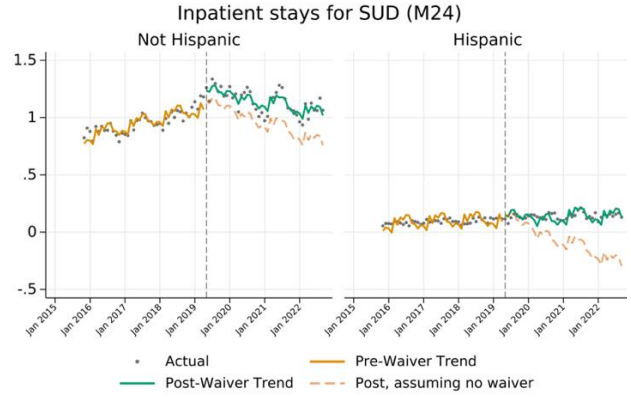
COVID-19 adjustment: Mar. 2020 to end of study period

Age

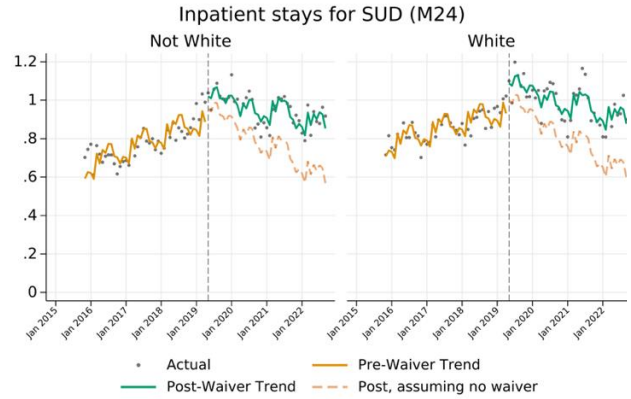


COVID-19 adjustment: Mar. 2020 to end of study period

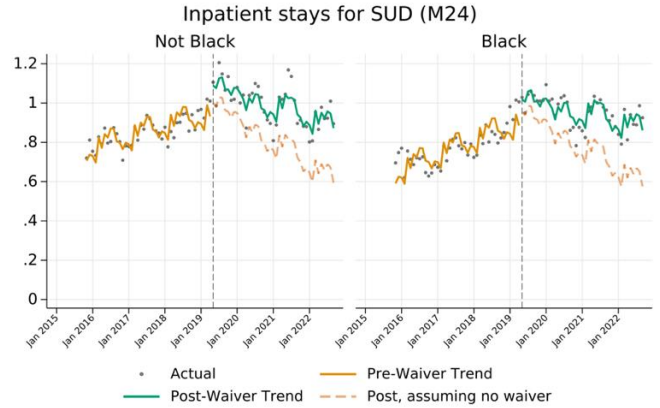
Race/Ethnicity



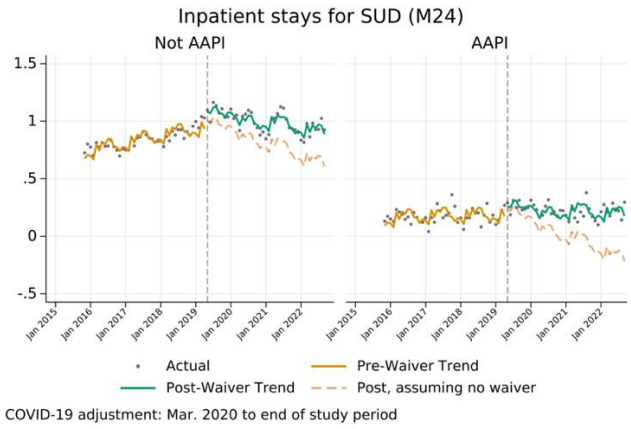
COVID-19 adjustment: Mar. 2020 to end of study period

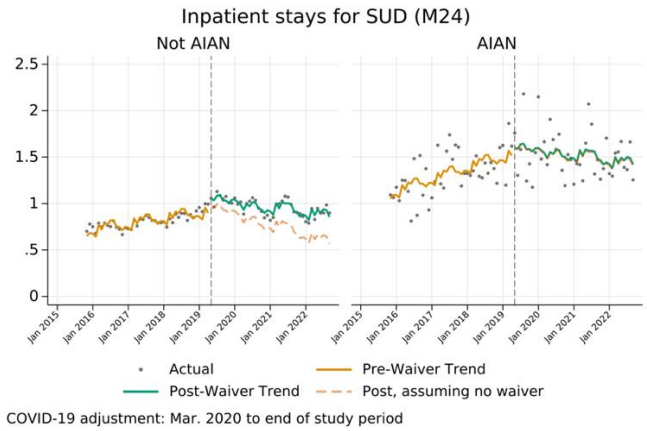


COVID-19 adjustment: Mar. 2020 to end of study period

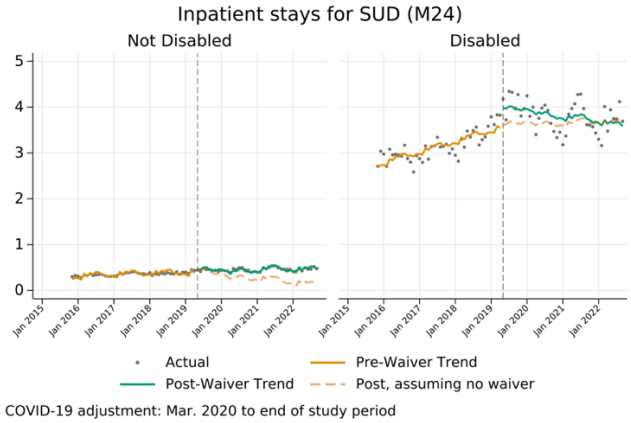


COVID-19 adjustment: Mar. 2020 to end of study period

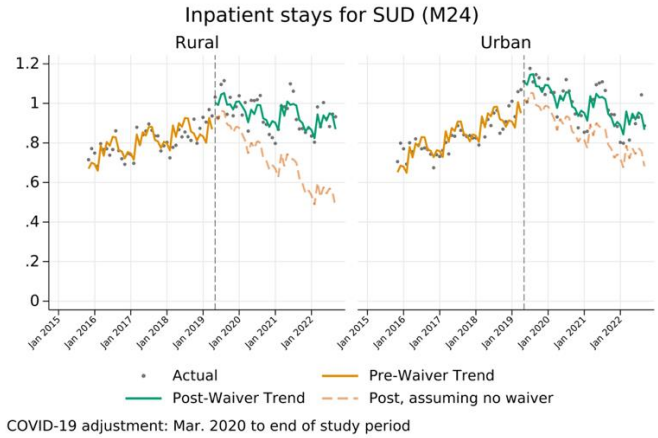




Disability



Urban/Rural



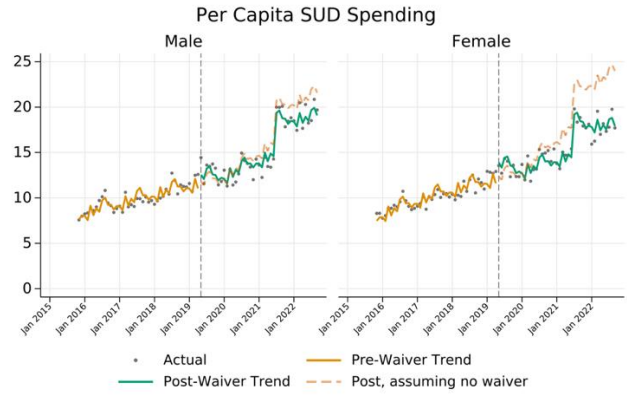
4.11 Per capita SUD spending (M30)

Table 4.11

Comparison groups	Difference in the overall effect of the SUD waiver	Difference in the Trend by subpopulations	Avg. Outcome, Sept 2022 (Diff.)
Male vs. Female	-0.7783 (-1.4864, -0.0701)	0.1086 (0.0744, 0.1428)	3.5655 (2.2556, 4.8753)
<18 vs. 18-64	1.1899 (0.3874, 1.9924)	0.0606 (0.0228, 0.0983)	3.6122 (2.0565, 5.1680)
65+ vs. 18-64	-3.0552 (-5.1545, -0.9560)	0.2698 (0.1459, 0.3936)	7.7349 (3.3519, 12.1179)
Hispanic vs. Not Hispanic	0.3603 (-0.3593, 1.0800)	-0.1337 (-0.1632, -0.1041)	-4.986 (-6.5243, -3.4478)
Not White vs. White	0.1841 (-0.4977, 0.8660)	0.071 (0.0374, 0.1047)	3.0258 (1.7213, 4.3302)
Black vs. Not Black	0.0224 (-0.6675, 0.7124)	0.0826 (0.0488, 0.1164)	3.3254 (2.0045, 4.6463)
AAPI vs. Not AAPI	0.3917	-0.114	-4.1674

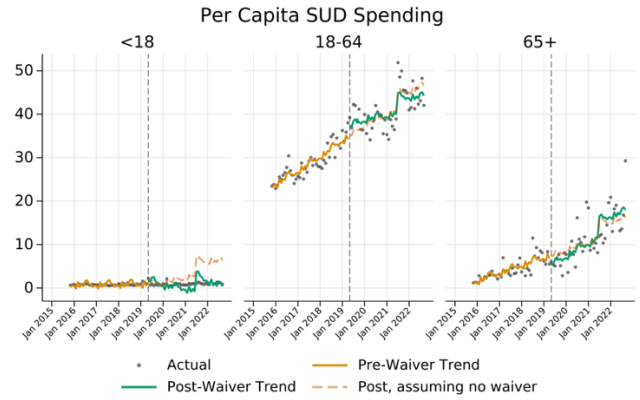
	(-0.4460, 1.2293)	(-0.1575, -0.0705)	(-5.9835, -2.3512)
AIAN vs. Not AIAN	0.0987 (-2.4159, 2.6133)	-0.0358 (-0.1634, 0.0917)	-1.3346 (-6.2617, 3.5925)
Disabled vs. Not Disabled	-3.9894 (-5.4698, -2.5090)	0.7146 (0.6416, 0.7876)	24.5937 (21.6010, 27.5865)
Rural vs. Urban	1.1495 (0.4687, 1.8303)	0.0755 (0.0424, 0.1086)	4.171 (2.8912, 5.4508)

Sex



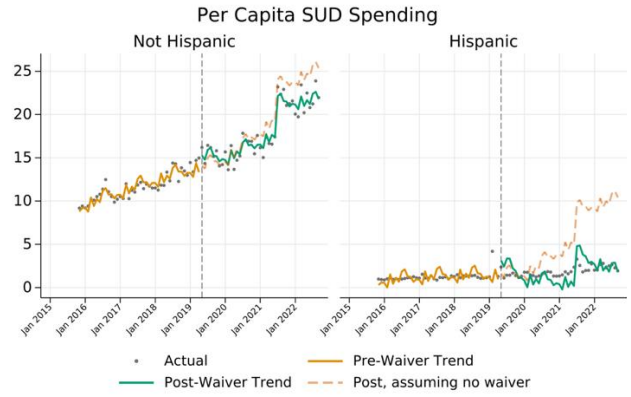
COVID-19 adjustment: Mar. 2020 to end of study period

Age

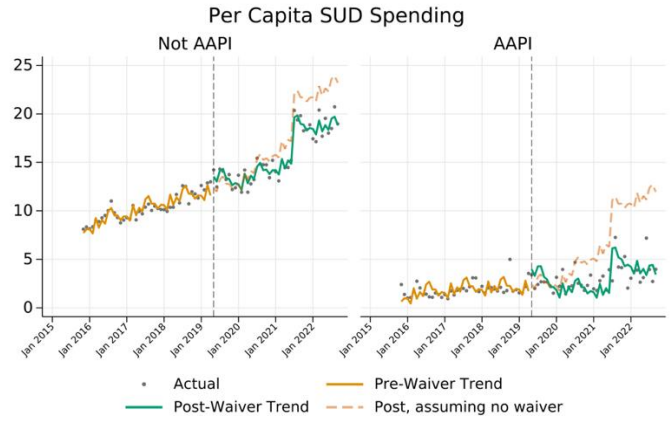


COVID-19 adjustment: Mar. 2020 to end of study period

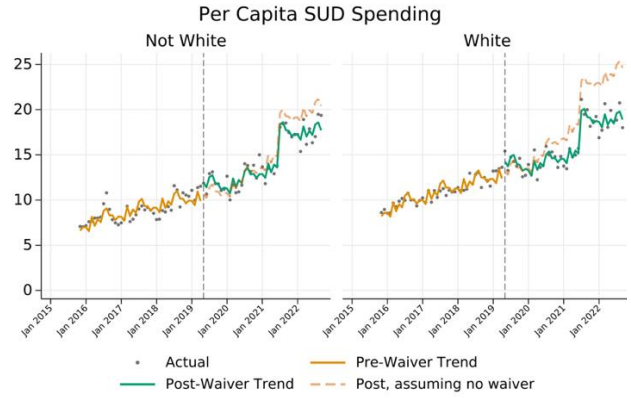
Race/Ethnicity



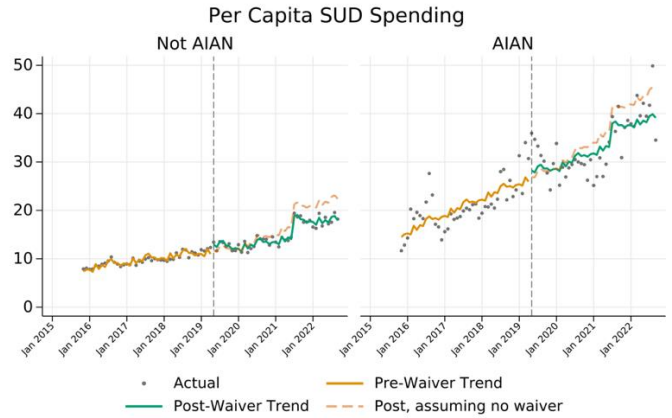
COVID-19 adjustment: Mar. 2020 to end of study period



