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

April 15, 2025

Jay Ludlam
Deputy Secretary, North Carolina Medicaid
North Carolina Department of Health and Human Services
2501 Mail Service Center
Raleigh, NC 27699-2501

Dear Deputy Secretary Ludlam:

The Centers for Medicare & Medicaid Services (CMS) completed its review of the Managed Care Interim Evaluation Report, which is required by the Special Terms and Conditions (STCs), specifically STC #36 "Interim Evaluation Report" of the North Carolina Medicaid Reform Demonstration (Project Number 11-W-00313/4), which was approved effective January 1, 2019 through October 31, 2024, with a temporary extension approved through December 10, 2024. This Interim Evaluation Report focuses on the managed care component of the demonstration, and covers the period from July 2021 (when the program's Standard Plans were first implemented) through February 2023, with baseline data from January 2016 through June 2021. CMS determined that the Evaluation Report, submitted on October 5, 2023 and revised on December 18, 2024, is in alignment with the CMS-approved Evaluation Design and the requirements set forth in the STCs, and therefore approves the state's Interim Evaluation Report.

The findings of the Interim Evaluation Report are preliminary, given that the report is based on the initial 20 months of the implementation of the state's managed care Standard Plans under the demonstration. After implementation, there were some improvements in the use of appropriate care, and use of care management services increased substantially. Rates of initiation and engagement in treatment for substance use more than doubled, and use of antidepressant medication management increased. Nonetheless, for other metrics, such as the rate of avoidable emergency department visits and access to preventive/ambulatory care among beneficiaries with substance use disorder, managed care implementation led to either no change or poorer outcomes. Although the analyses included controls for the COVID-19 public health emergency (PHE), the PHE might have contributed to the lack of positive impacts through its dampening effect on health care utilization. Though provider participation in Medicaid slightly declined after managed care implementation, over 80 percent of providers surveyed believed that quality of care and patient health and well-being improved or remained unchanged after managed care implementation. CMS looks forward to receiving further findings in the Summative Evaluation Report.

In accordance with STC #39, 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: 2025.04.15 13:33:33 -04'00'

Danielle Daly
Director
Division of Demonstration Monitoring and Evaluation

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

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INTERIM EVALUATION REPORT OF THE MANAGED CARE COMPONENT OF NORTH CAROLINA'S 1115 WAIVER

Table of Contents

List of Abbreviations

AMH – Advanced Medical Home

CDPS_Rx – Chronic Illness and Disability Payment System with Prescription Use flags

CIN – Clinically Integrated Network

CMS - Centers for Medicare & Medicaid Services

DiD – Difference in differences

ED – Emergency department

ITS – Interrupted time series

NC – North Carolina

OUD – Opioid Use Disorder

PMPM – Per-member-per-month

PHE – Public Health Emergency

SUD – Substance Use Disorder

Executive Summary

The goal 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 the burden from substance use disorders statewide. The demonstration consists of two major elements: components to restructure Medicaid and Health Choice delivery system and benefit structure in NC and components to address the opioid use epidemic and general substance use treatment needs in the state of North Carolina. This report evaluates changes in measures reflecting quality of care, process of care, and health outcomes, focused on the first two goals of the 1115 waiver related to system transformation. The Pilots will be evaluated in a separate Interim Evaluation Report, although Pilot participants are included in the analyses for the overall waiver evaluation. The first Rapid Cycle Assessment of the Pilots is available on NC DHHS's website.

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 Goals 1&2 of the waiver and test research questions using a number of data sources including Medicaid enrollment, claims and encounters, and state-level public data sources such as the Behavioral Risk Factor Surveillance System.

The evaluation study period for the Interim Evaluation Report runs from November 1, 2019 – February 28, 2023. Standard Plans (SP), a major component of the 1115 waiver, launched on July 1, 2021 and most analyses in this report compare the trends in metrics before and after the launch of SPs, controlling for observable variables, such as comorbidities and demographic characteristics. A major —and potentially -- confounding event occurred during the SP implementation period: the Public Health Emergency from the COVID-19 pandemic began with stay-at-home orders in March 2020 and only ended in May 2023. In our Interim Evaluation Report on the substance use disorder components of the waiver (May 2023), we developed a novel method of identifying the "return-to-normal" dates in our data, which we continue to use here.

We use interrupted time series models to examine the trends in metrics before the start of the SP launch and during the waiver implementation period. These models control for changes due to other factors such as the COVID-19 PHE, month effects, county effects, and beneficiary-level controls for age, race/ethnicity, sex, and the Chronic Disease Payment System (CDPS-Rx) risk score. The ITS analysis 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 SP implementation period to the SP waiver. We take this into account when describing results. We compare Level 3 Advanced Medical Homes (AMH) to Levels 1-2 AMHs using difference-in-differences analyses that compare the rate of change by AMH type from before to after the launch of SPs.

Below, we summarize the findings by the theme of the hypothesis:

1. **Hypotheses that evaluate the effect of SP launch**

Hypothesis 1.1 examined the impact of SP launch on a variety of measures of access to health care, quality of care, and health outcomes. Of the 35 measures examined, eight showed marked improvement. These included two metrics from the Standard Plan measure set: avoidance of antibiotic treatment for acute bronchitis and concurrent use of opioids and benzodiazepines. The six other measures that improved included breast cancer screening, postpartum contraceptive care within 90 days of delivery, appropriate testing for pharyngitis, reductions in the hospitalization rate for diabetes short-term complications among children and adolescents, reductions in the admissions rate for asthma among children and adolescents, and reductions in the rate of hospitalizations for urinary tract infections among children and adolescents. Interestingly these rates are all based on medication use or hospital care. Fifteen measures worsened since the launch of Standard Plans, even after attempting to control for changes due to the COVID-19 PHE, although our methods are incomplete in capturing its full effect on patterns of care. These measures reflect a broad range of pharmacy, outpatient, dental, and preventative care services which may be directly or indirectly affected by the transition to managed care. The remaining 12 measures did not exhibit any statistically significant differences from pre- to post-SP implementation, including one SP/AMH measure set metric.

Hypothesis 1.2 examined the impact of SP launch on measures of behavioral health access to care and quality among the population of beneficiaries in SPs. We found significant progress by SPs in engaging beneficiaries with behavioral health needs in care in nine metrics. These include greater retention in antidepressant medication use for beneficiaries with diagnosed depression at both the acute and continuation phases, greater follow-up after hospitalization for mental illness with enhanced behavioral services, greater rates of initiation in services for alcohol use disorder, initiation and engagement in treatment for opioid use disorder, and overall. Six measures of behavioral health care and quality worsened, even after adjusting for COVID-19 effects. These include adherence to antipsychotic medication

for SP members with Schizophrenia, two measures of metabolic monitoring for children and adolescents on antipsychotics, continuity of pharmacotherapy for OUD; the use of behavioral health services by beneficiaries with a serious mental illness, substance use disorder, or severe emotional disturbance, and access to preventative/ambulatory health services for people with a SUD diagnoses. The remaining 15 metrics showed no difference between the pre- and post- SP implementation periods, including four measures from the Standard Plan Measure Set.

Hypothesis 1.3 examines the use of MOUD and behavioral health services by SP enrollees and reductions in the use of opioids. We analyzed five metrics for this hypothesis. The initiation and engagement of opioid use treatment have both improved among beneficiaries in SPs since SP implementation. One measure of use of opioids in high dosages worsened, and the remaining two metrics showed no differences.

Hypothesis 2.1 examines whether improved access and quality of care through SPs decreased reactive services such as emergency department or hospital admissions. We analyzed three metrics for this hypothesis. One demonstrated substantial progress after SP implementation (ED visits per capita); one worsened (avoidable ED visits) and one demonstrated no difference from what is estimated to occur in the absence of the waiver (hospital admissions).

Hypothesis 2.2 examines measures of access to community care after hospital discharge. We examined two measures for this hypothesis. One measure reflected the percent of beneficiaries in the SP population who received care management services. This increased appreciably after SP implementation. The second metric reflecting patient engagement in post-discharge care worsened, indicating a large reduction in care by adult beneficiaries after an acute or non-acute inpatient stay.

Hypothesis 2.3 examines trends in expenditure patterns. While the budget neutrality and formal cost analysis is not conducted by the evaluation team, we did examine trends in per-member per-month expenditures by Medicaid and the Standard Plans for components of expenditures. We found that per capita spending in many areas was lower after SP implementation than what was projected in the absence of the waiver, although we notably found increases in spending on emergency department services. No changes were observed for behavioral health or prescription medication spending per capita.

Hypothesis 2.4 examines provider satisfaction and participation. For this hypothesis, we examined the change in the percent of providers with a Medicaid contract in the month that billed for services provided to beneficiaries. We found that rate was generally increasing during the study period, but that the rate of increase flattened out after SP implementation. We also provide qualitative information from provider interviews for this hypothesis.

2. **Hypotheses that evaluate the effect of Advanced Medical Homes (1.4)**

Hypothesis 1.4 examines whether outcome measures are different between tier 3 Advanced Medical Homes (AMH3) as compared to tier 1-2 AMHs, controlling for differences in beneficiary characteristics including comorbidities, and controlling for practice level characteristics that have been constant over time. We examined 23 outcome measures to test this hypothesis to determine whether tier 3 AMHs had improved outcomes over tier 1-2 AMHs since the implementation of SPs. While we did find an impressive rate of growth in the number of practices designated as an AMH and the percent of the beneficiary population receiving care management services, we found no differences in patterns of care for the remaining 21 measures. We do note that in some cases, beneficiaries in all types of AMHs had better outcomes after SP launch than before it, as noted in the results for hypotheses 1.1-1.3.

3. **Hypotheses that evaluate health equity (1.5)**

We also looked at the degree to which the SP implementation affected groups differently. Here, there was more evidence of heterogenous effects than we expected. For three stratification approaches – age, White race, and Black race – roughly one third of metrics had statistically significant differential effects at the last month of the study period. That is, there is evidence that the SP implementation affected one group more than the other. Not all of these are clinically significant effects – e.g. a tenth of a percentage point may not be of the utmost concern. In some cases, the differential effects led to attenuation of disparities; in others, it exacerbated existing disparities. The metrics most likely to identify differential effects were those with the largest sample size – e.g. expenditures, utilization, and quality metrics where a large portion of the population were eligible for inclusion.

In summary, this interim analysis examining changes in measures of access to care, quality of care, process, and outcomes found many ways in which Standard Plans have improved these measures of health care over the fee-for-service Medicaid Direct program that existed prior to the launch of Standard Plans in July 2021. Improvements were noted not just in primary care, but in access to quality care for beneficiaries with behavioral health diagnoses. At this writing, we do not find consistent patterns in the types of care that improved under Standard Plans versus the types of care that remained the same or even worsened. Some metrics of post-hospital care improved, while others did not, and thus we cannot consistently point to the

overwhelming need for system improvements in interactions between primary care and hospital care. Hospital care was especially disrupted by the PHE, with enormous rates of critical care use for COVID-19 cases and substantial reductions in many clinical areas such as elective surgeries. Patterns of hospital care still have not returned to normal. Many measures of behavioral health showed remarkable improvements, while some declined.

Many of the metrics that are still in need of improvement can be accomplished through system improvements in primary care. Automated electronic health record processes could better identify beneficiaries who are appropriate for statin prescriptions, or hospital follow-ups, for example. Increased care management, not yet analyzed for this report due to continued data challenges, could be one method of accomplishing these improvements, as could information technology enhancements through the health information exchange or shared EHRs.

Finally, an area of disappointment is the lack of improvement by tier 3 AMH practices in any of the metrics examined as compared to tier 1-2 AMHs. This analysis controls for the selection bias inherent in the voluntary participation in the AMH3 recognition program and thus uses a more rigorous analysis approach by examining improvements since AMH recognition rather than allowing practices with long-standing track records of quality improvement that predate SP launch to drive differences by AMH tier. That is, our analysis does not just look at whether practices with long-standing records of high quality elected to participate in the AMH program, but whether changes in AMH status after SP launch were associated with improvements in metrics.

Chapter 1. General Background Information

North Carolina Medicaid's 1115 Waiver entitled "North Carolina Medicaid Reform Demonstration", hereinafter referred to as "the Waiver," was approved by the Centers for Medicare & Medicaid Services (CMS) on October 24, 2018. Plans for the Waiver were initiated in 2015, when the NC General Assembly enacted Session Law 2015-245 to move the state's Medicaid and Health Choice programs away from reimbursing providers directly through fee-for-service payments to a system of paying private health plans on a capitated basis. The goal of the 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 the burden from substance use disorders statewide. In achieving the stated goals, the Waiver embeds two major elements of the demonstration: (1) components aimed at restructuring the Medicaid and Health Choice delivery and payment systems; and (2) components to address the opioid use epidemic and general substance use treatment needs in the state. This Interim Report will focus on the Waiver components related to the transformation of the delivery and payment systems, which began on July 1, 2021. For more details on the implementation of the Substance Use Disorder (SUD) components of the Waiver, please refer to the SUD Interim Evaluation Report, completed in May 2023.

The delivery and payment system components of the Waiver consist of several important policy changes. First, the State transitioned most NC Medicaid and Health Choice enrollees from a fee-for-service system into a capitated model of care. This shift has happened in phases, by eligible populations. The first group transitioned to Standard Prepaid Health Plans (Standard Plans or SPs) on July 1, 2021. This group includes individuals statewide who are not excluded from enrollment in SPs and do not qualify for one of the behavioral health intellectual/developmental disability Tailored Plans (hereinafter referred to as "Tailored Plans") or the specialized foster care plan, described below. In addition, beneficiaries who are members of a recognized federal tribe or eligible to receive services from the Indian Health Service in certain counties can opt into the Tribal Option instead of the capitated plans. Later in the demonstration, Medicaid enrollees with severe behavioral health conditions, intellectual or developmental disabilities, and/or traumatic brain injuries who meet criteria established by the Department of Health and Human Services and current as well as former foster children[1] will be enrolled in separate capitated plans with specialized

[1] Medicaid-only beneficiaries in foster care under age 21, children in adoptive placements and former foster youth who aged out of care up to age 26.

features that are customized for the needs of each of these groups. The final launch date of these specialty plans has not been determined as of this report. While most Medicaid enrollees will be covered under a capitated plan under the demonstration, several groups are excluded from participation, including most Medicaid enrollees who are dually eligible[2] and 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 Adult enrollees are also excluded. These beneficiaries will remain in fee-for-service Medicaid, now called NC Medicaid Direct.

The next significant policy shift revolves around the Advanced Medical Home (AMH) program. Expanding upon its pre-existing primary care case-management initiative, which was in place prior to the Waiver implementation, the State introduced the AMH program as a central method for providing and coordinating care management services within managed care. Presently, there are three tiers of AMHs, each with increasing care management obligations and criteria. As defined in the AMH manual for primary care providers,[3] "in AMH Tier 1 and 2 practices, PHPs will retain primary responsibility for care management, and practices will be required to closely coordinate and interact with each PHP with which they have a contract. AMH Tier 3 is a more advanced phase for practices ready to take on care management responsibility, either alone or as part of a network of practices affiliated with a Clinically Integrated Network (CIN). PHPs will provide oversight for care management delivered in or on behalf of Tier 3 practices but will otherwise delegate day to day care management responsibilities to the Tier 3 AMH practice or the system or CIN/partners with which they are affiliated." The distinction between Tier 1 and Tier 2 practices follows the same distinction from the current primary care case management program, with Tier 2 practices required to contract with a regional network, on top of the Tier 1 practice requirements such as after-hours availability and panel size. SPs are required to contract with 100% of Tier 3 AMH practices in their service area, although this has not been achieved in practice. As of May 2023, there were 1,348 practices which have been certified as AMHs, and 888 of these are currently certified as

[2] Dual eligibles will enroll in BH I/DD Tailored Plans at their launch for BH and I/DD services only and medically needy and HIPP beneficiaries who are enrolled in the Innovations waiver will enroll in BH I/DD Tailored Plans at their launch.

[3] NC DHHS (Aug 27, 2018) Becoming Certified as an Advanced Medical Home: A Manual for Primary Care Providers. Full manual can be found here.

AMH tier 3 practices. Participation in the program is optional for primary care practices, allowing them the flexibility to apply for recognition at a specific Tier level or to opt out entirely.

In January 2020, Medicaid also announced its strategy for the use of value-based payments through the Medicaid transformation process. Under this strategy, plan and provider contracts will include a value-based component before the end of the demonstration period. Component options include, but are not limited to AMH Performance Incentive Payments, participation in a Medicaid ACO, and adding value-based payments to existing care management models such as the pregnancy medical home model or local health department care management. Value-based approaches may be customized to specific populations, such as pediatrics, maternity care, or pharmacy. Many of the VBP models have only been phased in recently and data is not yet available that would support VBP analyses, so they are not included in this report. As the VBP models mature and have more post-implementation data, an evaluation of their impact can be conducted.

Finally, NC's demonstration permits DHHS to establish a limited number of Healthy Opportunities Pilots in a subset of regions. These pilots offer reimbursement for evidence-based, non-medical interventions that address housing, transportation, food, and interpersonal safety and toxic stress that are traditionally not covered by Medicaid. North Carolina will be able to evaluate the impact of the provision of these services on enrollees' health outcomes and healthcare costs. The Pilots will be evaluated in a separate Interim Evaluation Report, although Pilot participants are included in the analyses for the overall waiver evaluation. The first Rapid Cycle Assessment of the Pilots is available on NC DHHS's website.

Chapter 2. 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.
3. Reduce the burden of substance use disorder.[4]

All three goals can be used as a lens through which the delivery and payment system components of the Waiver are evaluated, although the first two are the focus of this report. The primary and secondary drivers or pathways through which these goals are theorized to be achieved are diagrammed below (Figures 2.1 – 2.2).

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 Standard Plans (SP), which serve most of the Medicaid population and the future implementation of Tailored Plans (TP). 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 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 in the PHP models will improve beneficiary outcomes. A number of managed care initiatives specifically address social determinants of health; these include the Healthy Opportunities

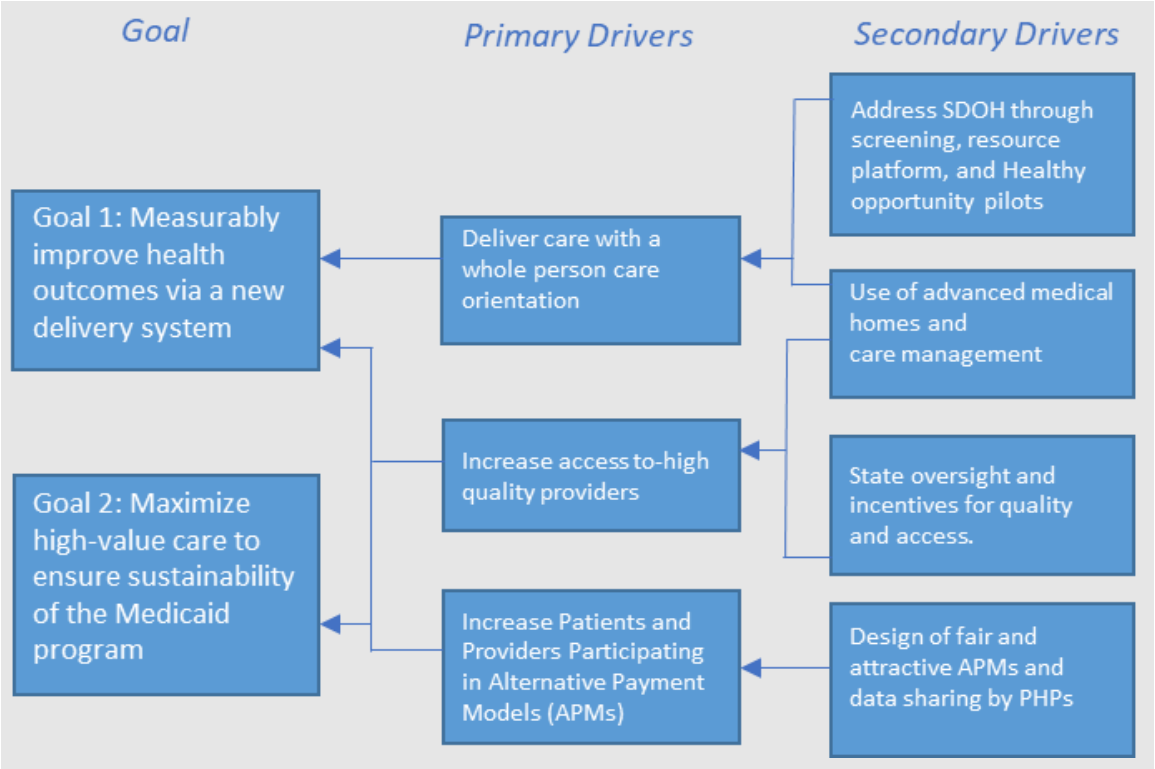
[4] The original goal was stated as "Reduce Substance Use Disorder." It has since been modified to "Reduce the Burden of Substance Use Disorder." In order to more accurately capture the intent of the transformation.

Pilots, the resource network 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 activities, value-added benefits, 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 EBPs.

Finally, primary drivers also enhance 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 2.1 Driver Diagram for Goals 1 and 2.

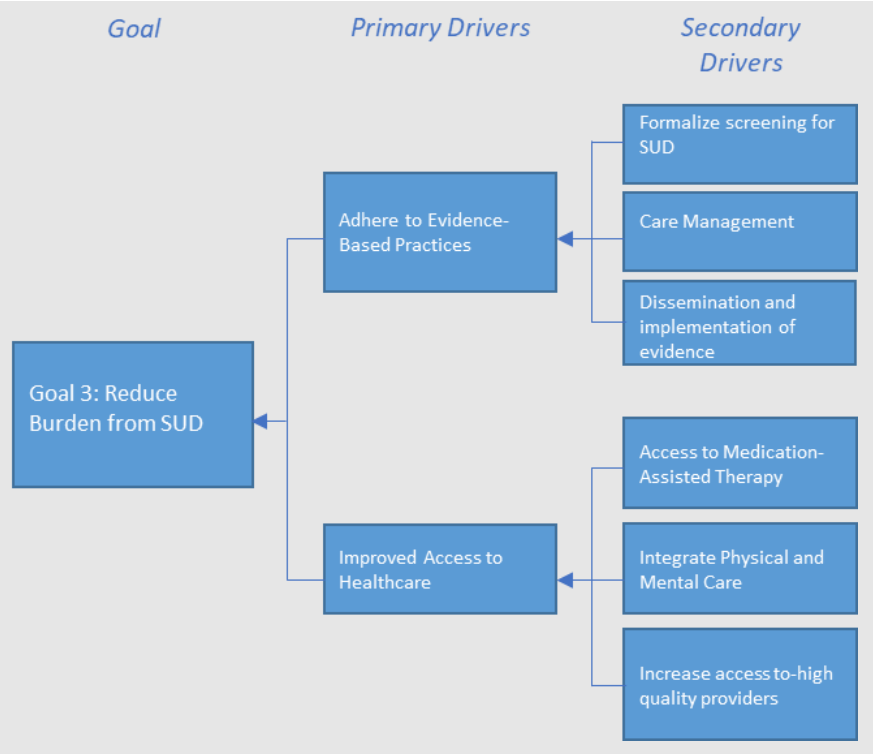


Corresponding with the following driver diagram (Figure 2.2), Goal 3 is to "reduce the burden of substance use disorder," both in terms of reductions in mortality and morbidity. The primary intention of the SUD components of the waiver are to provide beneficiaries with substance use disorders the high-quality 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))[5] leads to treatment being provided in the most appropriate care setting, adherence to medications and SUD services (including, as above, the notion that providers need to be recommending EBPs as well), and improving rates of treatment and engagement with SUD treatment and providers.

[5] 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.

Figure 2.2 Driver Diagram for Goal 3.



Each of the goals leads to a number of hypotheses which will be tested in the demonstration evaluation through the related research questions. Our focus in this report is on the delivery and payment system components of the Waiver that have been currently implemented, which lead to the following research questions and hypotheses[6]:

[6] Hypotheses related to Value-based payments, Tailored Plans and foster care plan are in the evaluation design document but not included in this report since these have not yet been implemented.

Goal 1: Measurably improve health outcomes via a new delivery system.

Hypothesis 1.1 The implementation of Medicaid managed care will increase access to health care and improve the quality of care and health outcomes.

- Research question 1.1.a Does the implementation of Standard Plans increase *access to health care* for those in the target population?
- Research question 1.1.b Does the implementation of Standard Plans improve the *quality of health care* received by the target population?
- Research question 1.1.c Does the implementation of Standard Plans improve *health outcomes* for those in the target population?

Hypothesis 1.2: 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.

- Research question 1.2.a Does the implementation of Standard Plans increase the rate of use of behavioral health services at the appropriate level of care for those in the target population?
- Research question 1.2.b Does the implementation of Standard Plans improve the quality of behavioral health care received for those in the target population?

Hypothesis 1.3: The implementation of Medicaid managed care will increase the use of medication-assisted treatment (MAT) and other opioid treatment services and decrease the long-term use of opioids.

- Research question 1.3.a Does the implementation of Standard Plans increase the use of MAT for those in the target population?
- Research question 1.3.b Does the implementation of Standard Plans increase the use of non-medication opioid treatment services for those in the target population?
- Research question 1.3.c Does the implementation of Standard Plans decrease the probability of long-term use of opioids?

Hypothesis 1.4: Implementation of Advanced Medical Homes (AMHs) will increase the delivery of care management services and will improve quality of care and health outcomes.

- Research question 1.4.a Does the implementation of AMHs increase the probability of receiving care management services?
- Research question 1.4.b Does the implementation of AMHs improve the quality of care received?
- Research question 1.4.c Does the implementation of AMHs improve health outcomes?

Hypothesis 1.5: The implementation of Medicaid managed care will reduce disparities (increase equity) in the quality of care received across rurality, age, race/ethnicity and disability status.

- Research question 1.5.a Does the implementation of Standard Plans increase equity in the quality of care for those in the target population?

Goal 2: Maximize high-value care to ensure sustainability of the Medicaid program.

Hypothesis 2.1: The implementation of Medicaid managed care will decrease the use of emergency departments for non-urgent use and hospital admissions for ambulatory sensitive conditions.

- Research question 2.1.a Does the implementation of Standard Plans decrease the use of emergency departments for non-urgent use?
- Research question 2.1.b Does the implementation of Standard Plans decrease the use of hospital admissions for ambulatory sensitive conditions?

Hypothesis 2.2: The implementation of Medicaid managed care will increase the number of enrollees receiving care management, overall and during transitions in care.

- Research question 2.2.a Does the implementation of Standard Plans increase the number of enrollees receiving care management?
- Research question 2.2.b Does the implementation of Standard Plans increase the number of enrollees receiving care management during transitions in care?

Hypothesis 2.3: The implementation of Medicaid managed care will reduce Medicaid program expenditures.

- Research question 2.3.a Does the implementation of Standard Plans reduce Medicaid program expenditures?

Hypothesis 2.4: The implementation of Medicaid managed care will increase provider satisfaction and participation in the Medicaid program.

- Research question 2.4.a Does the implementation of Standard Plans increase provider satisfaction?
- Research question 2.4.b Does the implementation of Standard Plans increase provider participation in the Medicaid program?

For narrative purposes, we divide the three main workstreams in this report into "qualitative" (interviews and focus groups), "provider survey" (a survey of Medicaid providers), and "quantitative" (administrative data such as claims and enrollment data and public surveys such as the Behavioral Risk Factor Surveillance System). These terms are not to be taken too literally -- for example, the survey team used quantitative approaches for their data analysis – but the terms are sufficiently descriptive. The bulk of this report focuses on the quantitative analyses, especially the technical details of the approach. However, qualitative findings are reported after the quantitative results for each hypothesis when available. Chapter 6 includes the results of the provider survey. All findings are synthesized with the quantitative findings in Chapter 7 to provide conclusions across the multiple components of the evaluation.