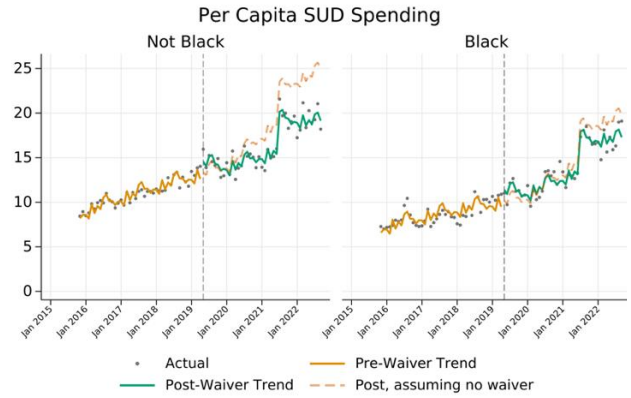
COVID-19 adjustment: Mar. 2020 to end of study period



COVID-19 adjustment: Mar. 2020 to end of study period

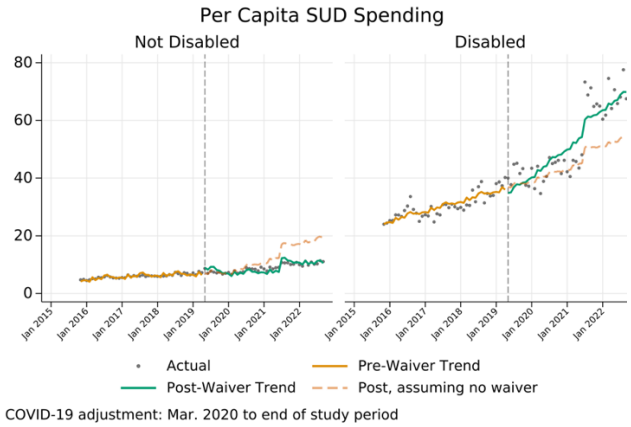


COVID-19 adjustment: Mar. 2020 to end of study period

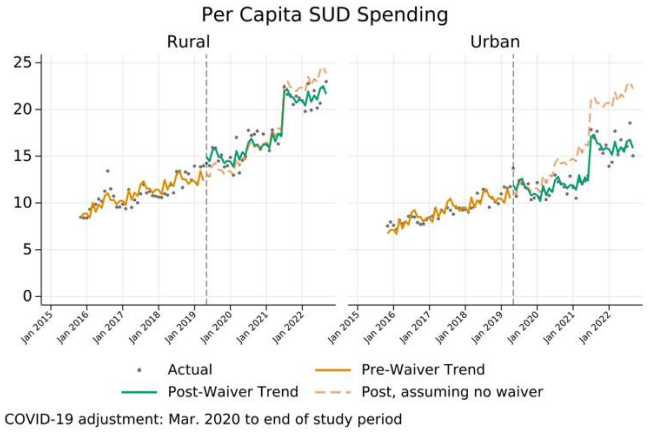


COVID-19 adjustment: Mar. 2020 to end of study period

Disability



Urban/Rural

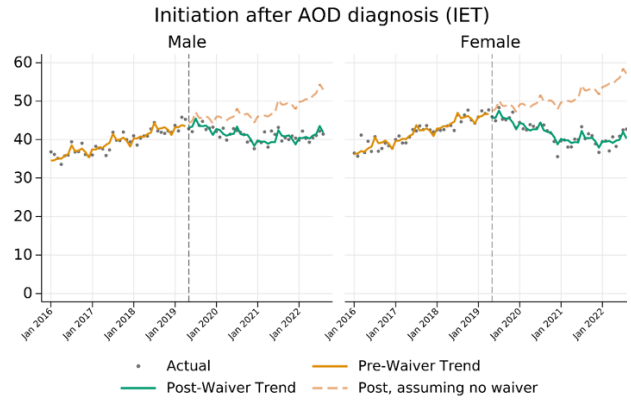


4.12 Initiation in care (IET/M15) (combined SUD only)

Table 4.12

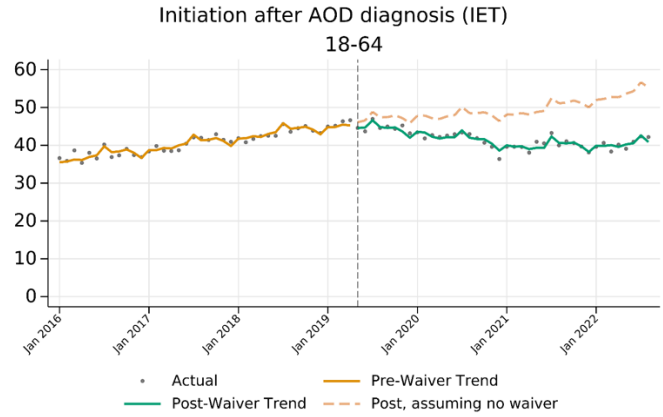
Comparison groups	Difference in the overall effect of the SUD waiver	Difference in the Trend by subpopulations	Avg. Outcome, Sept 2022 (Diff.)
Male vs. Female	0.6079 (-0.8086, 2.0244)	0.1309 (0.0677, 0.1941)	5.7115 (2.8326, 8.5904)
<18 vs. 18-64			
65+ vs. 18-64			
Hispanic vs. Not Hispanic	2.7114 (-2.0502, 7.4730)	0.1138 (-0.0867, 0.3143)	7.1493 (-2.3478, 16.6465)
Not White vs. White	0.0078 (-1.4080, 1.4235)	-0.1469 (-0.2099, -0.0839)	-5.7222 (-8.5975, -2.8469)
Black vs. Not Black	0.5282 (-0.8933, 1.9496)	-0.0215 (-0.0848, 0.0419)	-0.3085 (-3.1994, 2.5824)
AAPI vs. Not AAPI	7.9188 (-2.2305, 18.0680)	0.0296 (-0.3892, 0.4485)	9.0748 (-10.4952, 28.6449)
AIAN vs. Not AIAN	-3.4406 (-6.7302, -0.1511)	-0.7581 (-0.9033, -0.6129)	-33.0051 (-39.5779, -26.4322)
Disabled vs. Not Disabled	0.2875 (-1.1275, 1.7025)	-0.165 (-0.2276, -0.1025)	-6.1494 (-8.9997, -3.2992)
Rural vs. Urban	2.6124 (1.2093, 4.0154)	-0.0402 (-0.1025, 0.0222)	1.0462 (-1.7956, 3.8880)

Sex



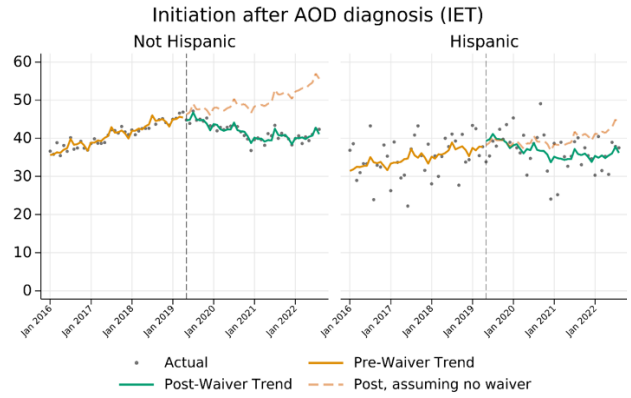
COVID-19 adjustment: Mar. 2020 to end of study period

Age

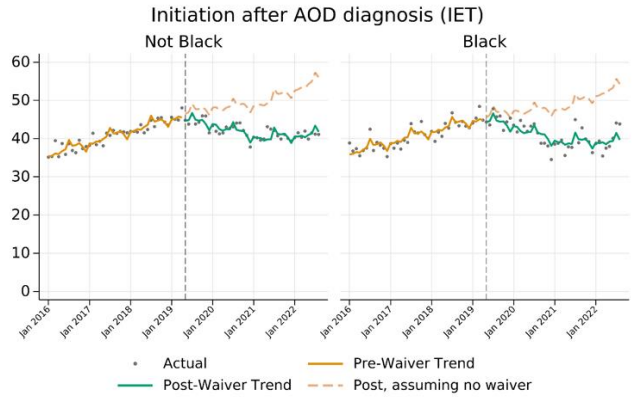


COVID-19 adjustment: Mar. 2020 to end of study period

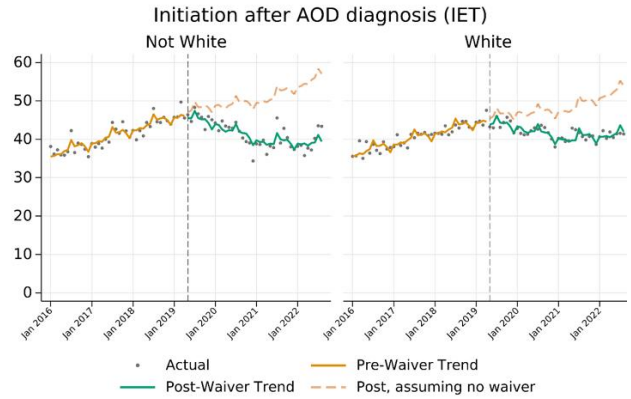
Race/Ethnicity



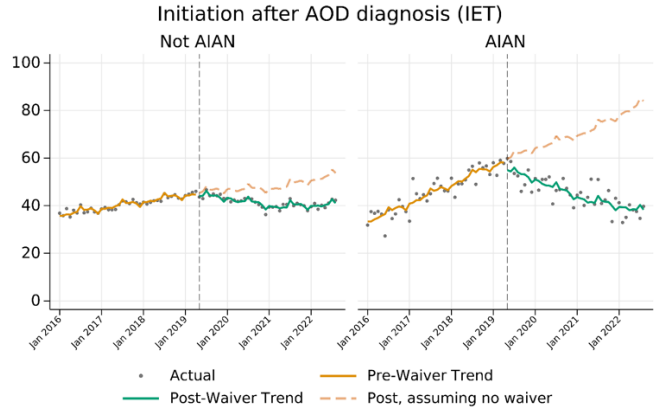
COVID-19 adjustment: Mar. 2020 to end of study period



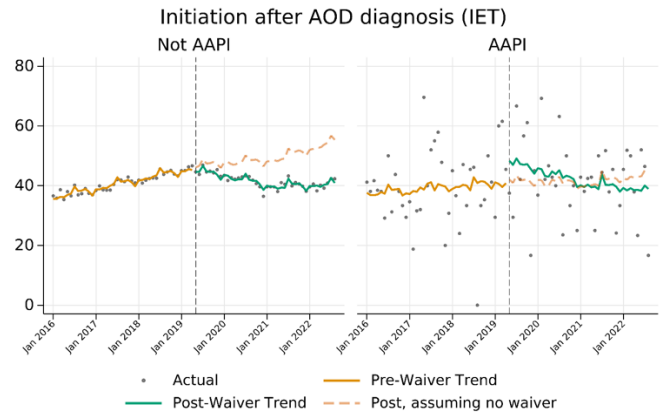
COVID-19 adjustment: Mar. 2020 to end of study period



COVID-19 adjustment: Mar. 2020 to end of study period

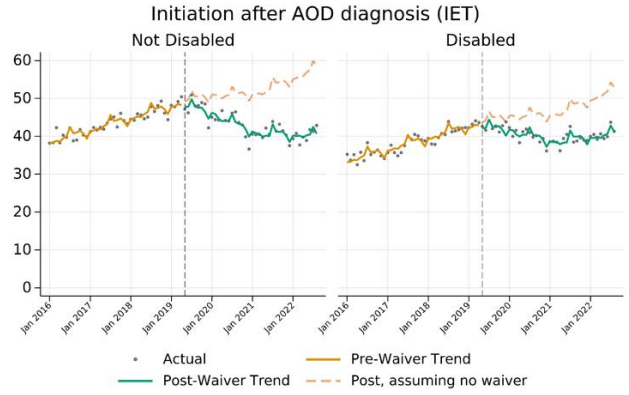


COVID-19 adjustment: Mar. 2020 to end of study period



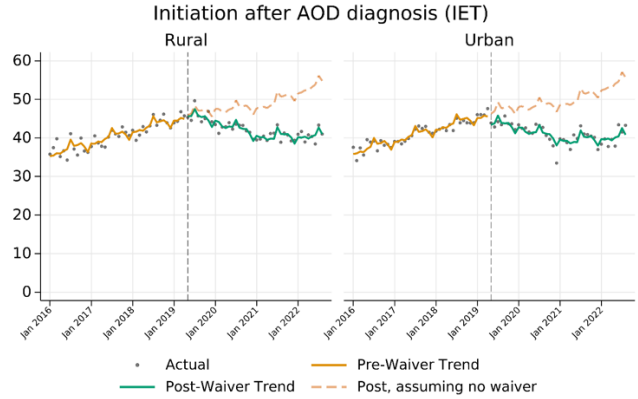
COVID-19 adjustment: Mar. 2020 to end of study period

Disability



COVID-19 adjustment: Mar. 2020 to end of study period

Urban/Rural



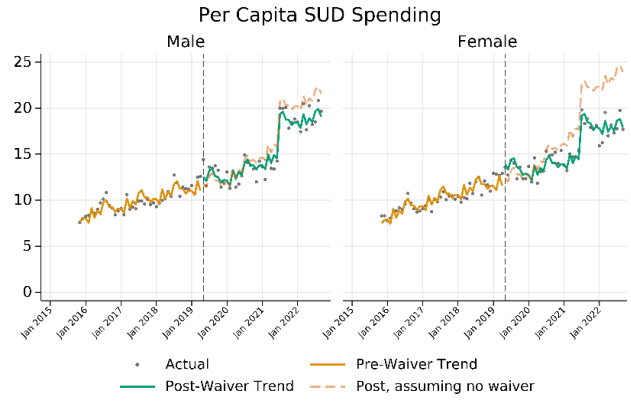
COVID-19 adjustment: Mar. 2020 to end of study period

4.13 Out-of-pocket costs to Medicaid Enrollees (All services)

Table 4.13

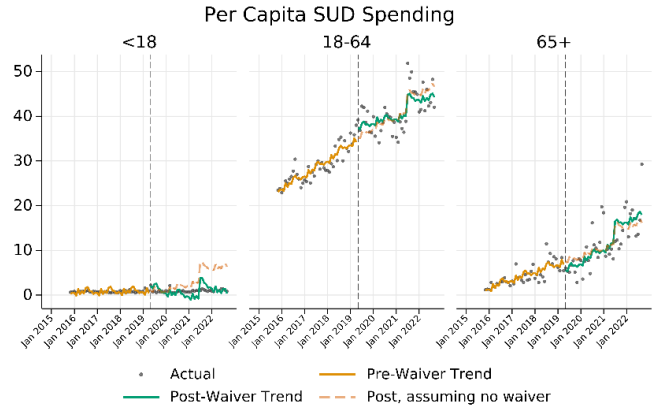
Comparison groups	Difference in the overall effect of the SUD waiver	Difference in the Trend by subpopulations	Avg. Outcome, Sept 2022 (Diff.)
Male vs. Female	-0.7783 (-1.4864, -0.0701)	0.1086 (0.0744, 0.1428)	3.5655 (2.2556, 4.8753)
<18 vs. 18-64	1.1899 (0.3874, 1.9924)	0.0606 (0.0228, 0.0983)	3.6122 (2.0565, 5.1680)
65+ vs. 18-64	-3.0552 (-5.1545, -0.9560)	0.2698 (0.1459, 0.3936)	7.7349 (3.3519, 12.1179)
Hispanic vs. Not Hispanic	0.3603 (-0.3593, 1.0800)	-0.1337 (-0.1632, -0.1041)	-4.986 (-6.5243, -3.4478)
Not White vs. White	0.1841 (-0.4977, 0.8660)	0.071 (0.0374, 0.1047)	3.0258 (1.7213, 4.3302)
Black vs. Not Black	0.0224 (-0.6675, 0.7124)	0.0826 (0.0488, 0.1164)	3.3254 (2.0045, 4.6463)
AAPI vs. Not AAPI	0.3917 (-0.4460, 1.2293)	-0.114 (-0.1575, -0.0705)	-4.1674 (-5.9835, -2.3512)
AIAN vs. Not AIAN	0.0987 (-2.4159, 2.6133)	-0.0358 (-0.1634, 0.0917)	-1.3346 (-6.2617, 3.5925)
Disabled vs. Not Disabled	-3.9894 (-5.4698, -2.5090)	0.7146 (0.6416, 0.7876)	24.5937 (21.6010, 27.5865)
Rural vs. Urban	1.1495 (0.4687, 1.8303)	0.0755 (0.0424, 0.1086)	4.171 (2.8912, 5.4508)

Sex



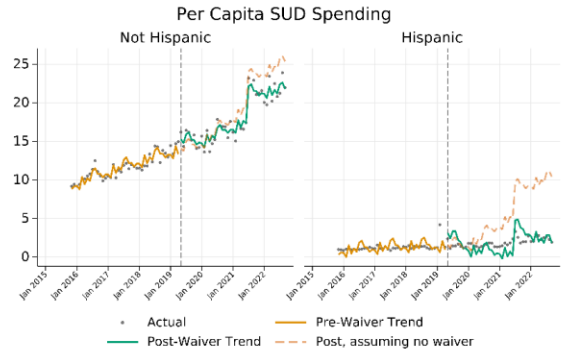
COVID-19 adjustment: Mar. 2020 to end of study period

Age

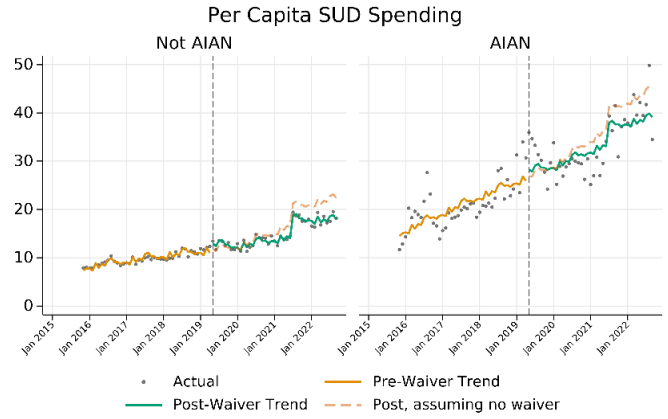


COVID-19 adjustment: Mar. 2020 to end of study period

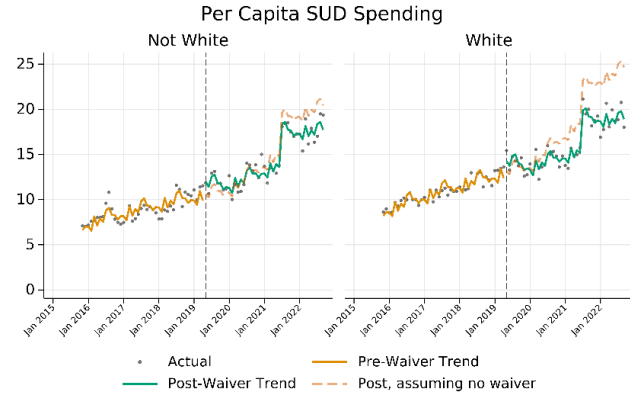
Race/Ethnicity



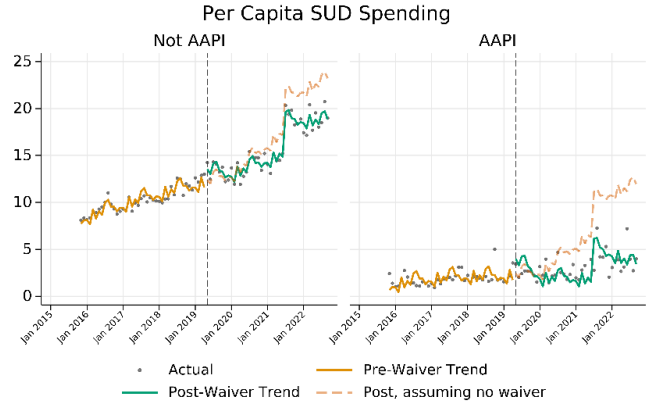
COVID-19 adjustment: Mar. 2020 to end of study period



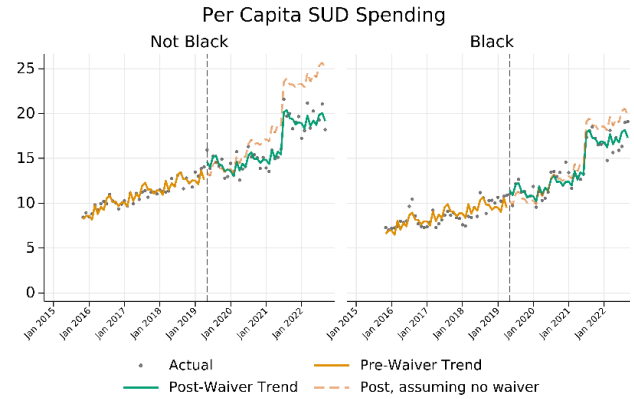
COVID-19 adjustment: Mar. 2020 to end of study period



COVID-19 adjustment: Mar. 2020 to end of study period

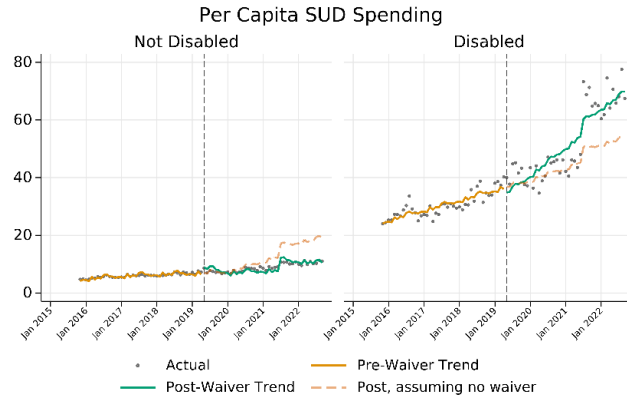


COVID-19 adjustment: Mar. 2020 to end of study period



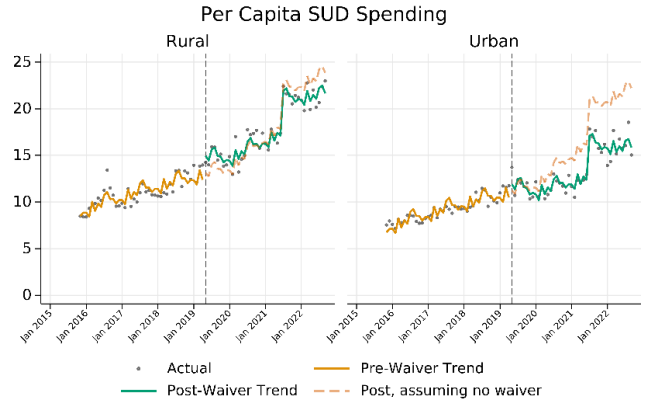
COVID-19 adjustment: Mar. 2020 to end of study period

Disability



COVID-19 adjustment: Mar. 2020 to end of study period

Urban/Rural



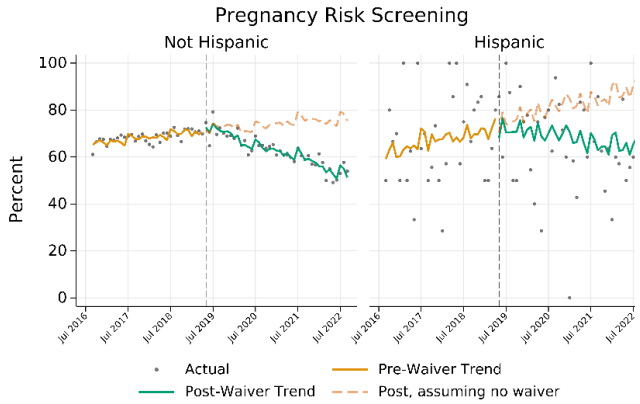
COVID-19 adjustment: Mar. 2020 to end of study period