Chapter 3. Approach to Analyses

3.1 Evaluation Design

The evaluation design in this Interim Evaluation Report focuses on the analysis of trends in the measures outlined in Table 3.4. Metrics are reported on either a monthly or annual basis, including some annual metrics that have been converted to a monthly specification. The qualitative evaluation focuses on detailed insights into the experience of healthcare organizations, PHPs, and Medicaid beneficiaries with Medicaid managed care. Interviews were conducted with leaders, administrators and providers from a wide range of healthcare organizations, including health systems, health-system-affiliated provider practices, independent practices, local health departments and federally qualified health centers.

3.2 Evaluation Period

The evaluation study period for the Interim Evaluation Report runs from November 1, 2016 – February 28, 2023, or the most recent data available. Some metrics require a "look-forward" period, meaning they conclude earlier because data after the reference date are needed for the calculation. Monthly metrics use the 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, 2016). We analyze changes in the level and trend of metrics before and after the July 2021 launch of the Standard Plans. We note in the Results section if the metrics are trending up or down during the SP implementation period – generally referred to as "the post-implementation period" or "after the waiver."

As will be described below in more detail, monthly data are generally the most desirable for assessing the effect of the SP implementation. Many metrics are calculated on an annual basis, which means that these metrics had to be "monthly-ized". There are a number of approaches that can be taken; we generally took a "snapshot" approach – evaluating that metric over the calendar month – as opposed to a "rolling" – calculating based on the previous 12 months.

While we would have preferred to limit the sample for this report to those who would have been eligible for a Standard Plan, the SP indicator in our data only began on November 1, 2019. This date was after the

implementation of some of the SUD components of the waiver and did not allow for an adequate pre-COVID-19 baseline period. Our team therefore reverse-engineered an "SP Proxy" variable in an attempt to identify people who would have been eligible for SPs earlier in the baseline period. While multiple conditions must be met for a member to be considered SP eligible for any given month, those who are Tailored Plan eligible would not be considered SP eligible. It was challenging to identify members who were Tailored Plan eligible due to the various timepoints that Tailored Plan eligibility was evaluated under varying specifications. We evaluated the accuracy of this proxy variable by comparing it to the accurate definition in the years available, and it generally performed well. The inaccuracy of Tailored Plan identification led to the largest impact on the accuracy of the SP Proxy variable which is 90.3% accurate. We use a 12-month look-back period to exclude people who might have been eligible for TPs and thus the baseline period begins on November 1, 2016, nearly one year after the implementation of ICD-10 codes. We used the SP Proxy variable to limit the sample to Medicaid beneficiaries for this Report, in order to identify beneficiaries who would have been eligible for an SP if SP implementation had occurred earlier. This approach provides a better comparable subpopulation to those in a SP than, for example, the entire Medicaid population.

3.3 Important Confounders during Managed Care Implementation

Three major events occurred prior to or during the MC implementation period. First, the Public Health Emergency (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. This was a once-in-a-generation disruption to healthcare utilization occurring at a critical time in the implementation. The PHE ended in May 2023, although different types of service returned to pre-pandemic ("normal") levels at different times during the PHE. In the earlier SUD Interim Report, our team developed a novel method of identifying the return-to-normal dates in our data, as described below.

To identify the separate effect of COVID-19, we measured distinct types of service use among NC Medicaid beneficiaries never enrolled in Standard Plans. 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". Then, 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. The impact of the COVID pandemic was taken into consideration when actual utilization fell outside of predicted utilization. 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.

The table provides the estimated COVID-19 period for each utilization type. We assigned each metric the most similar service type – for example, monitoring metrics that rely on outpatient care were assigned the Outpatient (E&M) Rate return to normal timeline. 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 February 2023 (the end of the study period). If the utilization type did not return to normal by September 2022, we defined the COVID-19 period as March 2020 to February 2023 (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 the end of the study period (Feb 2023).

Table 3.1 Estimated COVID-19 period for each utilization type.

Service Type	Measure	End of COVID-19 Period
Inpatient	Count	May 2020
	Rate	N/A
Outpatient (E&M)	Count	May 2020
	Rate	N/A
Emergency department	Count	May 2020
	Rate	N/A

Prescriptions	Count	N/A
	Rate	N/A
Dental visits	Count	May 2020
	Rate	June 2020
Multiple	N/A	N/A

For most categories of service, excluding dental visits, *per-beneficiary* utilization rates have not yet returned to normal as of the end of our study period. Visit counts (not divided by beneficiary population) for most categories of service (excluding prescriptions) mostly returned to expected levels by May 2020, although most of the metrics we present here are rates rather than counts.

The failure to return to normal after COVID-19 has a very important implication for our estimation models because it is much harder to tease out independent effects of the waiver if trends in metrics are still being affected by the PHE. In addition, we fully acknowledge that there are many dimensions in which health care use and the Medicaid program design has not yet returned to normal after the PHE. 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. Notably, Medicaid has made several of the PHE policies permanent, which may also affect patterns of care, that are difficult to tease out from the MC waiver effects.

Furthermore, there are population effects as well – the continuity of coverage requirement means that the number of Medicaid beneficiaries increased throughout the PHE, and the profile of eligible beneficiaries during the PHE differs from the profile pre-PHE. For example, some beneficiaries ineligible due to their income exceeding the eligibility level pre-PHE were covered post-PHE. Although the models account for *observed* characteristics, any differences in *unobserved* beneficiary characteristics would affect the conclusions.

Second, the **substance use disorder (SUD) 1115 waiver** was approved in April 2019, and SUD policy changes have been phased in since then. While most of the population with a severe SUD has not yet enrolled in a managed care plan and will eventually be enrolled in a Tailored Plan, the SUD waiver may have affected outcomes for people with SUD who are in a Standard Plan. We analyze the effect of several

SUD-related measures in this report, and it is possible that any identified effects are due to the SUD 1115 Waiver rather than the MC 1115 Waiver.

Finally, **Tailored Plans (TPs)** have been scheduled to launch several times during the MC implementation period examined here but did not launch until July 1, 2024, outside of the study period for this Interim Report. Activities by providers and beneficiaries taken to prepare for TP launch may have affected patterns of care examined here and could be attributed to the launch of SPs. The effect of TP launch will be examined in the Final Summative Report.

3.4 Evaluation Measures

To evaluate the SP implementation multiple domains, we selected a wide variety of metrics covering various services, populations, processes, and outcomes of interest and hypothesized to be affected by SP implementation.

Table 3.2 Measures included in the Interim Evaluation Report.

Measure (Abbreviation)	Hypotheses	Measure custodian	Numerator	Denominator	Process / Outcome
Asthma Medication Ratio (AMR)	1.1	NQF#: 1800 / NCQA – HEDIS / Adult & Child Core Sets	Medication ratio >=50%	Beneficiaries age 5-64 in PHP population with persistent asthma	Process
Breast Cancer Screening (BCS)	1.1	NQF#: 2372 / NCQA – HEDIS / Adult Core Set	Coded as receiving breast cancer screening	Women 50-74 years of age	Process
Cervical Cancer Screening (CCS)	1.1	NQF#: 0032 / NCQA – HEDIS / Adult Core Set	Coded as receiving cervical cancer screening	Women 21-64 years of age with a SUD diagnosis	Process
Contraceptive Care: Postpartum (CCP)	1.1	NQF#: 2902 / OPA / Adult & Child Core Set	Provided a most or moderately effective or long-acting reversible method of contraception (LARC) within 3 and 60 days of delivery	Women ages 15-44 who had a live birth	Process
Prenatal and Postpartum Care (PPC): Postpartum Care	1.1	NQF#: 1517 / NCQA – HEDIS / Adult Core Set	Coded as receiving a postpartum visit	Women with live births	Process
Child and Adolescent Well-Care Visits (WCV)	1.1, 1.4	NQF#: 1516 / NCQA – HEDIS / Child Core Set	One or more well-care visits	Children age 3-21 in PHP population	Process
Well-Child Visits in the First 30 Months (W30)	1.1	NQF#: 1392 / NCQA – HEDIS /	Two or more well-child visits	Children at age 15 months plus one day -	Process

		Child Core Set		30 months in PHP population	
Weight Assessment and Counseling for Nutrition and Physical Activity for Children/Adolescents (WCC)	1.1, 1.4	NQF#: 0024 / NCQA – HEDIS / Child Core Set	Coded as having Weight Assessment and Counseling for Nutrition and Physical Activity	Beneficiaries 3-17 in PHP population who had an outpatient visit with a PCP or OB/GYN	Process
Annual Dental Visit (ADV)	1.1	NQF#: 1388 / NCQA - HEDIS	Coded as receiving 1 or more outpatient dental visit	Beneficiaries 2 years of age or older	Process
Appropriate Testing for Pharyngitis (CWP)	1.1	NQF#: 0002 / NCQA - HEDIS	Coded as receiving a strep test	Children age 3-18 in PHP population diagnosed with pharyngitis and dispensed an antibiotic	Process
Appropriate Treatment for Upper Respiratory Infection (URI)	1.1, 1.5	NQF#: 0069 / NCQA - HEDIS	Coded as receiving appropriate treatment	Children 3 months – 18 years in PHP population given a diagnosis of URI	Process
Avoidance of Antibiotic Treatment for Acute Bronchitis/Bronchiolitis (AAB)	1.1	NQF#: 0058 / NCQA - HEDIS	Coded as not receiving antibiotics	Adults age 18-64 in PHP population with a diagnosis of acute bronchitis	Process
Pharmacotherapy Management of COPD Exacerbation (PCE)	1.1	NQF#: 2856 / NCQA - HEDIS	Coded as receiving pharmacotherapy management	Beneficiaries age 40+ in PHP population with an acute inpatient discharge or ED visit	Process
Statin Therapy for Patients with Cardiovascular Disease (SPC)	1.1	NQF#: 0543 / NCQA - HEDIS	Coded as receiving statin therapy	Men age 21-75 and women age 40-75 in TP population with atherosclerotic cardiovascular disease	Process
Statin Therapy for Patients with Diabetes (SPD)	1.1	NQF#: 0547 / NCQA - HEDIS	Coded as receiving statin therapy	Beneficiaries age 40-75 in PHP population with diabetes and without atherosclerotic cardiovascular disease	Process
Diabetes Screening for People with Schizophrenia or Bipolar Disorder who are Using Antipsychotic Medications (SSD)	1.1	NQF#: 1932 / NCQA – HEDIS / Adult Core Set	Coded as receiving a glucose test or an HbA1c test	Adults age 18-64 in TP population with a diagnosis of schizophrenia, schizoaffective disorder, or bipolar disorder, who were dispensed an antipsychotic medication	Process
Use of Imaging Studies for Low Back Pain (LBP)	1.1	NQF#: 0052 / NCQA - HEDIS	Coded as receiving 1+ imaging procedure	Beneficiaries with a diagnosis of low back pain in TP population	Process

Chlamydia Screening in Women (CHL)	1.1	NQF#: 0033 / NCQA – HEDIS / Adult & Child Core Set	Coded as receiving chlamydia screening	Women 16-24 years of age in TP population identified as sexually active	Process
Plan All-Cause Readmissions (PCR): Observed	1.1, 1.4	NQF#: 1768 / NCQA – HEDIS / Adult Core Set	Readmission within 30 days of discharge	Inpatient hospital stays for beneficiaries age 18+ in PHP population	Process
Access to Preventive/Ambulatory Health Services (AAP)	1.1, 1.4, 1.5, 1.6, 2.5	NCQA – HEDIS	Had an ambulatory or preventative care visit	Adult beneficiaries	Process
Diabetes Short-term Complications Admission Rate (PDI-15)	1.1, 1.4	PDI-15 / AHRQ	Coded as having an admission for short-term complications	Beneficiaries in PHP population with a diabetes diagnosis	Outcome
Chronic Obstructive Pulmonary Disease (COPD) or Asthma in Older Adults Admission Rate (PQI 05)	1.1, 1.4	PQI 05 / AHRQ / Adult Core Set	Discharges for asthma or COPD	Adult beneficiaries age 40+ in PHP population	Outcome
Asthma in Younger Adults Admission Rate (PQI 15)	1.1, 1.4	PQI 15 / AHRQ / Adult Core Set	Hospitalized for asthma	Young adult beneficiaries in PHP population	Outcome
Asthma Admission Rate (PDI-14)	1.1, 1.4	PDI-14 / AHRQ	Hospitalized for asthma	Children with Asthma in PHP population	Outcome
Heart Failure Admissions Rate (PQI 08)	1.1, 1.4	PQI 08 / AHRQ / Adult Core Set	Discharges for heart failure	Adult beneficiaries in PHP population	Outcome
Gastroenteritis Admission Rate (PDI-16)	1.1, 1.4	PDI-16 / AHRQ	Hospitalized for gastroenteritis	Children in PHP population	Outcome
Urinary Tract Infection Admission Rate (PDI-18)	1.1, 1.4	PDI-18 / AHRQ	Hospitalized for UTI	Children in PHP population	Outcome
Rate of Screening for Pregnancy Risk	1.1	NC Administrative Measure	Coded as receiving screening for pregnancy risk	Women with a SUD diagnosis and a claim/encounter for prenatal services	Process
Poor mental health in the past 30 days	1.1	BRFSS	--	--	Outcome
Binge drinking	1.1	BRFSS	--	--	Outcome
Concurrent Use of Opioids and Benzodiazepines (SUD21/COB)	1.1	NQF#: 3389 / PQA / Adult Core Set	Received concurrent prescriptions for opioids and benzodiazepines	Adult beneficiaries with two or more prescriptions of opioids on different service dates and with a cumulative days' supply of 15 or more days	Process
Adherence to Antipsychotic Medications for Individuals with Schizophrenia (SAA)	1.2; 1.5	NQF#: 1879 / NCQA – HEDIS / Adult Core Set	PDC >=80% and at least two Rx claims	Adults with an administrative diagnosis of Schizophrenia; during time periods not hospitalized	Process
Antidepressant Medication Management (AMM)	1.2, 1.4	NQF#: 0105 / NCQA– HEDIS / Adult Core Set	Beneficiaries who remained on	Beneficiaries ages 18 and older with a SUD diagnosis who filled at	Process

			antidepressant treatment	least one prescription for antidepressant medication	
Metabolic Monitoring for Children and Adolescents on Antipsychotics (APM)	1.2	NQF#: 2800 / NCQA – HEDIS / Child Core Set	Coded as receiving at least one test for blood glucose/ HbA1c/LDL-C/ cholesterol	Children and adolescents ages 1 to 17 who had two or more antipsychotic prescriptions	Process
Use of First Line Psychosocial Care for Children and Adolescents on Antipsychotics (APP)	1.2	NQF#: 2801 / NCQA – HEDIS / Child Core Set	Documentation of psychosocial care	Children and adolescents ages 1 to 17 who had a new prescription for antipsychotic medication	Process
Follow-up After Hospitalization for Mental Illness (FUH): 7 and 30 days after discharge	1.2, 1.4	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
Follow-up Care for Children Prescribed ADHD Medication (ADD)	1.2, 1.4, 1.5	NQF#: 0108 / NCQA – HEDIS / Child Core Set	Evidence of outpatient visit in the appropriate time frame	Children newly prescribed ADHD medications	Process
Initiation and Engagement of Alcohol and Other Drug Abuse or Dependence Treatment (IET)	1.2, 1.5	NQF#: 0004 / NCQA – HEDIS / Adult Core Set	Beneficiaries who initiated AOD treatment within 14 days of the diagnosis and who were engaged in ongoing AOD treatment within 34 days of the initiation visit	Adult beneficiaries with a new episode of SUD	Process
Follow-Up After Emergency Department Visit for Alcohol and Other Drug Abuse or Dependence (FUA)	1.2	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 (FUM)	1.2	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
Continuity of Pharmacotherapy for OUD (SUD22)	1.2	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
Use of Behavioral Health Care for People with SMI/SUD/SED	1.2	--	Evidence of behavioral health care use	Children and adults with a SUD diagnosis	Process
Access to Preventive/Ambulatory Health Services) (AAP)	1.1, 1.4, 1.5,	NCQA – HEDIS / CMS	Had an ambulatory or preventative care visit	Adult beneficiaries	Process

Access to Preventive/Ambulatory Health Services) among beneficiaries with SUD (SUD32)	1.2	NCQA – HEDIS / CMS	Had an ambulatory or preventative care visit	Adult beneficiaries with a SUD diagnosis	Process
Use of Opioids at High Dosage in Persons without Cancer (OHD/HDO/SUD18)	1.3	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 (OMP/UOP/SUD19)	1.3	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
Number or Percent of Practices on the PHP panel that state attested to being a Tierl 3 AMH	1.4	--	AMH Tier 3 practices	Practices	Process
Number or Percent of Enrollees Attributed to an AMH	1.4	--	Enrollees attributed to an AMH	All	Process
Emergency Department Visits per Member-Month	2.1	-	Number ED visits	All beneficiaries	Outcome
Avoidable or Preventable Emergency Department Visits	2.1	Oregon Health	Evidence of an avoidable ED visit	All beneficiaries	Outcome
Number of Hospital Admissions	2.1	--	Hospital Admissions	All beneficiaries	Outcome
Transitions in Care (TRC)	2.2	NCQA - HEDIS	Evidence of medication reconciliation	Beneficiaries discharged from a long hospital, rehab, or residential care	Process
Total Expenditures to the Medicaid Program and Components • ER expenditures (not resulted in inpatient) • Outpatient E&M codes • All outpatient • Rx • Dental • Behavioral health • IMD services • Inpatient	2.3	--	Total Medicaid expenditures	All beneficiaries	Outcome
Provider Participation in Medicaid: - Well-child providers - MH providers - Overall	2.4	--	Number of Medicaid enrollees	Medicaid Providers	Outcome

3.5 Data Sources

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

NC Medicaid FFS claims and membership information; LME/MCO encounter; and SP 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 SPs), administrative diagnoses received, and Medicaid enrollment information, as well as demographic characteristics. This set of data is referred to as "Medicaid data" below.

Data on provider participation in Medicaid is derived from the provider file and AMH recognition is derived from a **PHP provider file**.

Care management data have been received and are used from January 1 2020 – December 31, 2022. This data combines CCNC care management data with the SP care management data (BCM051). Data are not available before 2020 because of a vendor change at CCNC, and data after 2022 have not yet been received by our team.

North Carolina Immunization Registry (NCIR) data was used to capture information on child and adolescent immunization rates.

There are three sources of data we had anticipated using to test metrics but that were not yet available or became irrelevant. **Death certificate data** is available to test hypotheses about the reduction in overdose deaths and the linking to Medicaid data has been completed, but there are no metrics for Goals 1-2 that examined deaths. **Birth Certificate data** has also been received and linked with Medicaid data, but there are a concerning level of births that don't line up with the dates of hospitalizations in claims data, so the data are not reported here. **The Controlled Substance Reporting System (CSRS)** data was requested many years ago, but has not been made available to the evaluation team.

3.6 Analysis of Monthly Measures

Most of the measures analyzed for this report are generated monthly, which permits the use of interrupted time series analysis (ITS). This method models trends before and after the launch of Standard Plans in July 2021 and examines differences in the pre- and post-intervention trends. That is, the models compare the values post-implementation with the estimated values if the implementation had not occurred; this "counter-factual" (what the metrics would have been in the absence of implementation) is obviously unknown and thus is estimated by statistical models.

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

$$Y_{it} = \beta_0 + \beta_1 TimeRelWaiver_{it} + \beta_2 Post_{it} + \beta_3 Post_{it} \times TimeRelWaiver_{it} + \beta_4 Z_{it} + \varepsilon_{it}$$

where β_k are coefficients, $TimeRelWaiver_{it}$ denotes time (in months) relative to July 2021 for individual i and month t, $Post_{it}$ takes the value 1 for observations in or after July 2021 (equivalently, $Post_{it}$ is 1 when $TimeRelWaiver_{it} \geq 0$), Z_{it} is a matrix of time-varying covariates (e.g. beneficiary diagnoses) , and the ε_{it} are random errors that are allowed to be arbitrarily correlated within an individual (that is, we cluster standard errors at the beneficiary level). The set of covariates includes a COVID-19-specific intercept and slope (determined by the Return To Normal analysis), month indicators, and beneficiary-level controls: age (in quadratic form), race/ethnicity, sex, disability status, separate indicators for each CDPS-Rx category [7], number of months enrolled in the past 12 months (which affects the calculation of CDPS-Rx scores), and indicators for the beneficiary's county of residence. The CDPS_Rx system is used to adjust the models for member "risk" - the number, type, and costliness of chronic medical conditions and prescriptions used. We use these CDPS_Rx derived chronic condition categories as binary indicators of individuals with each condition or using each medication class, over a univariate risk-adjustment score, because the former method greatly improved the predictive ability of the estimation models reported. Any CDPS_Rx category indicator that occurred for fewer than 0.1 percent of cases were dropped. We estimate the ITS models using ordinary least squares (OLS) regression.

[7] For each metric, any CDPS indicator that occurred for fewer than .1 percent of cases the indicator was dropped.

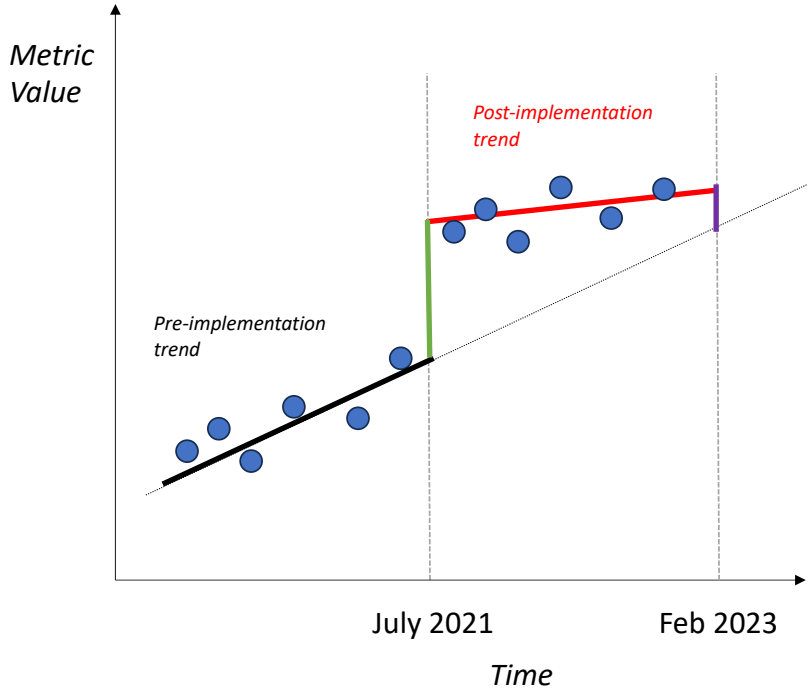
By estimating these models, we examined several different dimensions of changes in quality, process and outcome measures associated with SP implementation:

1) **Immediate change:** a measure of the immediate effect of the waiver on the metric throughout the implementation period. This value is derived by comparing the outcome value between its level *if the implementation had not occurred* and the estimated value *with the implementation.* Note that the "pre-intervention" value for July 2021 is obtained by projecting the baseline trend into the month of July, so it is an estimate of what would have occurred, if the MC waiver had not been implemented. In the result tables, we present the predicted outcome in July 2021 with the waiver, in the absence of the waiver, and the difference of the two, and conduct a Wald test of difference in the marginal predictions.
2) **Differences in rate of change**: this measures the difference between the pre-waiver and the post-waiver rate of change (slope) in the measure. In the model equation, this parameter is represented by β_3. If the waiver was associated with an increase in the slope of the trend, the post-waiver rate of change will be larger than the pre-waiver rate of change. For example, if a measure was increasing by 0.25 visits per month prior to the MC waiver and increasing by 0.3 visits per month after the SP launch date, the rate of change would have increased by 0.05 and this could be described as a more rapid increase in the measure post-waiver. Depending on the metric, this could be interpreted as a positive or negative outcome.
3) **Difference in predicted outcomes at study endpoint**: this measures the difference between the adjusted predicted outcome with the MC waiver and without the MC waiver at the study endpoint, which is February 2023 in most cases. This estimate summarizes our best understanding of the waiver effects by February 2023, and combines the information contained in the estimate of immediate and rate of change effects. For example, if we estimate an immediate change of 0.5 and a slope change of 0.05, then the waiver would be associated with an $0.5 + 0.05 \times 20 \text{ months} = 1.5$ increase in the outcome, compared to a counterfactual world without the waiver implementation. Note that to the extent the trends vary, the resulting differences will vary by month; for example, a "negative" instantaneous effect and a "positive" trend effect means that points more distant from implementation will be more likely to have a positive effect.

Monthly analyses control for the effects of COVID-19, using a variable-time approach described below. 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.

These effects can be viewed graphically in Figure 3.1 below. (For illustration purposes, COVID effects are not shown.) Blue dots represent individual monthly values. The black line represents the pre-implementation trend. The green line represents the average "jump" in metric value if there were no time trends (effect #1). The red line shows the time trend post-implementation. The difference in slope between the black (pre-implementation) and red (post-implementation) lines represents effect #2 above. The black dotted line extends the pre-implementation trend forward to February 2023; this represents the best estimate for what metrics would have been in the absence of implementation. The combination of the average effect and the difference in trend means that the post-implementation estimate differs from the best estimate of the counter-factual – what the metric would have been if the implementation had not occurred. This effect calculated by the end of the study period (Feb 2023) is shown by the purple line below (effect #3).

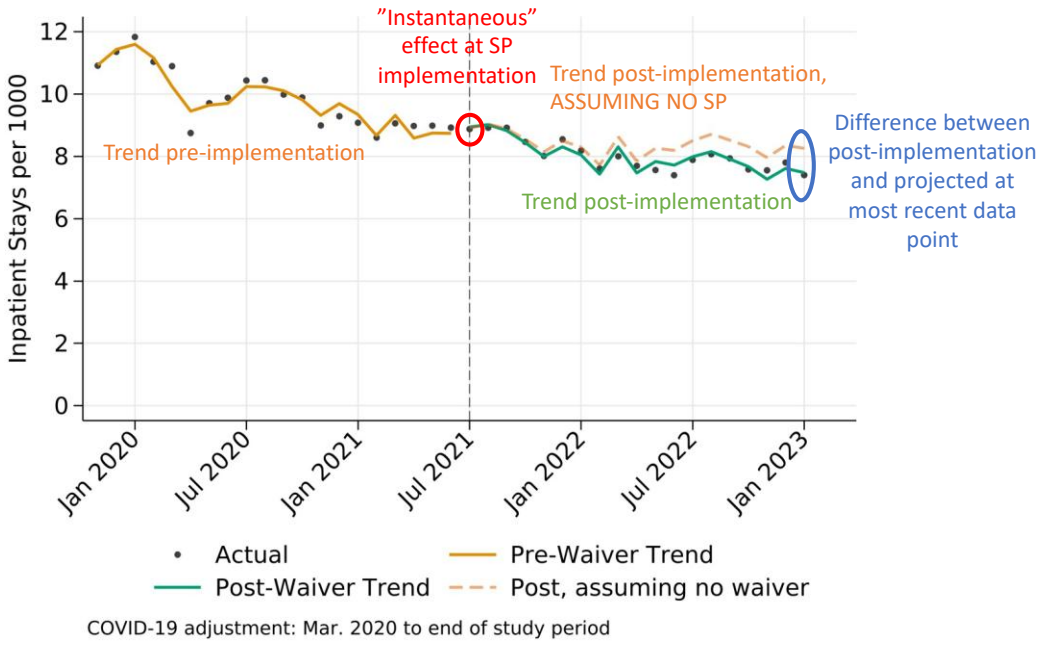
Figure 3.1 variable-time approach on COVID-19 effects



In practice, the figures in the Results section are more complicated because (for example) they account for changes in diagnoses and seasonal effects (e.g. increased flu diagnoses in the winter). But at their core, the "effects" of the MC waiver are described with these three perspectives: an average effect, a slope/trend difference, and the resulting difference in "current" values.