4.14 Rate of Screening for Pregnancy Risk

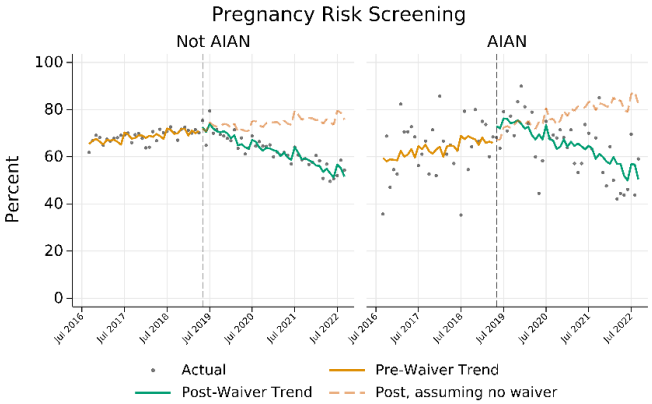
Table 4.14

Comparison groups	Difference in the overall effect of the SUD waiver	Difference in the Trend by subpopulations	Avg. Outcome, Sept 2022 (Diff.)
Hispanic vs. Not Hispanic	-3.0489 (-18.2251, 12.1272)	0.0276 (-0.7273, 0.7825)	-1.9455 (-38.8001, 34.9091)
Not White vs. White	-0.2832 (-5.3040, 4.7376)	-0.1345 (-0.3939, 0.1249)	-5.6637 (-18.1126, 6.7851)
Black vs. Not Black	-3.4763 (-8.4997, 1.5471)	-0.1407 (-0.3992, 0.1178)	-9.1048 (-21.4498, 3.2402)
AAPI vs. Not AAPI	-19.7316 (-52.9921, 13.5289)	-0.7881 (-2.6718, 1.0957)	-51.2546 (-1.4e+02, 34.2805)
AIAN vs. Not AIAN	5.3083 (-4.3104, 14.9269)	-0.3244 (-0.8431, 0.1942)	-7.6695 (-33.3326, 17.9936)
Disabled vs. Not Disabled	1.4109 (-8.8526, 11.6743)	-0.3116 (-0.8606, 0.2374)	-11.0534 (-36.5211, 14.4144)
Rural vs. Urban	-7.2268 (-11.9536, -2.5001)	0.2076 (-0.0336, 0.4488)	1.0788 (-10.4913, 12.6488)

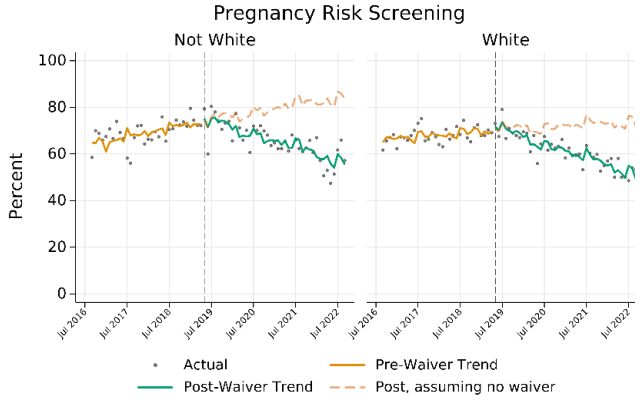
Race/Ethnicity



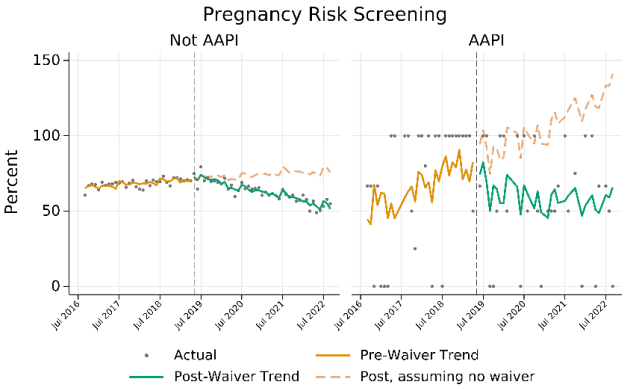
COVID-19 adjustment: Mar. 2020 to end of study period



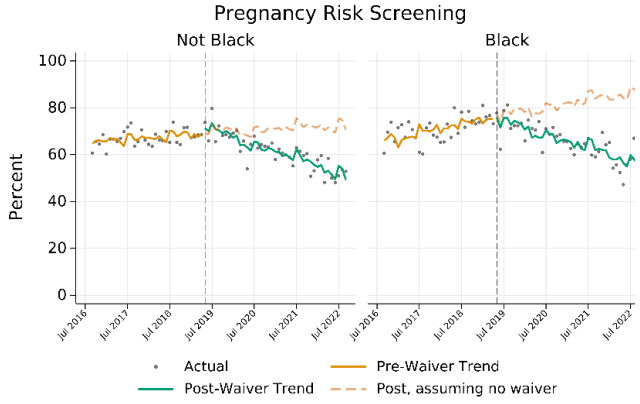
COVID-19 adjustment: Mar. 2020 to end of study period



COVID-19 adjustment: Mar. 2020 to end of study period

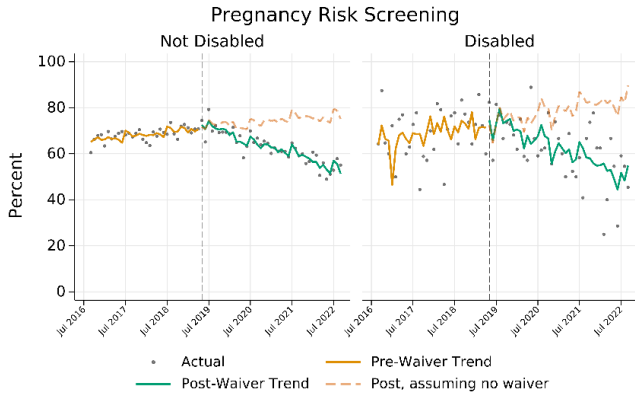


COVID-19 adjustment: Mar. 2020 to end of study period



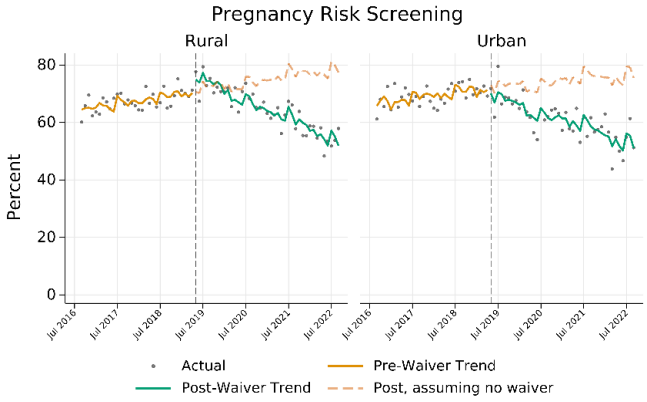
COVID-19 adjustment: Mar. 2020 to end of study period

Disability



COVID-19 adjustment: Mar. 2020 to end of study period

Urban/Rural



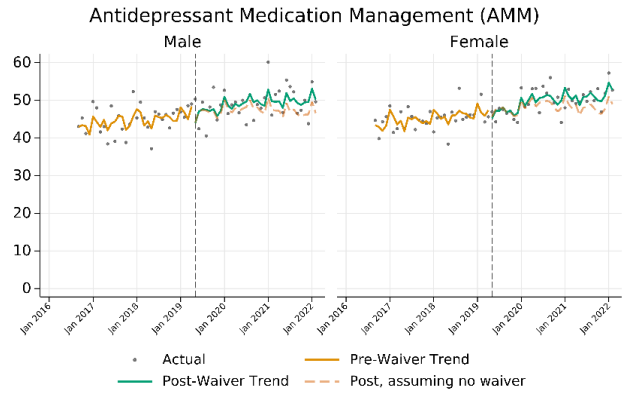
COVID-19 adjustment: Mar. 2020 to end of study period

4.15 Antidepressant Medication Management – Acute Phase (AMM)

Table 4.15

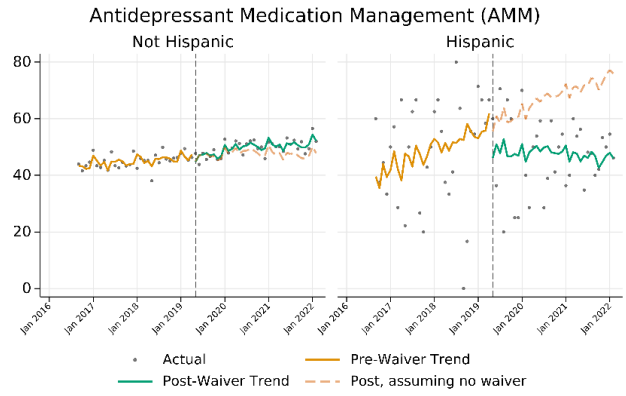
Comparison groups	Difference in the overall effect of the SUD waiver	Difference in the Trend by subpopulations	Avg. Outcome, Sept 2022 (Diff.)
Male vs. Female	0.3654 (-4.4044, 5.1352)	-0.0178 (-0.2710, 0.2355)	-0.2207 (-10.5142, 10.0729)
Hispanic vs. Not Hispanic	-9.2449 (-24.5321, 6.0424)	-0.7588 (-1.5635, 0.0459)	-34.2853 (-67.5660, -1.0046)
Not White vs. White	-1.9777 (-6.6737, 2.7183)	0.1656 (-0.0830, 0.4141)	3.4867 (-6.6278, 13.6012)
Black vs. Not Black	-3.0025 (-7.7182, 1.7133)	0.1743 (-0.0751, 0.4238)	2.7508 (-7.3975, 12.8992)
AAPI vs. Not AAPI	-4.2871 (-36.4642, 27.8900)	-0.1579 (-1.8685, 1.5528)	-9.4971 (-79.2118, 60.2175)
AIAN vs. Not AIAN	10.4454 (-1.1005, 21.9913)	0.1753 (-0.4446, 0.7952)	16.2313 (-9.1628, 41.6253)
Disabled vs. Not Disabled	-2.0461 (-6.5066, 2.4143)	0.1522 (-0.0845, 0.3889)	2.9769 (-6.6208, 12.5746)
Rural vs. Urban	2.2526 (-2.1946, 6.6998)	0.0741 (-0.1605, 0.3086)	4.6965 (-4.8577, 14.2507)

Sex

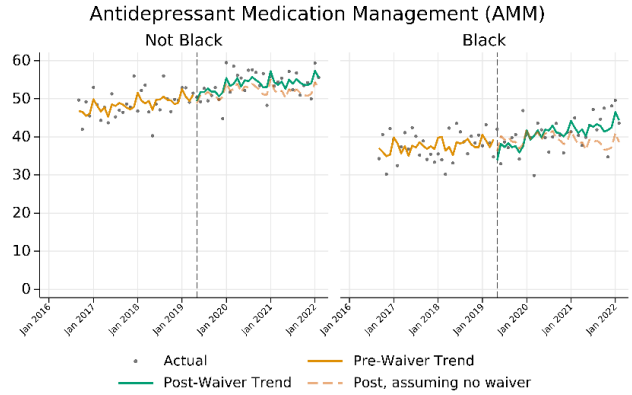


COVID-19 adjustment: Mar. 2020 to end of study period

Race/Ethnicity



COVID-19 adjustment: Mar. 2020 to end of study period



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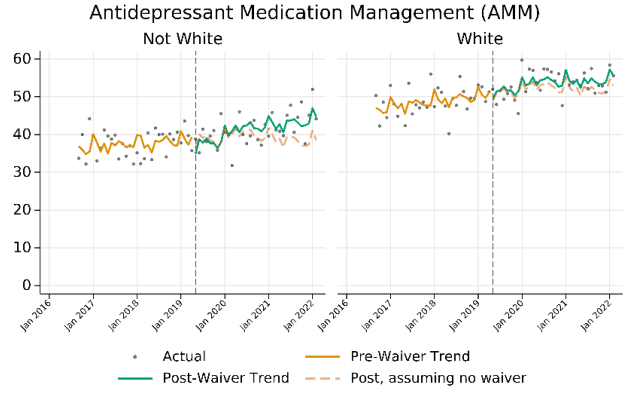
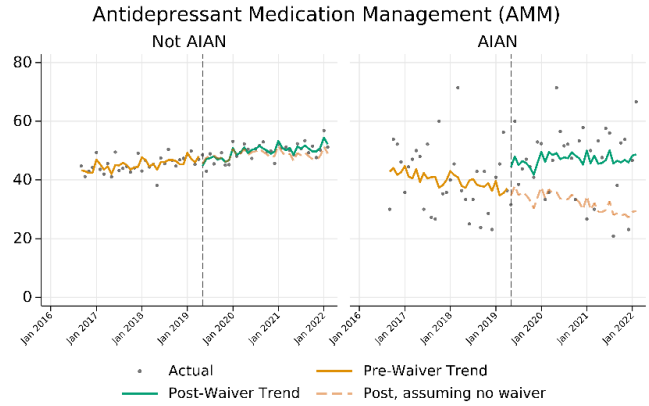
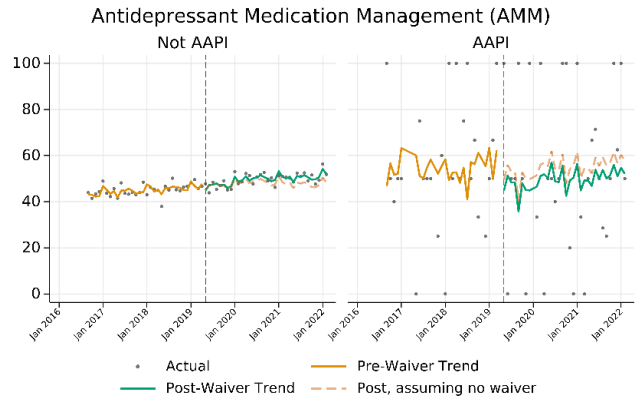