The image above (Figure 3.1) shows the “simplified concept”; the image below (Figure 3.2) is an annotated example of the actual results. This result in Figure 3.2 shows a near zero “instantaneous effect” shown by the red circle – the green and orange lines in July 2021 are nearly identical. Post-implementation, the green line generally slopes down more than the orange; this leads to a difference in February 2023 (blue circle) where the green line lies below the orange line. The conclusion here (ignoring statistical significance) is that post-implementation this measure is less than the measure would have been in the same month if Standard Plans had NOT been implemented.

Figure 3.2 annotated example of actual results.



Each metric includes a table with the format as shown below. The shading of the cells below aligns with the color in the figure above. Orange represents the "baseline" (pre-implementation) slope. Green denotes the post-implementation slope. Red denotes the "instantaneous" difference; blue refers to the difference in the last data point. The row below each point estimate provides the 95 percent confidence interval. Those 95% confidence intervals that contain zero are not statistically significant. For example, suppose the instantaneous difference is .0274 with a confidence interval of (-0.0825, 0.1373); zero lies between the two endpoints and thus there is no statistical evidence of an effect. In contrast, the difference at the final data point is -0.7839 with a confidence interval (CI) of (-1.0293, -0.5386) which does not contain zero and thus there is statistical evidence of a difference. Not shown explicitly in figure 3.2 is the difference in slopes; that is denoted by (-0.0557, -0.0345) and thus there is statistical evidence of a difference in slope for the two periods.

Table 3.3 example of table included with each metric.

	Baseline	SP Waiver Implementation	Difference
Average Predicted Outcome, July 2021	8.9313	8.9586	0.0274
	(8.8455, 9.0170)	(8.8911, 9.0261)	(-0.0825, 0.1373)
Slope	0.102	0.057	-0.0451*
	(0.0161, 0.1880)	(-0.0292, 0.1431)	(-0.0557, -0.0345)
Average Predicted Outcome, Jan 2023	10.4901	9.7062	-0.7839*
	(10.2494, 10.7308)	(9.6429, 9.7695)	(-1.0293, -0.5386)
N	64,219,845		

3.7 Analysis of Annual Measures

We used adjusted and unadjusted linear regression models to evaluate the trends in annual measures. Adjusted analyses controls for the same set of covariates that may affect the outcomes as were used for monthly measures, 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 (indicator flags) to account for changes in the prevalence of chronic conditions in the Medicaid population over time. We also include county fixed effects in our models.

Annual measures that required a lookback period for the identification of the eligible population exclude the first year of the baseline period. We applied the latest technical specifications (Adult and Child Core Sets for FFY 2023, HEDIS MY2023 Volume 2, Version 5.0 of the SUD Technical Specifications) to all years of available data at the time of analyses.

To explore the impact of the intervention on mental health related outcomes from the Behavioral Risk Factor Surveillance System (BRFSS) survey, we used linear regression models within the framework of a quasi-experimental difference-in-differences approach, using another state as a comparison group. The effects of the SP waiver were evaluated during the post-intervention period (2021-2022) compared to pre-intervention years (2016-2020). 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 evaluation period (Sooner Select was implemented on April 1, 2024). We control for differences between the two states throughout the study period, changes that occurred in both states during the post SP-implementation period, and changes in the average level and trend that occurred only in NC after adjusting for the other factors. We control for the following covariates: sex, age groups, race categories, income, employment, educational and marital status variables as well as year and state fixed effects. We also restricted the sample to lower income individuals (< $35,000 of household income) within two states**. However, 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.

3.8 Analysis of Advanced Medical Homes models

In addition to comparison of SP implementation, we also estimated models that compare outcomes for people attributed to a primary care practice recognized as a Tier 3 Advanced Medical Home (AMH3) as compared to those attributed to Tiers 1 or 2 AMH practices. Our primary model runs this analysis as a difference-in-differences analysis, comparing the difference in outcomes between AMH tiers after SP implementation to before. However, we also examine the differences between types of AMH models regardless of when they were implemented in order to determine whether the recognition of AMH models as Tier 3 at any point, even prior to SP implementation, drove the results. We identify AMHs according to their recognized level. The difference-in-difference models run for Hypothesis 1.4 control for the same covariates indicated above for all other monthly outcome models.

3.9 Cost of Care

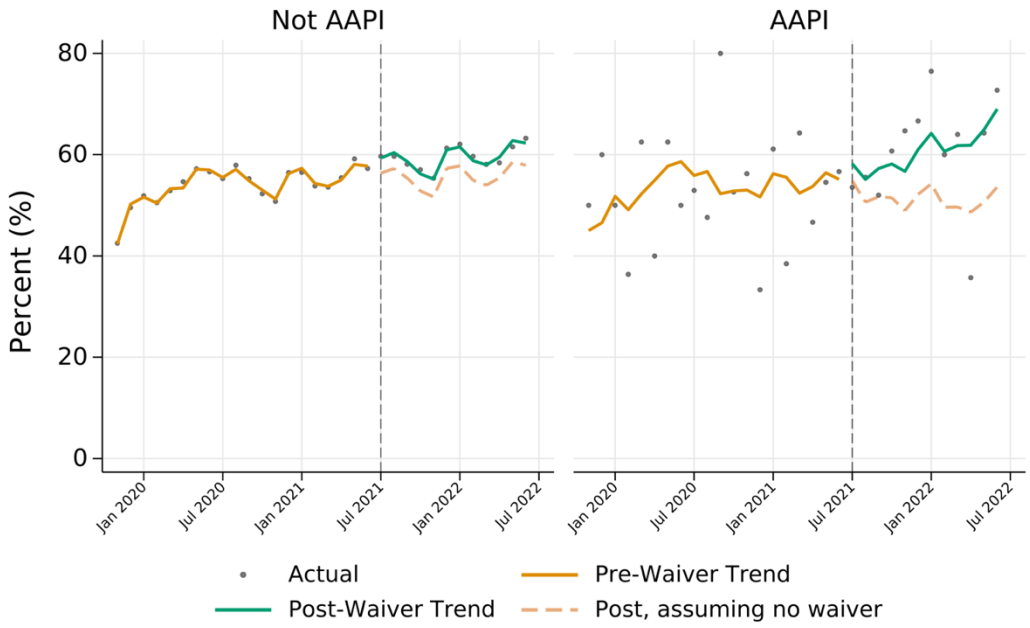
Research question 3.3 examines the costs of care and out-of-pocket costs to beneficiaries. We use actual payments from NC DHHS or from the Standard Plans to providers in our analysis. This means that we are not taking a strict Medicaid perspective for this analysis, which would only include direct fee-for-service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

3.10 Stratification (health equity analyses)

We stratified on a variety of beneficiary characteristics, including sex, age category (0-17, 18-64, and 65 or more), whether the beneficiary was disabled (based on eligibility), whether the beneficiary lived in a metropolitan or non-metropolitan area (using the NCHS 2013 Urbanization classification scheme), race, and ethnicity to test hypothesis 1.5 about changes in disparities in care in multiple dimensions.

Not every stratification is shown for each metric. This is for various reasons. First, each metric has up to nine stratification figures, leading to quite a long report. For some measures, not every population is included and thus not every comparison is valid (e.g. pregnancy outcomes; adolescent-focused measures). For some of the smaller subpopulations – notably Asian-American/Pacific Islander, American Indian/Alaska Native, and those whose race was not indicated, the size of the subpopulation is sufficiently small to render the stratification results for some stratification analyses effectively useless due to high variability; in some cases, the numbers are such that privacy issues are relevant. For example, a representative result for whether the beneficiary was Asian-American/Pacific Islander is shown below in Figure 3.3. The monthly values for the Asian-American/Pacific Islander group (right panel) shows high variability, with swings of 10-20 percentage points common.

Figure 3.3 Monthly values for the Asian-American/Pacific Islander group



There was no systematic effort to choose only stratification results that are desirable versus those that are not desirable. There was, however, a bias towards stratifications that showed some differences – in trend, estimated rate at the end of the study period, or baseline trends or values – regardless of whether they reflected negatively or positively on SP implementation.

3.11 Qualitative Evaluation

The qualitative evaluation includes cross-sectional interview data collected between 2021 and 2023. In 2021, we conducted qualitative semi-structured interviews with 41 healthcare organizations before the launch date of July 1, 2021, between December 2020 and May 2021, and with the PHP staff after the launch date of July 1, 2021, between July and October. These interviews focused on the awareness of the transition to Medicaid managed care, preparation for the transition, challenges faced during the preparation, support needed, and the impact of the Covid-19 pandemic. In 2022, we interviewed representatives from 26 healthcare organizations between March and July. These interviews focused on the experience of working with PHPs and the AMH program and preparing for Tailored Plans. In 2023, we interviewed representatives from 36 healthcare organizations between February and May. These

interviews focused on the experience of working with PHPs, value-based contracting, the AMH program, and overall satisfaction with Medicaid managed care.

During all waves of data collection, we used multiple sources to identify healthcare organizations for interviews, including data from Medicaid provider files shared by the NCDHHS and publicly available information (for example, from web searches). We purposively sampled healthcare organizations for the proportion of Medicaid beneficiaries, provider specialty (family medicine, pediatrics, OBGYN, behavioral health, etc.), and geographic diversity. We sampled practices with a large share of Medicaid beneficiaries as these providers will most likely continue Medicaid participation after the transition to managed care. We selected provider specialties that deliver primary care or behavioral health that were diverse in geographic location (Regions 1 to 6) to account for variability in coverage by health systems and health plans across regions of the state. We conducted repeat interviews with a subset of the sample (20 to 30%) in 2022 and 2023 from the previous year to examine the changes in experiences as the program matures. Table 3.4 shows the characteristics of participating healthcare organizations.

Table 3.4 Characteristics of participating healthcare organizations.

	2021	2022	2023
Health plans	5	-	-
Healthcare organization characteristics	N (total 41)	N (total 26)	N (total 36)
Region			
1	5 (12.2%)	1 (3.8%)	6 (16.7%)
2	3 (7.3%)	2 (7.7%)	4 (11.1%)
3	9 (21.9%)	4 (15.3%)	7 (19.4%)
4	14 (34.1%)	5 (19.3%)	7 (19.4%)
5	8 (19.5%)	8 (30.8%)	10 (27.8%)
6	2 (4.8%)	6 (23.1%)	2 (5.6%)
Type of Practice/specialty			
Behavioral Health	15 (36.6%)	-	6 (18.8%)
Family Medicine/Internal Med	11 (26.8%)	5 (19.3%)	11 (34.4%)
Pediatrics	11 (26.8%)	9 (34.7%)	9 (28.1%)
Obstetrics and Gynecology	4 (9.75%)	-	-
Affiliation			
Health Systems	4 (9.75%)	4 (15.4%)	4 (11.1%)
System-affiliated practices	4 (9.75%)	3 (11.5%)	3 (8.3%)

Independent practices	28 (68.3%)	11 (42.3%)	11 (34.4%)
Federally Qualified Health Centers	5 (12.2%)	5 (19.2%)	3 (8.3%)
Local Health Departments	-	4 (15.3%)	4 (11.1%)
Medicaid Beneficiaries			
Less than 25%	8 (19.5%)	4 (15.4%)	9 (25.0%)
25% to 50%	6 (14.6%)	5 (19.2%)	7 (19.4%)
More than 50%	20 (48.8%)	10 (38.5%)	14 (38.9%)
Unsure	7 (17.1%)	7 (26.9%)	6 (16.7%)
Interviewee Characteristics	N (total 43)*	N (total 41)*	N (total 47)*
Leadership	15 (34.9%)	12 (29.3%)	11 (23.4%)
Providers	8 (18.6%)	9 (21.9%)	14 (38.9%)
Facility administrators/staff	20 (46.5%)	20 (48.8%)	22 (46.8%)

*More than one person was interviewed at some healthcare organizations to better understand their experience with the transition to Medicaid managed care. Additional participants at healthcare organizations were identified by the snowballing approach.

We also conducted 21 interviews and one focus group (4 participants) with Medicaid beneficiaries from February and May 2023. The interviews focused on five key areas: awareness of change, PHP experience, accessing needed care, non-medical benefits from PHPs, and care management. Medicaid beneficiaries were identified from provider sites and community-based organizations. We included adult beneficiaries and caregivers who were 18 years or older and preferred English or Spanish as their language and who had Medicaid coverage before and after the transition to managed care. Table 3.4 shows the characteristics of Medicaid beneficiaries participating in the evaluation study.

Table 3.5 Characteristics of Medicaid beneficiaries who participated in 2023.

Type of participant	Number of participants (N 25)
Adult beneficiary	6 (24%)
Caregiver	8 (32%)
Both adult and caregiver	11 (44%)
Participant Primary Language (language in which interviews and focus group conducted)	
English	20 (80%)
Spanish	5 (20%)

Participant residence		
Rural	9 (36%)	
Urban	16 (64%)	
Number of years with Medicaid coverage		
Less than 3 years	5 (20%)	
3 to 5 years	9 (36%)	
More than 5 years	9 (36%)	
Unknown	2 (8%)	
Medicaid Region		
1	0 (0%)	
2	4 (16%)	
3	3 (12%)	
4	8 (32%)	
5	10 (40%)	
6	0 (0%)	
Health plan	Adult	Child
United Healthcare Community Plan	3	2
Healthy Blue	3	7
Carolina Complete	2	2
AmeriHealth Caritas	1	2
WellCare	4	11
Medicaid Direct	4	2
Unknown	0	2

Interviews with healthcare organizations and beneficiaries were conducted on Zoom, lasted 30 to 60 minutes, and were audio-recorded and transcribed. The beneficiary focus group lasted 29 minutes, was audio-recorded, transcribed into Spanish, and translated into English. We conducted a thematic analysis each year to identify the salient findings in the data. In 2022 and 2023, we used a rapid analysis approach[8] to identify the major categories in the data, which informed the development of the codebook. A preliminary codebook was developed deductively and revised inductively, drawing on the themes in the data. Each year, two team members independently coded 2 to 5 interview transcripts to assess adequacy of

[8] Hamilton, A. B., and Finley, E. P. (2019). Qualitative Methods in Implementation Research. An Introduction. Psychiatry Research, 280, 112516

the codebook and agreement on meanings and the application of codes. The agreement was between 75% and 92% for the first two transcripts, subsequently increasing from 90% to 95%. Most disagreements concerned the interpretation of codes and clarity of code definitions. Disagreements were resolved between the coders, sometimes with additional team members included in the discussion to reach a consensus. Following this process, a few minor changes were made to codebooks, such as adding a new code and a few sub-codes. The two coders coded the remaining transcripts individually, bringing discrepancies for research team discussion to maintain agreement on interpretations. Two members reviewed coded data and analyzed them for emerging themes. The qualitative examination reports detailed insights into the transition to managed care, such as perceptions of access to care, the experience of working with PHPs, AMH program adoption, and provider participation based on results from 2021 and 2022 and preliminary results from 2023.

Finally, although technically more *quantitative* than *qualitative*, additional analysis was conducted from feedback from providers directly collected via a provider survey. See Chapter 6 for more details on that element of the analysis which was not formally conducted as part of the evaluation.

Chapter 4. Methodological Limitations

Our analysis approach uses distinct time periods to examine different phases of waiver activities, although, these are not as distinct as would be ideal. Efforts to implement managed care in the Medicaid program were initiated by North Carolina's General Assembly before the baseline period incorporated here. If provider behavior changed due to expectations of upcoming changes, our baseline period does not capture a true baseline but rather one under increasing expectation of managed care implementation. Another limitation is the concern about accuracy and completeness of encounter data from SPs, 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 during the SP implemented period and have reported any data quality concerns to NC DHHS as soon as they were discovered, in order to improve data quality as the demonstration continues. Regular, semi-monthly technical calls between the evaluation team and NC DHHS have identified, addressed, and resolved multiple issues retrospectively, so despite the expected technical challenges of complex data feeds from the plans to the Department to the evaluation team, differences resulting from data (rather than from the implementation *per se*) have been addressed insofar as they have been identified. An additional limitation is that the ITS models are unable to tease out events that happened concurrently with the SP waiver implementation but may have had nothing to do with the waiver, such as changes in medical technology or the use of new diagnostic or procedure codes. In addition, if practices adopt other care delivery models during SP implementation, we are not able to identify or isolate changes in metrics that could be due to additional programs. We will continue to compare trends in utilization measures from encounter data to similar measures in NC claims data as well as external data sources (e.g., trends in the BRFSS data), although external sources tend to have a greater lag in availability. Another limitation is that the flag that identifies people eligible for Standard Plans only goes back to November 2019, when the SUD components of the waiver were already being implemented. We created an SP Proxy flag to increase the baseline period, but we know the accuracy is 92%. Additionally, the evaluation will not be able to assess all aspects of the Demonstration due either to data 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.

Finally, we have included a table that lists all measures that were not included in this Interim Report for various reasons.

Table 0.1 Methodological Limitations of Measures not included

Measure number from original design	Measure name	Hypothesis	Reason for exclusion
Measures that are obsolete, retired, or otherwise will not be available for analysis in the Interim and Final Reports			
1	Getting Care Quickly	1.1	CAHPS data was not available for analysis
2	Getting Needed Care	1.1	
14	Customer Service	1.1	
15	Rating of Health Plan	1.1	
16	Rating of all Health Care	1.1	
17	Rating of Personal Doctor	1.1	
81	Medical Assistance with Smoking and Tobacco Use Cessation	1.2, 1.4	
105	Coordination of Care (consumer perceptions)	2.2	
90	Number of providers with DEA DATA 2000 waivers	1.3, 3.2	DATA 2000 waivers are no longer a DEA requirement
91	Number of providers with DEA DATA 2000 waivers who have written prescriptions for Medicaid enrollees for MAT	1.3, 3.2	DATA 2000 waivers are no longer a DEA requirement
18	Adult BMI Assessment	1.1	Retired Measures
20	Tobacco Use screening and follow-up	1.1	
29	Annual Monitoring for Patients on Persistent Medications	1.1	
49. – 57.	Comprehensive Diabetes Care (9 measures)	1.1	
23	Flu vaccine for Adults age 18-64	1.1, 1.4, 1.5	Very low rates of detection, measure deemed not reliable

10	Dental Sealants for Children at Elevated Caries Risk	1.1, 1.5	Rates were low and dental was not included under managed care
Measures that were not included because of substitutions with other measures			
5. – 8.	Children and Adolescents' Access to Primary Care Practitioners (4 measures)	1.1	Substituted Well-Child Visits
26	Medication Management for People with Asthma	1.1, 1.4	Similar to Asthma Medication ratio, which was included
42	Frequency of Prenatal Care (>=81% of expected visits)	1.1	Now included in the PPC Measure
62	Receipt of Preventative Dental Services	1.1	Because dental services remained in Medicaid Direct, we decided to analyze only one dental measure, Annual Dental Visits
107	Enrollees Receiving Care Management during transitions in care	2.2	We instead reported a HEDIS measure: Transitions in Care (TRC): engagement in post-discharge care
93	Long-Term Use of Opioids	1.3, 3.2	We were unable to find an established metric reflecting this concept but included other measures of opioid use
Measures that were not available for analysis at the time of the Interim Report but will be included in the Final Summative Report			
46. – 47.	30-day hospital readmission rate following hospitalization for SUD or OUD	1.1	We did not report these measures because it is relevant to Tailored Plans, which were not launched prior to the Interim Report
84. – 85.	ED visits for SUD-related diagnoses and specifically for OUD (2 measures)	1.2, 3.2	
86	IP visits for SUD and specifically for OUD	1.2, 3.2	
92	Percent of SUD diagnosed beneficiaries who receive an SUD treatment service	1.3, 3.1	
72	Death rate post prison release	1.1	Prison data were not linked to Medicaid

			data by the time of the report
48	Comprehensive Diabetes Care: HbA1c poor control (>9.0) +	1.1, 1.4	Administrative claims data do not accurately reflect performance because HIE data is not yet available.
59	Controlling High Blood Pressure	1.1, 1.4	
75	Depression screening among those with SUD	1.2	Depression screening is not well populated in claims and HIE data is not yet available.
67	Live Births Weighing Less than 2500 Grams +	1.1	Reliable linkage with Medicaid data was not complete by the time of the report
96	Reduced incarceration for drug-related charges	1.3	Prison data were not linked to Medicaid data by the time of the report
110	Out-of-pocket costs to Medicaid enrollees	2.3, 3.3	The source variables needed to accurately calculate this measure were not available from Medicaid Direct and Standard Plans at the time the Interim Report was submitted.
68	Infant Mortality	1.1	Measures that were not available for analysis at the time of the Interim Report
66	Death rate by group (e.g., SUD, SMI)	1.1	
44	Pregnant smokers screened and treated for tobacco use	1.1	
69	Healthy Days	1.1	
70	Tobacco Use Rate (multiple measures)	1.1	
71	Overweight / Obesity Rate	1.1	
103	Number of hospital days	2.1	
106	Time to SDOH Screening from PHP attribution	2.2	
108	Medication Reconciliation Post-Discharge	2.2	

Chapter 5. Quantitative Results

Results from the quantitative analyses are presented below, organized by hypothesis. Results from the provider survey and qualitative analyses are presented in Chapter 6.

Hypothesis 1.1: The implementation of Medicaid managed care will increase access to health care and improve the quality of care and health outcomes.

We use a large variety of metrics to reflect access, quality, and health outcomes, capturing the experience of different populations served by Medicaid, to measure improvement in these domains. These populations include women, pregnant people, and those diagnosed with asthma in addition to general, all-population, measures.

Hypothesis 1.1 examined the impact of SP launch on a variety of measures of access to health care, quality of care, and health outcomes. Of the 34 measures examined (Table 5.1), eight showed marked improvement; fifteen measures significantly worsened after the launch of SPs, and the remaining 11 measures showed no difference from pre- to post-SP implementation.

Table 0.1 Summary of Metric Results for Hypothesis 1.1

SP/AMH measure Set*	Measure (Metric abbreviation)	Adjusted waiver effects at endpoint	Improved, Worsened/No Difference**
SP	Asthma Medication Ratio (AMR)	--	Worsened
	Breast Cancer Screening (BCS)	--	Improved
SP/AMH	Cervical Cancer Screening (CCS)	--	Worsened
SP/AMH	Childhood Immunizations Status (CIS) - Combination 10	--	Worsened
SP/AMH	Immunizations for Adolescents (IMA) - Combination 2	--	Worsened
	Contraceptive Care: Postpartum (CCP) mostly/moderately effective method within 3 days of delivery	0.4% pts (NS)	No Difference
	Contraceptive Care: Postpartum (CCP) mostly/moderately effective method within 90 days of delivery	2.6% pts	Improved
	Contraceptive Care: Postpartum (CCP) long-acting reversible method of contraception (LARC) within 3 days of delivery	-0.2% pts (NS)	No Difference
	Contraceptive Care: Postpartum (CCP) long-acting reversible method of contraception (LARC) within 90 days of delivery	-0.3% pts	Worsened
	Prenatal and Postpartum Care (PPC): Postpartum Care	2.5%pts	Improved
	Child and Adolescent Well-Care Visits (WCV)		Worsened

SP/AMH	Well-Child Visits in the First 30 Months (W30)	-3.5 pts	Worsened
	Weight Assessment for Children/Adolescents (WCC)	-7.2% pts	Worsened
	Counseling for Nutrition for Children/Adolescents (WCC)	-4.4% pts	Worsened
	Counseling for Physical Activity for Children/Adolescents (WCC)	-4.6% pts	Worsened
	Dental Visits (monthly)	-0.6% pts	Worsened
	Appropriate Testing for Pharyngitis (CWP)	4.0% pts	Improved
	Appropriate Treatment for Upper Respiratory Infection (URI)	-3.4% pts	Worsened
SP	Avoidance of Antibiotic Treatment for Acute Bronchitis/Bronchiolitis (AAB)	--	Improved
	Pharmacotherapy Management of COPD Exacerbation (PCE) - systemic corticosteroid prescription fill within 14 days of a hospital event	-11.5% pts (NS)	Worsened
	Pharmacotherapy Management of COPD Exacerbation (PCE) - bronchodilator prescription fill within 30 days of a hospital event.	-5.5% pts (NS)	No Difference
	Statin Therapy for Patients with Cardiovascular Disease (SPC)	-4.8% pts	Worsened
	Statin Therapy for Patients with Diabetes (SPD)	-1.7% pts	Worsened
	Diabetes Screening for People with Schizophrenia or Bipolar Disorder who are Using Antipsychotic Medications (SSD)	--	Worsened
	Use of Imaging Studies for Low Back Pain (LBP)	0.7% pts (NS)	No Difference
SP/AMH	Chlamydia Screening in Women (CHL)	--	Worsened
SP/AMH	Plan All-Cause Readmissions (PCR): Observed		Improved
	Diabetes Short-term Complications Admission Rate (PDI 15)	0.0065% pts	Improved
	Chronic Obstructive Pulmonary Disease (COPD) or Asthma in Older Adults Admission Rate (PQI 05)	0.02% pts (NS)	No Difference
	Asthma in Younger Adults Admission Rate (PQI 15)	-0.02% pts (NS)	No Difference
	Asthma Admission Rate Pediatric Quality Indicator Rate (PDI 14)	-0.0074% pts	Improvement
	Heart Failure Admissions Rate (PQI 08)	-0.03% pts (NS)	No Difference
	Gastroenteritis Admission Rate (PDI 16)	-0.3% pts (NS)	No Difference
	Urinary Tract Infection Admission Rate (PDI 18)	-2.4% pts	Improvement
	Rate of Screening for Pregnancy Risk	-1.1% pts (NS)	No Difference
	Poor mental health in the past 30 days	--	No Difference
	Binge drinking	--	No Difference
SP	Concurrent Use of Opioids and Benzodiazepines (COB)	--	Improved

-- = an adjusted endpoint was not calculated for annual metrics

** SP = Metrics included in the Standard Plan Measure Set; AMH=Metrics included in the AMH Measure Set.*

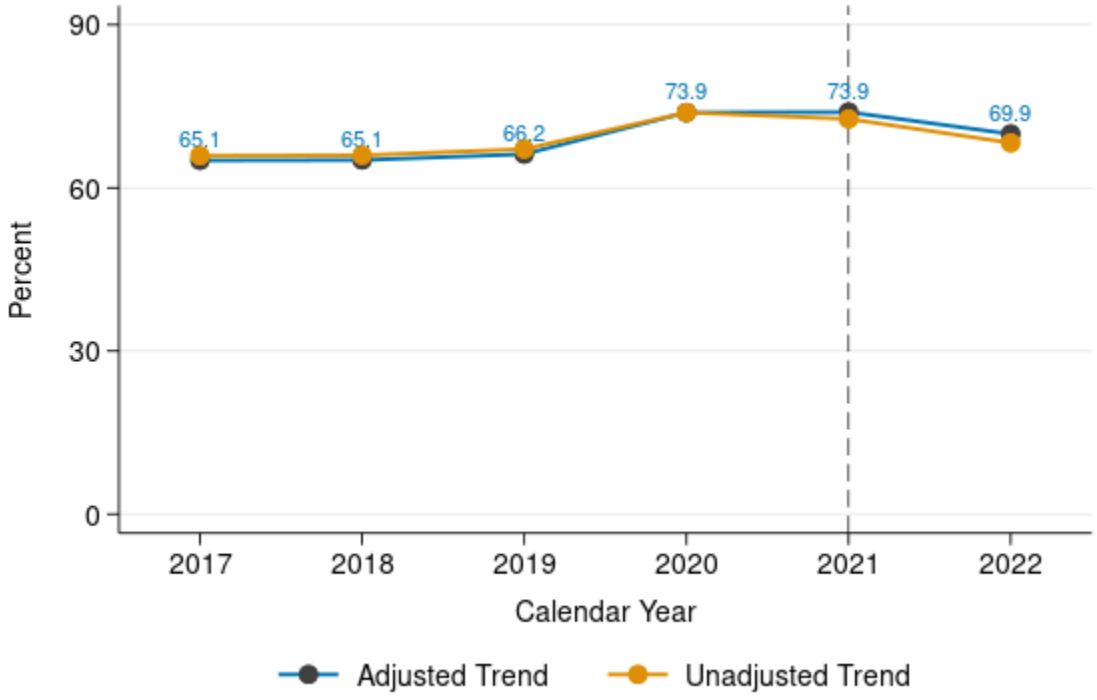
*** although an adjusted endpoint was not calculated, we use the observed directional effect in 2022 compared to prior years to determine whether the metric is improving, worsening, or exhibiting no difference.*

Below, we report individually on each of the metrics reported in the Summary tables. Within each hypothesis, metrics are slightly grouped by similarity, but the order within each Hypothesis is not particularly meaningful.