COVID-19 adjustment: Mar. 2020 to end of study period

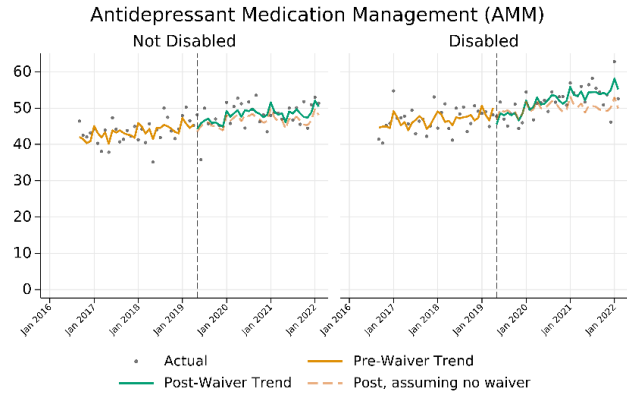


COVID-19 adjustment: Mar. 2020 to end of study period



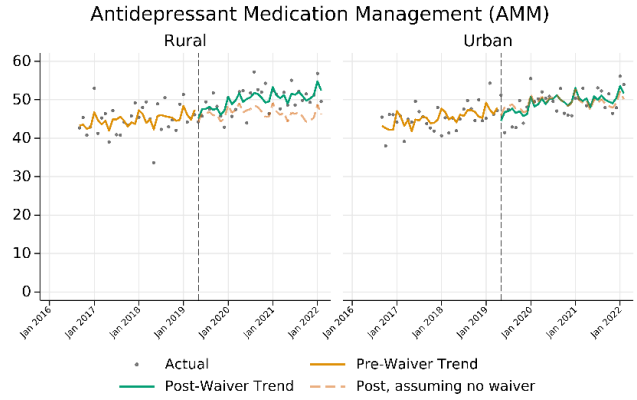
COVID-19 adjustment: Mar. 2020 to end of study period

Disability



COVID-19 adjustment: Mar. 2020 to end of study period

Urban/Rural



COVID-19 adjustment: Mar. 2020 to end of study period

Chapter 5: Analyses by Standard Plan Enrollment

Although this report focuses on the effect of the implementation of SUD components of North Carolina's 1115 demonstration waiver on outcomes related to substance use disorder, as described in the methods section, we do control for the effect that standard care plans may have had on outcomes beginning on July 1, 2021 because those changes would otherwise confound the estimates of the effect of SUD waiver implementation. Those results are not specifically presented in this report in order to retain the focus on SUD implementation. However, several of the figures presented above showed a decided change in the trends and levels of some of the outcome variables around SP launch. This could happen for at least two reasons, which we will refer to as *direct effects* and *indirect effects*. First, SPs may have changed patterns of care for beneficiaries enrolled in those plans, such as through care management, changes in benefit design or practice patterns, different provider networks or other factors. Direct effects should occur only among SP enrollees, which were about 25% of the population with SUD. Indirect effects, in contrast, could have affected all beneficiaries with SUD and could be due externalities in the health system from SP launch, such as changes in provider capacity to treat Medicaid beneficiaries, or confusion about enrollment or benefit design. Because SP launch occurred during the COVID-19 PHE, the indirect effects could also be picking up changes due to a new phase of the PHE that had nothing to do with SPs but occurred disproportionately on or after SP launch.

In this chapter, we compare a selected set of outcomes for beneficiaries who were who were enrolled in SPs compared with beneficiaries never enrolled in SPs during the study period. We focus on the effect of SP launch on changes in the average level of the outcome as well as changes in the trend for the never/ever-SP subpopulations. Never-SP beneficiaries should only be affected by indirect effects, whereas ever-SP beneficiaries could be affected by either direct or indirect effects. We test whether the effects of SP launch were different by these two groups in terms of changes in the level and trend of each outcome. We report these results in brief here. The Interim Managed Care Evaluation Report will focus in much more detail on the effects of SP launch.

Medicaid Beneficiaries with SUD Diagnosis (M3)

We provide detailed results of this metric to aid in interpretation of the other metrics, which are summarized briefly below. From the figure below, we can see that those in SPs had much lower SUD diagnosis rates than those never in SPs by design, since the never-SP subpopulation includes beneficiaries who have severe SUD and are TP-eligible. We can also see that the trends in SUD diagnosis were very different even before SP launch, possibly due to changes from the SUD components of the waiver and other factors. The ITS model predicts that SP launch is associated with a small increase in the rate of SUD diagnoses in the ever SP population such that the diagnosis rate is slightly above what it would have been without SP launch (green line is above the dotted brown line on the right panel below). In the never SP group, however, we see that SP launch is associated with a substantial downturn in the diagnosis rate,

which must be due to indirect effects, although we note that this trend is striking. These results are confirmed in the first row of the table below the figure. SP launch is associated with a slightly greater increase in the SUD diagnosis rate in the ever-SP group than the never-SP group, and a larger increase in the trend, since the diagnosis rate in the never-SP group began trending downward.

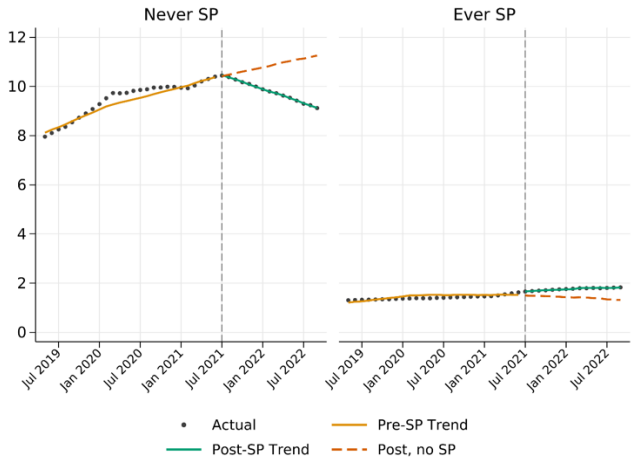


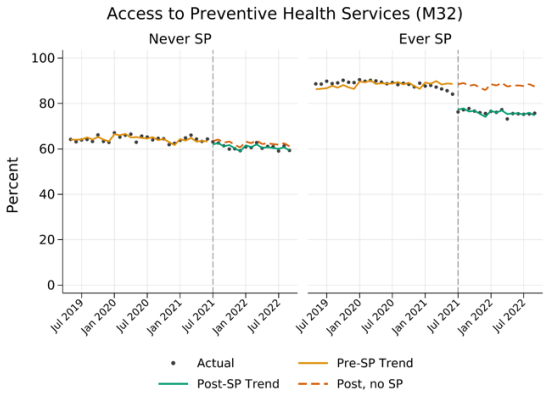
Table 5.1

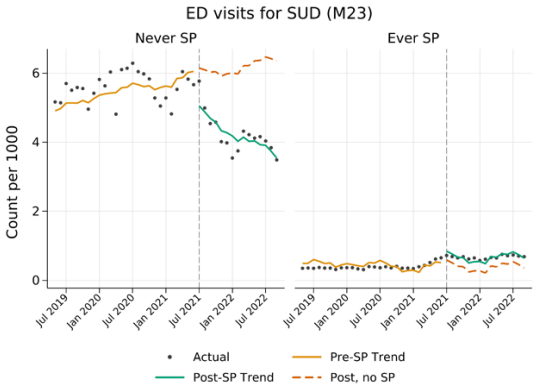
Ever SP vs. Never SP	Intercept Change (Diff.)	Slope Change (Diff.)	Avg. Outcome, Sept 2022 (Diff.)
Percent of beneficiaries with a SUD diagnosis (M3)	0.12* (0.05, 0.19)	0.18* (0.17, 0.19)	2.64* (2.54, 2.74)
Treatment rate (M6)	-13.97* (-14.58, -13.37)	0.0655* (0.0051, 0.1259)	-13.06* (-13.92, -12.19)
Use of outpatient treatments (M8)	-130.77* (-136.46, -125.09)	0.90* (0.37, 1.43)	-118.17* (-126.56, -109.78)
Use of MAT (M12)	-92.61* (-97.71, -87.51)	2.38* (1.92, 2.84)	-59.32* (-67.38, -51.25)
Access to Preventive/Ambulatory Health Services for Adult Medicaid Beneficiaries with SUD (M32)	-9.57* (-10.39, -8.75)	-0.099* (-0.18, -0.01)	-10.95* (-12.05, -9.84)
Percent of Individuals Receiving MOUD who are also Receiving Counseling and Behavioral Therapies to Treat Substance Use Disorders (Q3)	-5.37* (-9.14, -1.60)	0.55* (0.18, 0.91)	2.26* (-3.54, 8.06)
Emergency Department Utilization for SUD per 1000 beneficiaries (M23)	1.35* (1.18, 1.51)	0.12* (0.11, 0.14)	3.09* (2.91, 3.28)
Inpatient Stays for SUD per 1000 beneficiaries (M24)	0.50* (0.41, 0.60)	0.027* (0.017, 0.037)	0.87* (0.77, 0.98)
Per capita SUD spending (M30)	-7.28* (-9.12, -5.44)	0.41* (0.15, 0.67)	-1.48 (-3.98, 1.01)

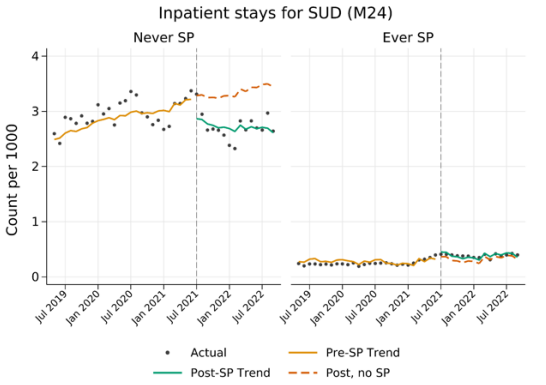
Initiation of SUD care (IET)	4.69* (2.86, 6.51)	0.14 (-0.04, 0.33)	6.56* (4.47, 8.66)
Out-of-pocket costs to Medicaid Enrollees with SUD (All services)	-28.96* (-30.93, -26.99)	-0.38* (-0.57, -0.18)	-34.23* (-36.78, -31.67)

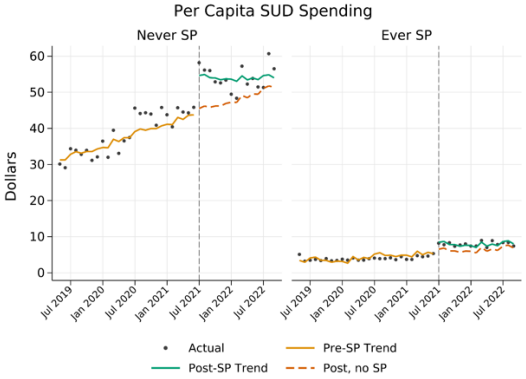
We similar examined several other outcomes to examine whether SP launch had differential effects between ever-SP beneficiaries and never-SP beneficiaries. Below is a summary of these findings and some of the figures are provided below the summary:

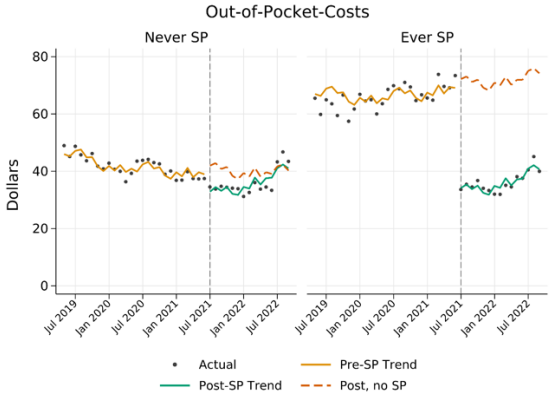
- All metrics examined had a statistically significant difference between the effect of SP launch on Ever-SP vs Never-SP populations.
- Most of the average effects of SP launch were negative, generally indicating the effect of SP implementation was larger and negative in the Ever-SP population than the Never-SP population. The larger effects indicate that the direct effects appear to dominate the indirect effects, at least for these measures, and the negative effect indicate that SP launch moved in the direction of reducing these measures, most of which were measures we would want to see increased (exceptions are ED- and IP-use per 1000 and out-of-pocket costs).
- The percent of beneficiaries with a SUD diagnosis, ED use for SUD per 1000, IP stays per 1000, and initiation of SUD care all had positive effects of SP launch, indicating that these measures increased more for SP enrollees than Never-SP enrollees, or moved in opposite directions.
- The trends were generally positive and significant, indicating that the rate of increase is larger for the SP than the never-SP population. The two exceptions were for trends in access to preventative care services and out-of-pocket costs.
- The average total effect of SP launch in September 2022 (combining the average change in the level of the metric with the change in the trend) was positive for five metrics, indicating that the SP launch had greater effects in the Ever-SP population than the Never-SP population on the Percent of beneficiaries with a SUD diagnosis; percent of beneficiaries on MOUD who received psychosocial services; ED visits per 1000; IP stays per 1000; and initiation of care for SUD. Five metrics had a negative effect, indicating that the effect was lower for SP enrollees than for the Never-SP population: the treatment rate, the outpatient treatment rate, the use of MAT; and out-of-pocket costs for beneficiaries with a SUD diagnosis. There was no difference in the effect of SP launch on per capita SUD spending between the Ever- SP and never-SP populations.

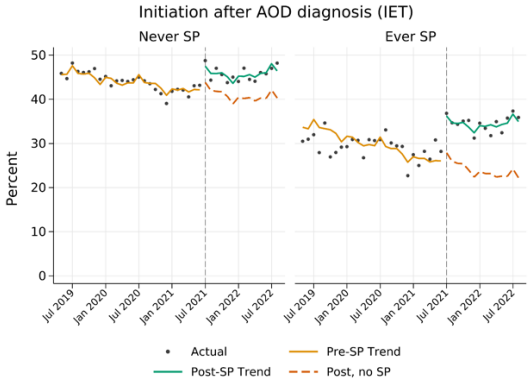

Access to Preventive Health Services (M32)
Never SP
Ever SP
Percent
0
20
40
60
80
100
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Jul 2022
Actual
Pre-SP Trend
Post-SP Trend
Post, no SP


ED visits for SUD (M23)
Never SP
Ever SP
Count per 1000
0
2
4
6
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Jul 2022
Actual
Pre-SP Trend
Post-SP Trend
Post, no SP


Inpatient stays for SUD (M24)
Never SP
Ever SP
Count per 1000
0
1
2
3
4
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Jul 2022
Actual
Pre-SP Trend
Post-SP Trend
Post, no SP


Per Capita SUD Spending
Never SP
Ever SP
Dollars
0
10
20
30
40
50
60
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Jul 2022
Actual
Pre-SP Trend
Post-SP Trend
Post, no SP


Out-of-Pocket-Costs
Never SP
Ever SP
Dollars
0
20
40
60
80
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Jul 2022
Actual
Pre-SP Trend
Post-SP Trend
Post, no SP


Initiation after AOD diagnosis (IET)
Never SP
Ever SP
Percent
0
10
20
30
40
50
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Jul 2022
Actual
Pre-SP Trend
Post-SP Trend
Post, no SP

Chapter 6: Conclusions, Policy Implications, and Lessons Learned

The results from this report are consistent with the tremendous losses and pivots that North Carolina, like virtually all other states, had to make during the COVID-19 PHE. The SUD components of the waiver were only beginning to gain traction as the PHE began, having been implemented only 10 months before its start. Most NC DHHS staff and providers worked under extraordinary conditions, that lasted longer than anyone imagined. The findings in this report do not in any way detract from the dedication of the thousands of dedicated public health professionals that accomplished daily miracles during this time.

The SUD waiver is the most challenging waiver component to evaluate because it is not a discrete event, like managed care launch, but comprised of multitudes of policy changes and approvals, many of which are still in progress. Many of the clinical coverage policies in behavioral health had some revisions during SUD implementation, but many other policy changes are still in progress. For example, although the state had budget authority to pay for SUD services in an IMD and as of July 1, 2021, SPs could use IMDs as covered services, nothing is listed in the Revision Information for the Inpatient Behavioral Health clinical coverage policy. Other SUD policy changes already implemented expand the types of providers who can bill for services and line many SUD services up with ASAM's Levels of Care. Tailored Plan launch has been postponed several times compromising the momentum of SUD implementation and has not yet been implemented.

There are some bright spots in this report: the number of people using evidence-based medication treatments for opioid use disorder is increasing, the continuity of pharmaceutical care for OUD is increasing, more providers are available to provide SUD services to beneficiaries, fewer beneficiaries without cancer are receiving opioid prescriptions from multiple providers, and beneficiaries with SUD diagnoses are accessing more ambulatory and preventative care. In addition, the stratified analyses reported in Chapter 4 show an improvement in health equity for a number of important SUD metrics.

In no uncertain terms, however, we have identified serious lack of access to many essential services for people with substance use disorders, even after the implementation of many of the components of the SUD waiver. Most of the SUD metrics required by CMS for SUD 1115 waivers declined rather than improved during the waiver implementation. The percent of beneficiaries with SUD receiving any type of care has stagnated at 35-40% of the population identified for treatment. This statistic alone indicates that more than 60% of people in the target population are not receiving any type of service in a given month. The percent of beneficiaries with a diagnosed SUD condition receiving outpatient SUD services has dropped to

levels below those experienced during the initial months of the PHE when the state was under stay-at-home orders. These levels indicate that in a typical month almost 75% of the eligible population is not receiving a single outpatient service. Finally, over 40% of non-elderly adults with opioid use disorder are not accessing evidence-based medication treatments for opioid use disorder, an essential tool the provider community has to fight this deadly condition.

While the Interim report uses much more sophisticated tools and a broader array of metrics than the Mid-point Assessment (MPA), which was conducted over a year ago, it is worthwhile to compare the findings from these two reports, as we did in the prior tables. It should be noted that the standards use in the two reports give different assessments, even for the same metrics. The approach required by CMS for the MPA is a simple comparison of two time points and doesn't account for any other trends. The ITS approach we used compares trends during the entire baseline (pre-SUD implementation) period to trends after implementation, controlling for many observable characteristics, such as burden of chronic disease in beneficiaries, demographic factors, seasonal trends, the COVID PHE, and other characteristics. Even if a metric is improving, if its improvement is at a slower rate than before the beginning of the SUD waiver, we note this as a deficiency, since the waiver was designed to escalate improvements in care for people with SUD.

As can be seen below (Table 5), few metrics demonstrate progress by this standard. Only five metrics that were improving at the time of the MPA continued to improve at this writing. Those were the percent of beneficiaries with SUD diagnoses, reductions in the concurrent use of opioids and benzodiazepines, spending on SUD services, per beneficiary spending on services, and access to ambulatory and preventative health services. The State was successfully able to turn around the measure of continuity of MOUD, which had decreased by the MPA, but now has increased.

Table 5. Summary of SUD Metric Results by Milestone

Measure (Metric abbreviation)	State's demonstration target	Directionality at mid-point (Oct 2021)	Adjusted waiver effects at Sept 2022	Progress * (Yes/No)
Assessment of Need and Qualification for SUD Treatment Services				
Medicaid Beneficiaries with SUD Diagnosis (M3)	Increase then decrease	Increase	Increase	Yes
Milestone 1: Access to critical levels of care for SUD				
Any SUD treatment (M6)	Increase	NI	Decrease	No

Early Intervention for SUD (M7)	Increase	Decrease	--	--
Outpatient Services for SUD (M8)	Increase	Increase	Decrease	No
Intensive Outpatient and Partial Hospitalization Services (M9)	Increase	Decrease	Decrease	No
Residential and Inpatient Services (M10)	Increase	Decrease	Decrease	No
Withdrawal Management (M11)	Increase	Increase	Decrease	No
Medication-Assisted Treatment (M12)	Increase	Increase	Decrease	No
Continuity of Pharmacotherapy for OUD (M22)	Increase	Decrease	Increase[+]	Yes[+]
Milestone 2: Use of Evidence-Based SUD-Specific Patient Placement Criteria				
Medicaid Beneficiaries Treated in an IMD for SUD (M5)	Increase	Increase	Decrease	No
Average Length of Stay in IMDs (M36)	Decrease	Increase	No change	Yes[1]
Milestone 4: Sufficient Provider Capacity at Critical Levels of Care, including for Medication-Assisted Treatment for Opioid Use Disorder				
SUD Provider availability (M13)	Increase	NI	Increase	Yes
SUD Provider availability for MAT (M14)	Increase	NI	Increase	Yes
Milestone 5: Implementation of Comprehensive Strategies to Address Prescription Drug Abuse and Opioid Use Disorders				
Use of Opioids at High Dosage in Persons without Cancer (M18)	Decrease	Decrease	Increase	No
Use of Opioids from Multiple Providers in Persons Without Cancer (M19)	Decrease	NI	Decrease	Yes
Use of Opioids at High Dosage and from Multiple Providers in Persons Without Cancer (M20)	Decrease	NI	Decrease	Yes
Concurrent Use of Opioids and Benzodiazepines (M21/COB)	Decrease	Decrease	--	--
Emergency Department Utilization for SUD per 1000 beneficiaries (M23)	Decrease	Increase	Increase	No
Milestone 6: Improved Care Coordination and Transitions Between Levels of Care				
Initiation and Engagement of Alcohol Abuse or Dependence Treatment (IET/M15)	Increase	--	Initiation: Decrease Engagement: Decrease	No No
Initiation and Engagement of OUD Treatment (IET/M15)	Increase	--	Initiation: Decrease Engagement: Decrease	No No

Initiation and Engagement of other Drug Abuse or Dependence Treatment (IET/M15)	Increase	--	Initiation: Decrease Engagement: Decrease	No No
Initiation and Engagement of any Drug Abuse or Dependence Treatment (IET/M15)	Increase	Initiation: Increase Engagement: Decrease	Initiation: Decrease Engagement: Decrease	No No
Follow-Up After Emergency Department Visit for Alcohol and Other Drug Abuse or Dependence (M17.1)	Increase	7-day decreased 30-day increased	7-day decreased 30-day decreased	No No
Follow-Up After Emergency Department Visit for Mental Illness (M17.2)	Increase	7-day increased 30-day increased	7-day decreased 30-day increased	No Yes
Readmissions Among Beneficiaries with SUD (M25)	Decrease	Decrease	No change	No
Other SUD Metrics				
Inpatient Stays for SUD per 1000 beneficiaries (M24)	Decrease	NI	No change	No
Total spending on SUD services (M28)	Increase	NI	Increase	Yes
Total spending on SUD services within IMDs (M29)	Decrease	NI	No change	No
Per capita SUD spending (M30)	Increase	NI	Increase	Yes
Per capita SUD spending within IMDs (M31)	Decrease	NI	Increase	No
Access to Preventive/Ambulatory Health Services for Adult Medicaid Beneficiaries with SUD (M32)	Increase	NI	Increase	Yes
State-specified Metrics (Health IT)				
Connecting Primary Care to SUD Service Offerings (Q2)	Increase	NI	Decrease	No
Percent of Individuals Receiving MOUD who are also Receiving Counseling and Behavioral Therapies to Treat Substance Use Disorders (Q3)	Increase	NI	Decrease	No

*Notes: * Progress here indicates that by the end of the study period (typically September 2022), the level of the metric was at least as good (high or low) as we estimate it would have been without the SUD waiver (but still with the COVID PHE and SP implementation).*
-- = counts were too small to reliably project trends
NI = Not included in the mid-point assessment

+ = metric is annual only. The small number of data points make it difficult to tell whether the change was due to the waiver implementation.

1 = While the average LOS in IMDs did not change during the study period, it was already substantially below the CMS goal of <30 days, so we believe progress was already made in this metric.

We offer some new suggestions and reinforce others made previously in the MPA.

1. ***Allow competition for Tailored Plans to facilitate TP launch***: The delayed implementation of the Tailored Plans has been a big setback of the SUD waiver implementation. By re-integrating medical and surgical care back into a single PHP (capitated health plan), the state has the opportunity to improve behavioral health and medical care for a population that has considerable unmet needs. However, the design of Tailored Plans contrasts dramatically with Standard Plans in that TPs are set up to be regional monopolies initially, which could explain why these plans haven't launched to date. Allowing managed competition across health plans for TP eligible beneficiaries from the start could facilitate TP launch and potentially improve outcomes for beneficiaries for both medical and behavioral health.

2. **Use the metrics to mount an adaptive response***:* We reiterate the importance of careful monitoring of these metrics and assigning accountability for improvements. Many of the metrics demonstrated here are in one of the dashboards that the Sheps Center provides to DHHS and are updated monthly[25]. Identifying the metrics most in need of improvement, in the places most in need of improvement, can help prioritize spending and service expansions.

3. ***Ensure that the provider community is aware of the IMD waiver***: The IMD waiver is not widely recognized in the provider community (results from the MPA) and has not been widely implemented. SUD services in an IMD can offer an institutional option that may not be appropriate for many people with SUD, but can provide an additional care option for those in inpatient settings. This option does not seem to be widely described as a new service offering to providers through the Division of Mental Health's website and we do not find much change in the use of IMD services for SUD.

[25] We note that the SUD dashboard has been available for many years but the newer behavioral health dashboard which contains many new measures reflecting mental health and substance use care, has only recently been made available with regular updates to NC DHHS.

4. ***Identify opportunities to engage beneficiaries in treatment at critical moments***: Follow up after hospital and emergency department use remain low, despite tremendous advances in infrastructure through EHRs and other platforms. Initiation in treatment after a diagnosis and engagement in treatment after initiation are on the decline for all four types of substance use disorders examined here. Incentivizing providers to achieve improvements in care at these critical moments could help move the needle on many of these metrics.

Appendix 1: COVID-19 Period Estimation

Introduction

Detection of the effects of policy changes over the last several years is complicated by the onset of the COVID-19 pandemic, which caused a lockdown beginning in March 2020 in North Carolina and most other states. COVID-19 affected schooling, employment, and health service use in a multitude of ways that are still being assessed. The period during which COVID-19 can be expected to affect the health service use outcomes measured in this report is not immediately clear, since different types of health care faced distinct shocks and demands (for example, variation in ease of switching to telehealth as a primary service delivery mode). Ideally, the impact of the SUD 1115 Waiver could be isolated from the effects of COVID-19. In this brief, we present the novel method we developed and implemented to detect the period during which COVID-19 could be reasonably expected to affect service use patterns, confounding estimates of SUD 1115 Waiver effects. In addition, Standard Plans were implemented on July 1, 2021, capitating care for most Medicaid beneficiaries through separate managed care plans, which may have further affected patterns of care. The key idea we used to identify these separate effects was to measure distinct types of service use among a population exposed to COVID-19 but not exposed to either the SUD components of the 1115 Waiver nor to Standard Plans: NC Medicaid beneficiaries never diagnosed with SUD and not enrolled in Standard Plans. We recognize that this population may not be entirely similar to those beneficiaries who were affected by the SUD components of the waiver, at least definitionally, they lack SUD diagnoses. However, we used broad categories of care in order to create typical packages of services that could be used by all beneficiaries.

Methods

Analytic sample: We limited the first stage of the analysis to adult NC Medicaid beneficiaries never diagnosed with SUD and never enrolled in Standard Plans, which were implemented on July 1,2021. This transition is a major component of the overall NC Medicaid 1115 Waiver governing the transition to managed care and it affected the claim submission process, the data available to the Sheps Center, and the patterns of service use among Medicaid beneficiaries enrolled in the new plans. To isolate service use changes due to COVID-19 from changes due to the SPs, we restricted the sample to those never enrolled in SPs. For pharmacy utilization, we excluded Dual eligible Medicare/Medicaid beneficiaries.

Outcomes: We defined five types of general care utilization relevant to the monitoring metrics: inpatient utilization, evaluation and monitoring (E&M) outpatient visits, prescription drug fills, emergency department visits, and dental appointments. For each of these, we defined the numerator as "any care in this setting during the month" and the denominator as defined in the *analytic sample* section.

Model specification: To forecast expected utilization in the absence of COVID-19, we specified a model with a linear, quadratic, or cubic time trend (determined via the Akaike Information Criterion measure of model fit) and month fixed effects to account for seasonality. We estimated the model using Newey-West standard errors to account for autocorrelation. We forecasted means and 95% confidence intervals beginning in March 2020 through September 2022 and then compared the observed utilization with these intervals. When actual utilization fell outside of predicted utilization, this was defined as the preliminary COVID-19 period (as can be seen below, this never occurred before the COVID-19 PHE). When actual utilization remained within the predicted utilization bounds for 3 or more months within a 6-month period, we defined a date at which utilization "returned to normal" (RTN), or systematically returned to the forecasted utilization. We then incorporate the RTN date in the interrupted time series (ITS) models used in this report, adjusting for a COVID-19-specific intercept and slope in the period between March 2020 and the month before the return to normal.

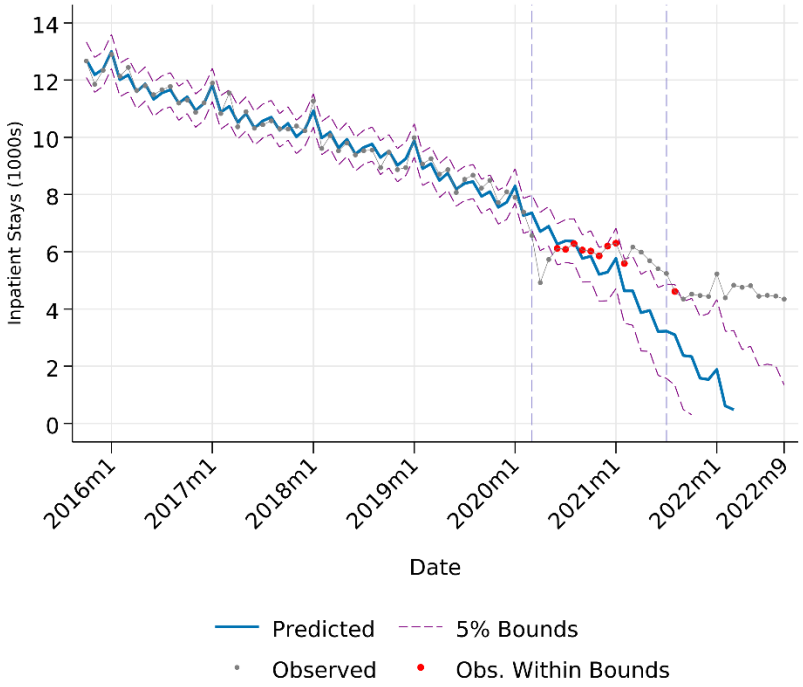
Results

The table provides the estimated COVID-19 period for each utilization type, while the figures show forecast and actual utilization for each of the 5 utilization types and the 2 measures (count vs. rate). Metrics that aggregate multiple service types together (such as spending metrics and overall behavioral health provider participation) use the most common end of COVID-19 period, which was September 2022 (the end of the study period). Unlike other metrics, prescriptions did not show an immediate COVID-19 effect but diverged slowly from pre-COVID trends starting in March 2020, so the COVID-19 time period for pharmacy metrics was defined as March 2020 to September 2022.

Service Type	Measure	End of COVID-19 Period	Monitoring Metrics Using This Period
Inpatient	Count	May 2020	M29
	Rate	N/A	M5, M10, M24, M25, M31, M36
Outpatient (E&M)	Count	May 2020	N/A
	Rate	N/A	M3, M6, M7, M8, M9, M11, M12, M15, M17(1), M17(2), M32, Q2, Q3, FUH, non-MOUD, OOP, BH Care
Emergency department	Count	May 2020	N/A
	Rate	N/A	M23, Avoidable ED
Prescriptions	Count	N/A	N/A
	Rate	N/A	AMM
Dental visits	Count	May 2020	N/A
	Rate	June 2020	ADV
Multiple	N/A	N/A	M28, M30, BH provider participation

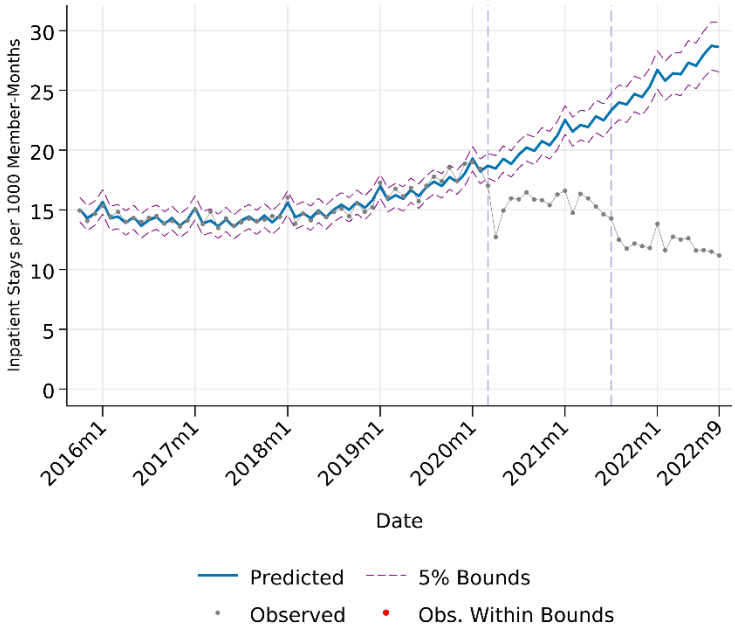
The following figures show utilization trends for each of the different service types and the forecasted utilization in the absence of COVID-19.

Appendix Figure 1. Count of Inpatient Visits.



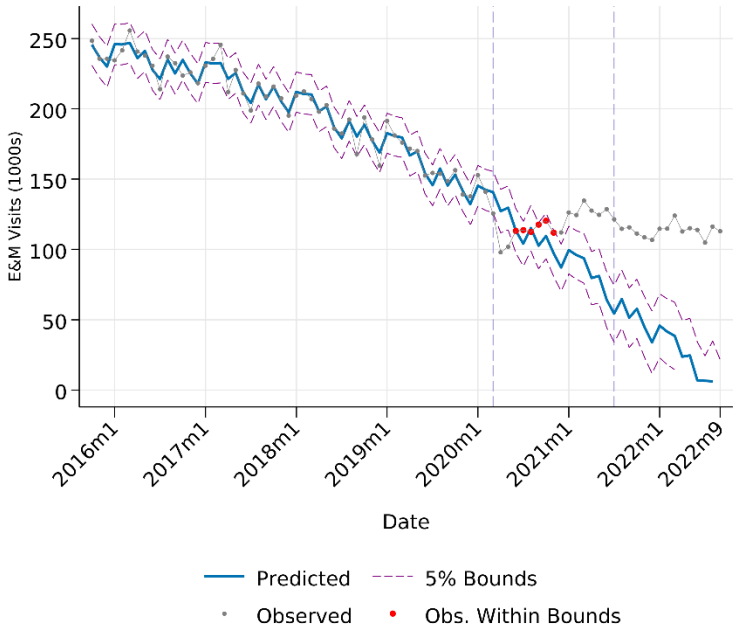
Population: fully-eligible beneficiaries without SUD who remained in Medicaid Direct.
The vertical dotted lines shown the onset of the COVID-19 pandemic in NC (March 2020) and the Standard Plan launch (July 2021), respectively.
Predictions less than 0 are omitted.