Asthma medication ratio (AMR)

The asthma medication ratio is an annual measure defined as the percentage of beneficiaries ages 5 to 64 identified as having persistent asthma and who had a ratio of controller medications to total asthma medication of 50% or greater during the measurement year. This measure started at 65.1% in 2017 and increased through 2021 when it peaked at 73.9%. It declined four percentage points in 2022 to 69.9%.

Figure 0.1 Trends in asthma medication ratio

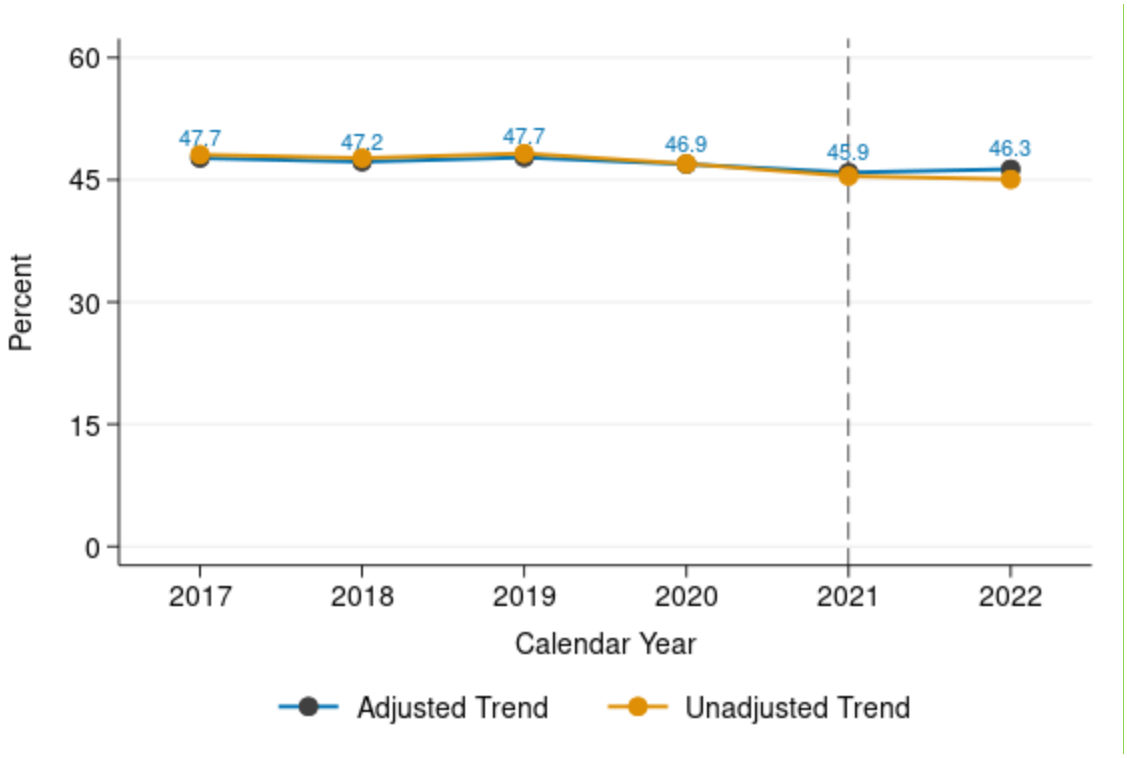


Notes: Adjusted model includes age (quadratic), urban location, race specific indicator variables and the Chronic Illness and Disability Payment System (CDPS + Rx) risk adjustment scores (indicator flags).

Breast cancer screening (BCS)

The percentage of women ages 50 to 74 who had a mammogram to screen for breast cancer had remained relatively stable between 2017 and 2022. The measure fell between 2019 and 2021, from 47.7% to 45.9%, perhaps reflecting the effects of the pandemic. The year 2022 saw a slight increase in the breast cancer screening rate to 46.3%.

Figure 0.2 Trends in breast cancer screening

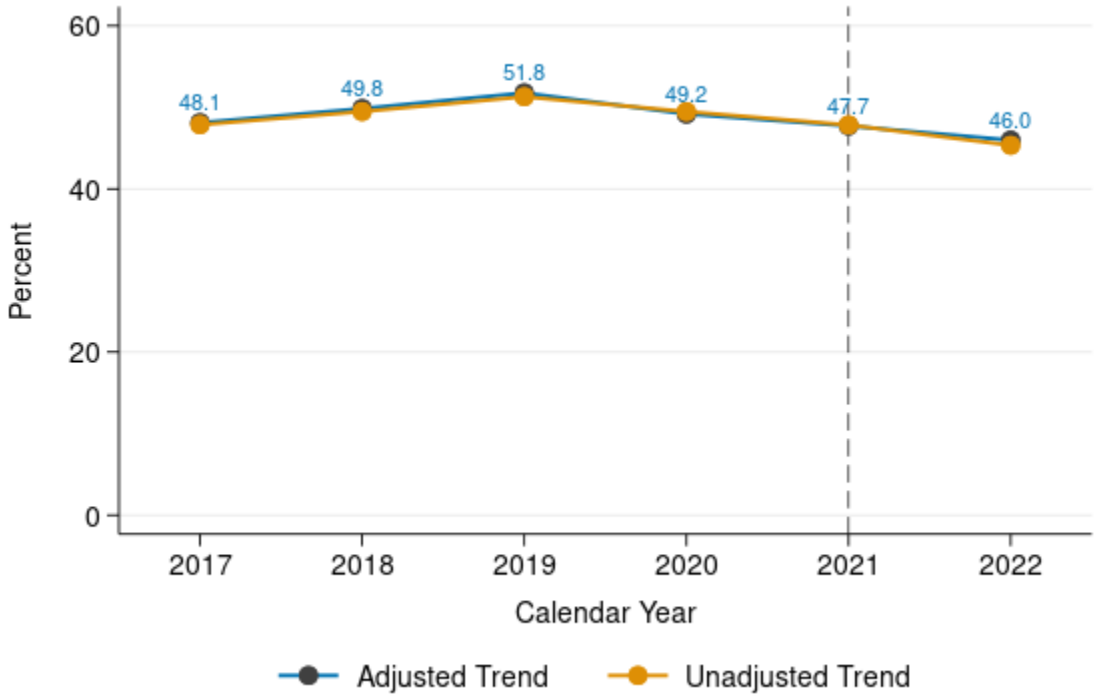


Notes: Adjusted model includes age (quadratic), urban location, race specific indicator variables and the Chronic Illness and Disability Payment System (CDPS + Rx) risk adjustment scores (indicator flags).

Cervical cancer screening (CCS)

The percentage of women ages 24 to 64 who were screened (cervical cytology or high-risk human papillomavirus test at age 30 or older) for cervical cancer had been increasing from 2017 – 2019, but then decreased from 2019 - 2022. Rates range from 51.8% in 2019 to 46.0% in 2022.

Figure 0.3 Trends in cervical cancer screening

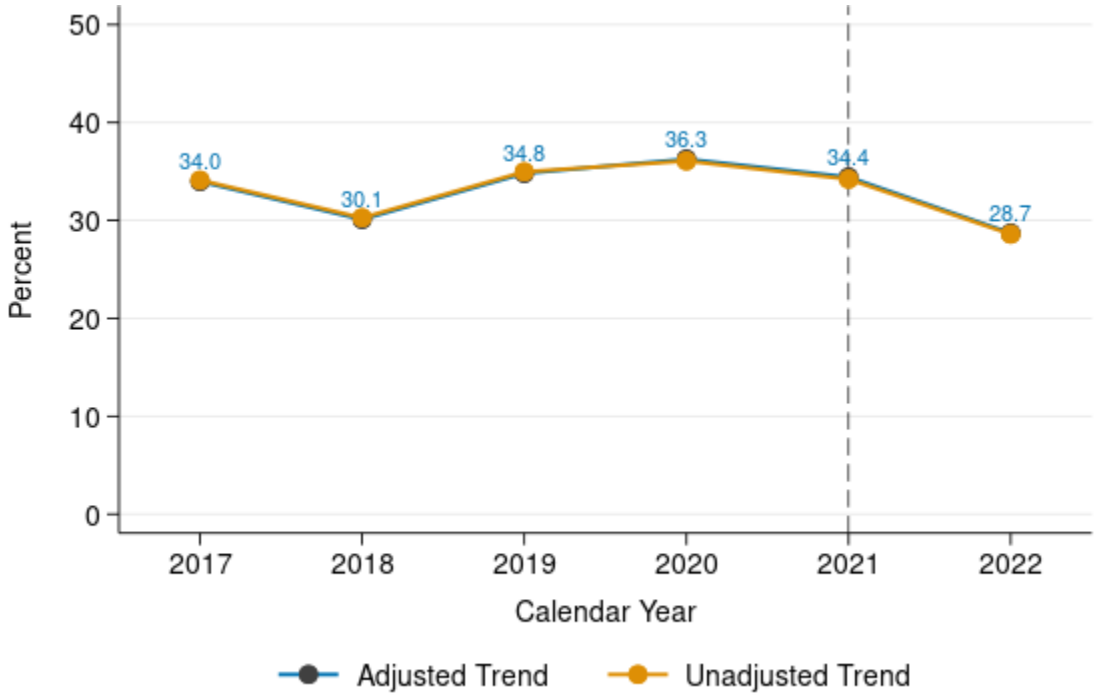


Notes: Adjusted model includes age (quadratic), urban location, race specific indicator variables and the Chronic Illness and Disability Payment System (CDPS + Rx) risk adjustment scores (indicator flags).

Childhood Immunization Status (CIS) – Combination 10

This measure is the percentage of children aged two who had four diphtheria, tetanus and acellular pertussis; three polio; one measles, mumps and rubella; three haemophilus influenza type B; three hepatitis B; one chicken pox; four pneumococcal conjugate; one hepatitis A; two or three rotavirus; and two influenza vaccines by their second birthday. The percentage of children aged two up to date on all 10 vaccines increased from 30.1% in 2018 to 36.3% in 2020. However, the measure has declined each of the last two years, during the pandemic, and was at its lowest value in the past six years in 2022 (28.7%).

Figure 0.4 Trends in Childhood Immunization Status (Combination 10)

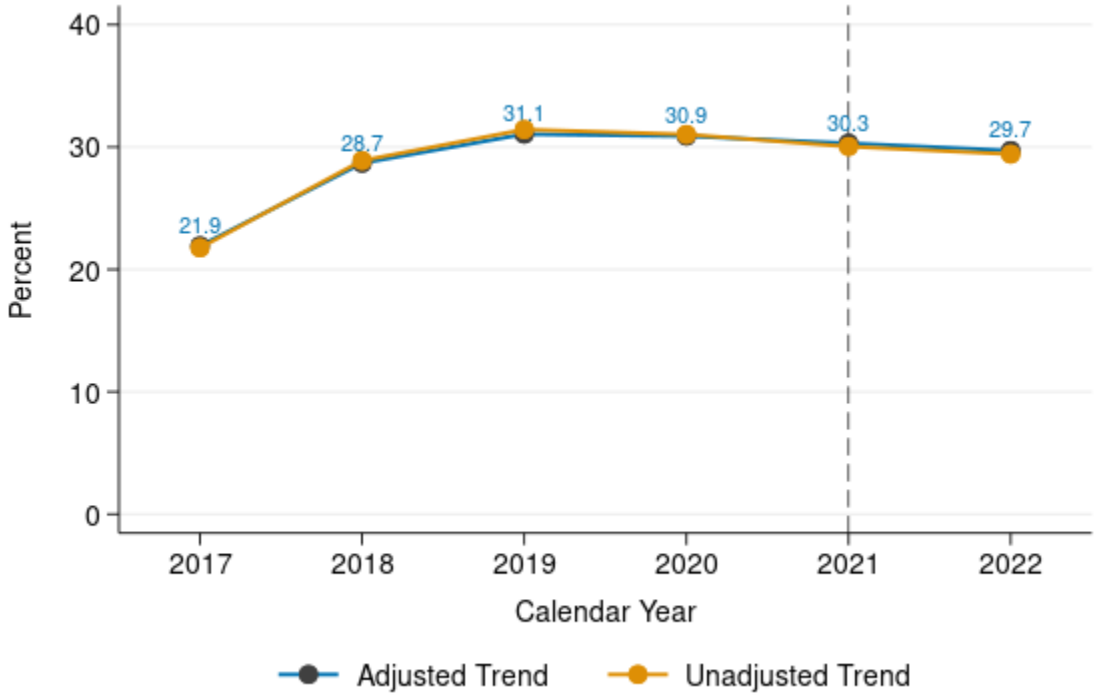


Notes: Adjusted model includes age (quadratic), urban location, race specific indicator variables and the Chronic Illness and Disability Payment System (CDPS + Rx) risk adjustment scores (indicator flags).