Appendix Figure 2. Rate of Inpatient Visits



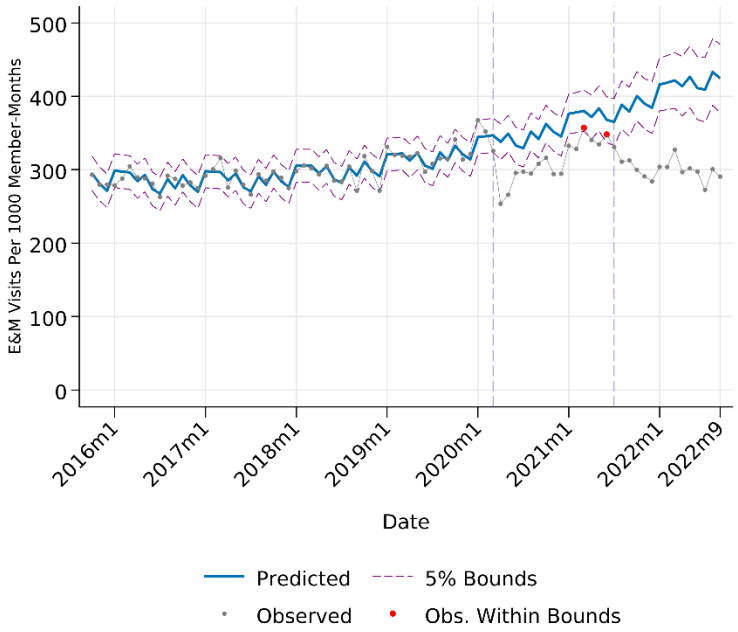
Population: fully-eligible beneficiaries without SUD who remained in Medicaid Direct.
The vertical dotted lines shown the onset of the COVID-19 pandemic in NC (March 2020) and the Standard Plan launch (July 2021), respectively.
Predictions less than 0 are omitted.

Appendix Figure 3. Count of Evaluation and Management Visits.



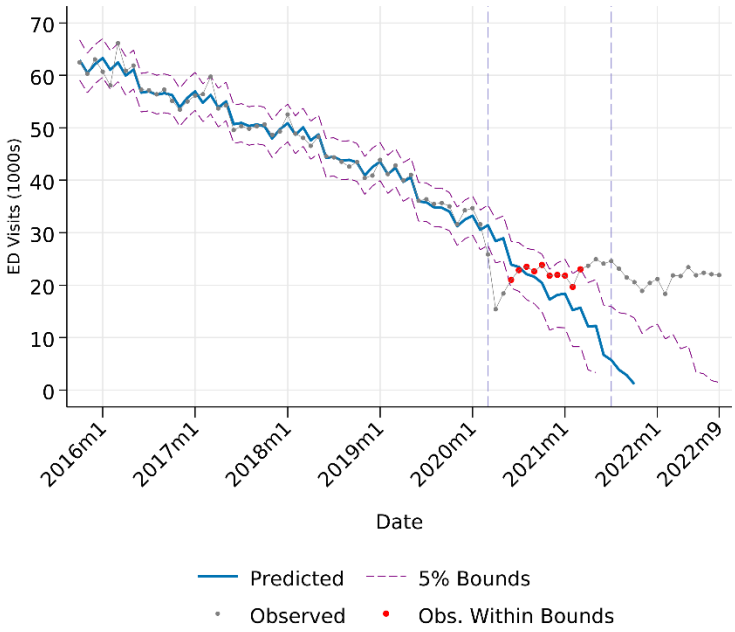
Population: fully-eligible beneficiaries without SUD who remained in Medicaid Direct.
The vertical dotted lines shown the onset of the COVID-19 pandemic in NC (March 2020) and the Standard Plan launch (July 2021), respectively.
Predictions less than 0 are omitted.

Appendix Figure 4. Rate of Evaluation and Management Visits



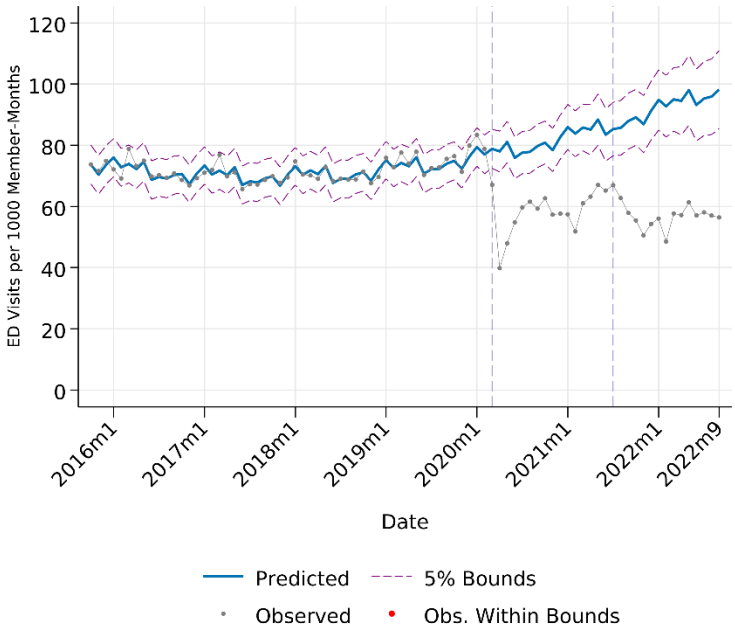
Population: fully-eligible beneficiaries without SUD who remained in Medicaid Direct.
The vertical dotted lines shown the onset of the COVID-19 pandemic in NC (March 2020) and the Standard Plan launch (July 2021), respectively.
Predictions less than 0 are omitted.

Appendix Figure 5. Count of ED Visits.



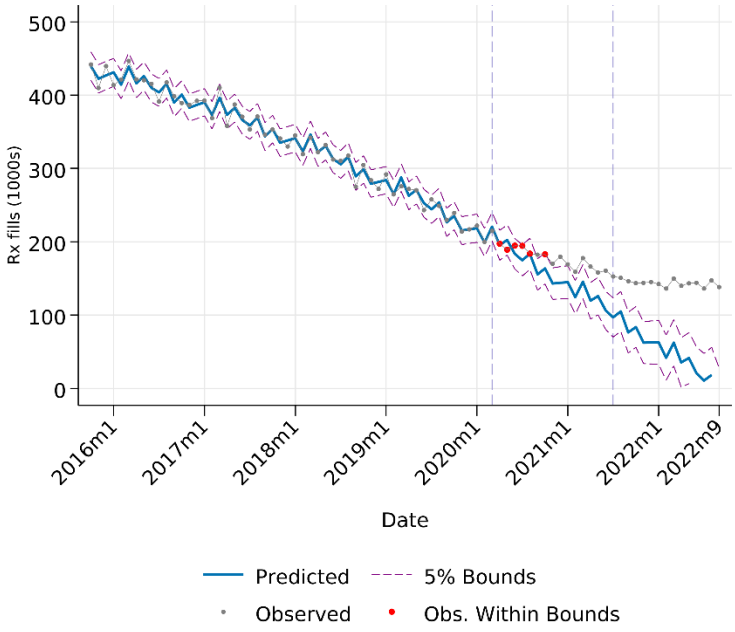
Population: fully-eligible beneficiaries without SUD who remained in Medicaid Direct.
The vertical dotted lines shown the onset of the COVID-19 pandemic in NC (March 2020) and the Standard Plan launch (July 2021), respectively.
Predictions less than 0 are omitted.

Appendix Figure 6. Rate of ED Visits.



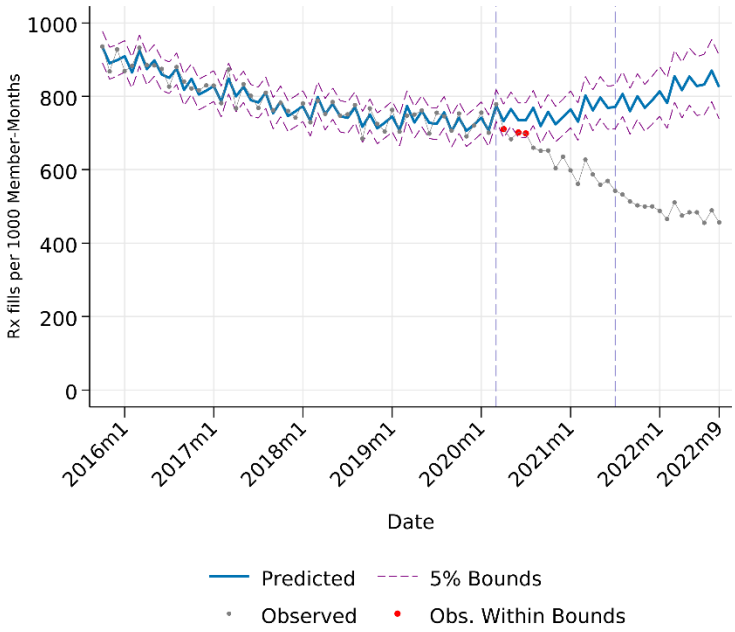
Population: fully-eligible beneficiaries without SUD who remained in Medicaid Direct.
The vertical dotted lines shown the onset of the COVID-19 pandemic in NC (March 2020) and the Standard Plan launch (July 2021), respectively.
Predictions less than 0 are omitted.

Appendix Figure 7. Count of Prescription Fills.



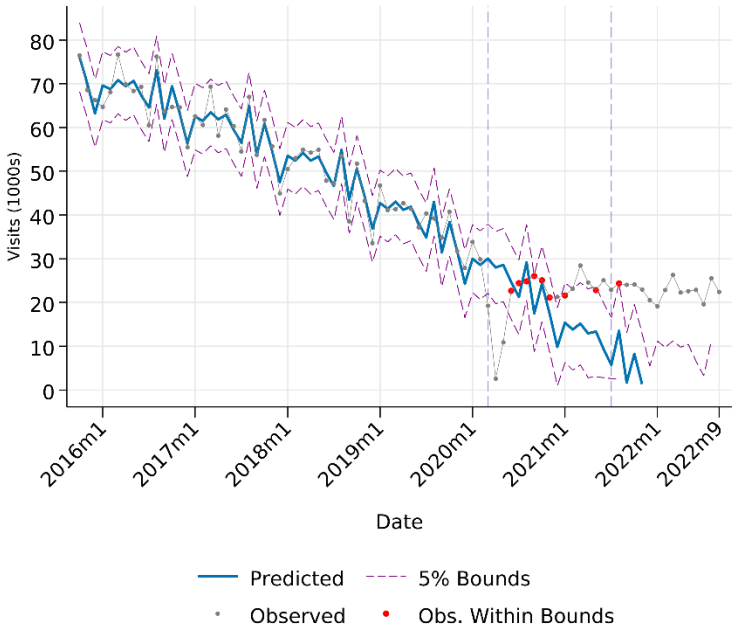
Population: fully-eligible beneficiaries without SUD who remained in Medicaid Direct.
The vertical dotted lines shown the onset of the COVID-19 pandemic in NC (March 2020)
and the Standard Plan launch (July 2021), respectively.
Predictions less than 0 are omitted.

Appendix Figure 8. Rate of Prescription Fills.



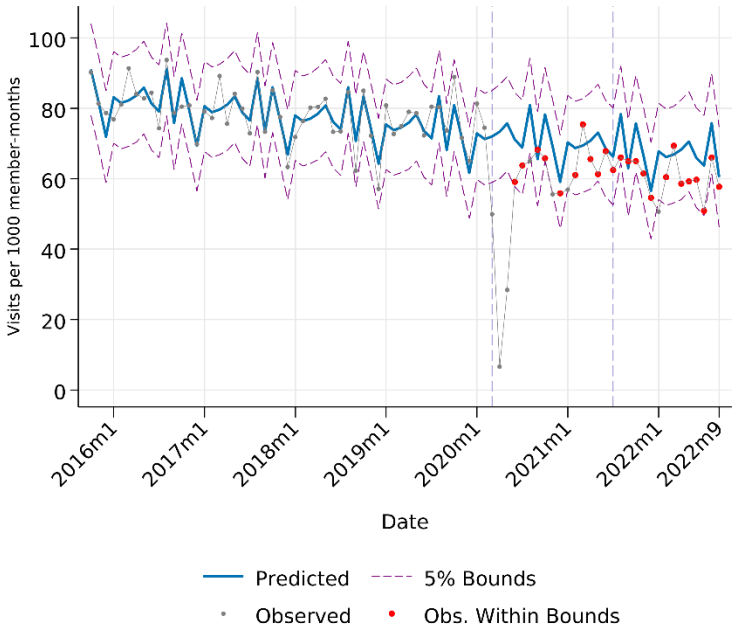
Population: fully-eligible beneficiaries without SUD who remained in Medicaid Direct.
The vertical dotted lines shown the onset of the COVID-19 pandemic in NC (March 2020)
and the Standard Plan launch (July 2021), respectively.
Predictions less than 0 are omitted.

Appendix Figure 9. Count of Dental Visits.



Population: fully-eligible beneficiaries without SUD who remained in Medicaid Direct.
The vertical dotted lines shown the onset of the COVID-19 pandemic in NC (March 2020) and the Standard Plan launch (July 2021), respectively.
Predictions less than 0 are omitted.

Appendix Figure 10. Rate of Dental Visits.



Population: fully-eligible beneficiaries without SUD who remained in Medicaid Direct.
The vertical dotted lines shown the onset of the COVID-19 pandemic in NC (March 2020) and the Standard Plan launch (July 2021), respectively.
Predictions less than 0 are omitted.