Immunizations for Adolescents (IMA) – Combination 2

This measure is the percentage of adolescents age 13 who had one dose of meningococcal vaccine, one tetanus, diphtheria toxoids and acellular pertussis (Tdap) vaccine, and have completed the human papillomavirus vaccine series by their 13th birthday. The percentage of adolescents aged 13 up to date on their vaccines increased from 21.9% in 2017 to 31.1% in 2019. The measure has been slowly declining since 2019, ending at 29.7% in 2022.

Figure 0.5 Trends in Immunizations for Adolescents (Combination 2)



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 (indicator flags).

Contraceptive Care – Postpartum Women: Most or Moderately Effective Contraception within 3 days of delivery

The pre-implementation trend for this measure was generally flat, as was the projected post-implementation measure. There is a slightly higher rate post-implementation, however this is not statistically significant. Likewise, we do not estimate a change in the rate after implementation.

Figure 0.6 Contraceptive Care – Postpartum women

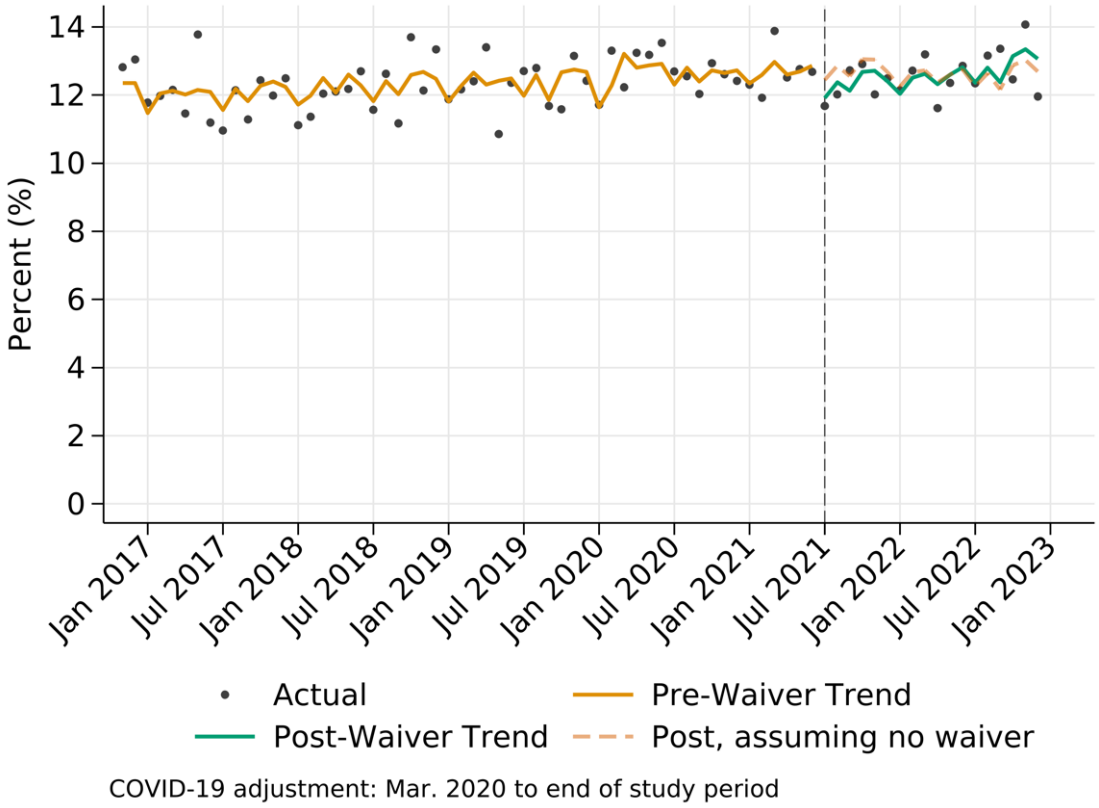


Table 0.2 Contraceptive Care – Postpartum women

	Baseline	SP Waiver Implementation	Difference
Average Predicted Outcome, July 2021	12.4673*	11.9318*	-0.5355
	(11.8837, 13.0510)	(11.4363, 12.4274)	(-1.3127, 0.2417)
Slope	0.0079	0.0613	0.0534
	(-0.0087, 0.0244)	(-0.0183, 0.1409)	(-0.0247, 0.1315)
Average Predicted Outcome, Dec 2022	11.617*	11.9892*	0.3722
	(10.0498, 13.1842)	(11.4766, 12.5019)	(-1.2738, 2.0183)
N	220,301		

*Notes: 95% confidence intervals in parentheses. SP = Standard Plan. *p < 0.05.*

Contraceptive Care – Postpartum Women: Most or Moderately Effective Contraception with 90 Days of Delivery

In this measure of longer-term access to contraceptive care, we see a slow and steady decline through the pre-implementation phase, with a sizable effect visible in March 2020 from which this value never really recovered. At implementation there is little evidence of an immediate effect; however, a slowing of the decreasing trend is shown post-implementation, leading to a statistically significant difference of 2.6% points.

Figure 0.7 Trends in mostly and moderately effective methods of contraception

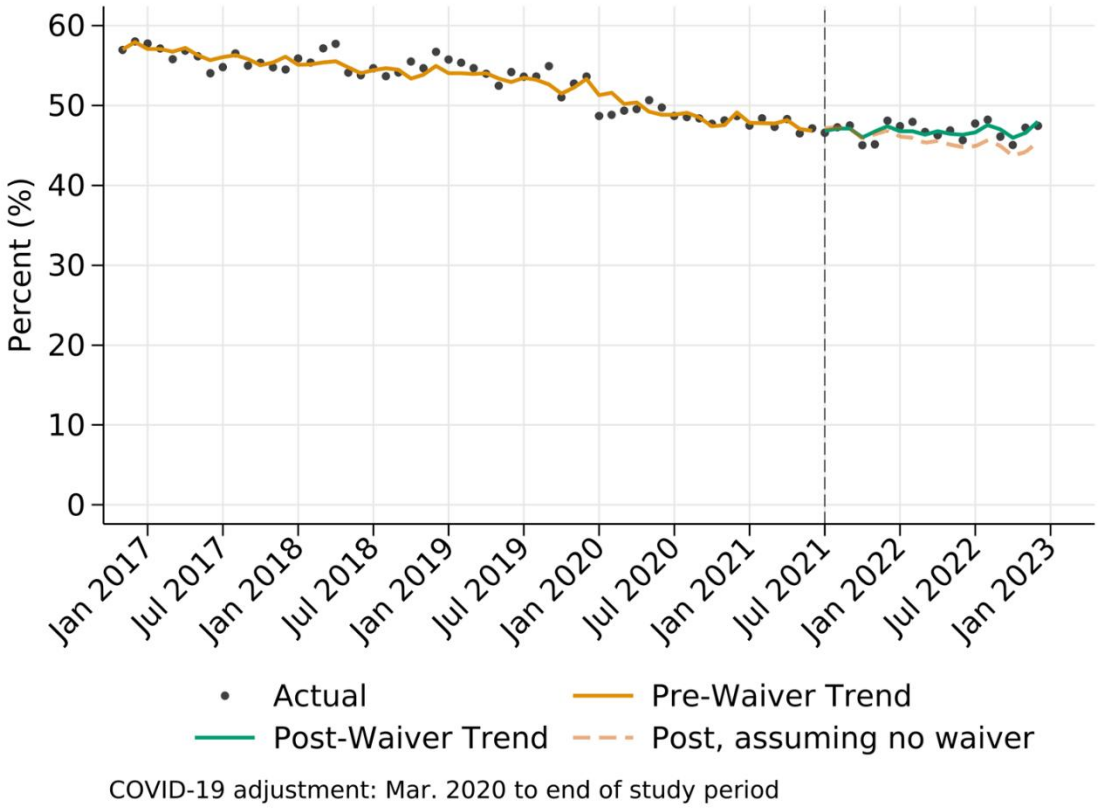


Table 0.3 Contraceptive Care – Postpartum Women: Most or Moderately Effective Contraception within 90 Days of Delivery

	Baseline	SP Waiver Implementation	Difference
Average Predicted Outcome, July 2021	47.3877*	47.0185*	-0.3692
	(46.5157, 48.2597)	(46.2696, 47.7675)	(-1.5368, 0.7985)
Slope	-0.1023*	0.0718	0.1742*
	(-0.1272, -0.0775)	(-0.0467, 0.1904)	(0.0578, 0.2905)
Average Predicted Outcome, Dec 2022	43.3371*	45.9287*	2.5916*
	(41.0011, 45.6731)	(45.1623, 46.6952)	(0.1405, 5.0427)
N	220,301		

*Notes: 95% confidence intervals in parentheses. SP = Standard Plan. *p < 0.05.*

Contraceptive Care – Postpartum Women: Long-Acting Reversible Contraception within 3 days of Delivery

Despite having a decent sample size for this measure of 220,000 in the study, the values are rather variable. This leads to a generally unremarkable statistical result for this measure. There is no difference noted at implementation, no difference in the slopes, and no difference in December 2022, the last available value for this measure. Although the figure shows post-implementation values as slightly lower than projected, the difference is inconsequential and statistically zero.

Figure 0.8 Trends in long-acting reversible method of contraception

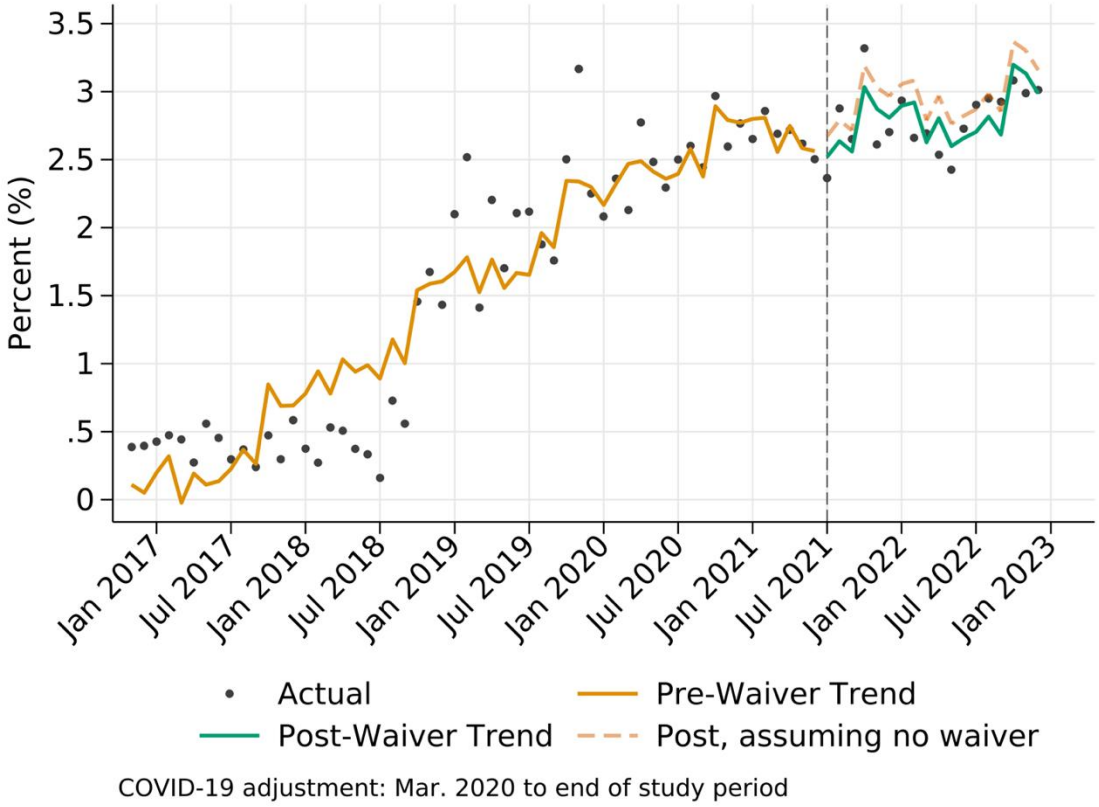


Table 0.4 Contraceptive Care – Postpartum Women: Long-Acting Reversible Contraception within 3 days of Delivery

	Baseline	SP Waiver Implementation	Difference
Average Predicted Outcome, July 2021	2.8532*	2.7003*	-0.1529
	(2.5721, 3.1344)	(2.4525, 2.9481)	(-0.5312, 0.2253)
Slope	0.0617*	0.0606*	-0.0011
	(0.0558, 0.0675)	(0.0222, 0.0989)	(-0.0390, 0.0368)
Average Predicted Outcome, Dec 2022	3.1332*	2.9618*	-0.1715
	(2.3885, 3.8780)	(2.7015, 3.2221)	(-0.9568, 0.6138)
N	220,301		

*Notes: 95% confidence intervals in parentheses. SP = Standard Plan. *p < 0.05.*

Contraceptive Care – All Women

This measure shows a common pattern: a decreasing value throughout the pre-implementation period, and a notable COVID effect in April 2020. At implementation, the model identifies a small but statistically significant decrease in value. A statistically identical slope means the difference in the post-implementation period from the projected in the absence of the waiver is roughly constant, although slightly increasing from .26 percentage points at implementation to just under .3% points in December 2022.

Figure 0.9 contraceptive care – all women

Figure 0.9

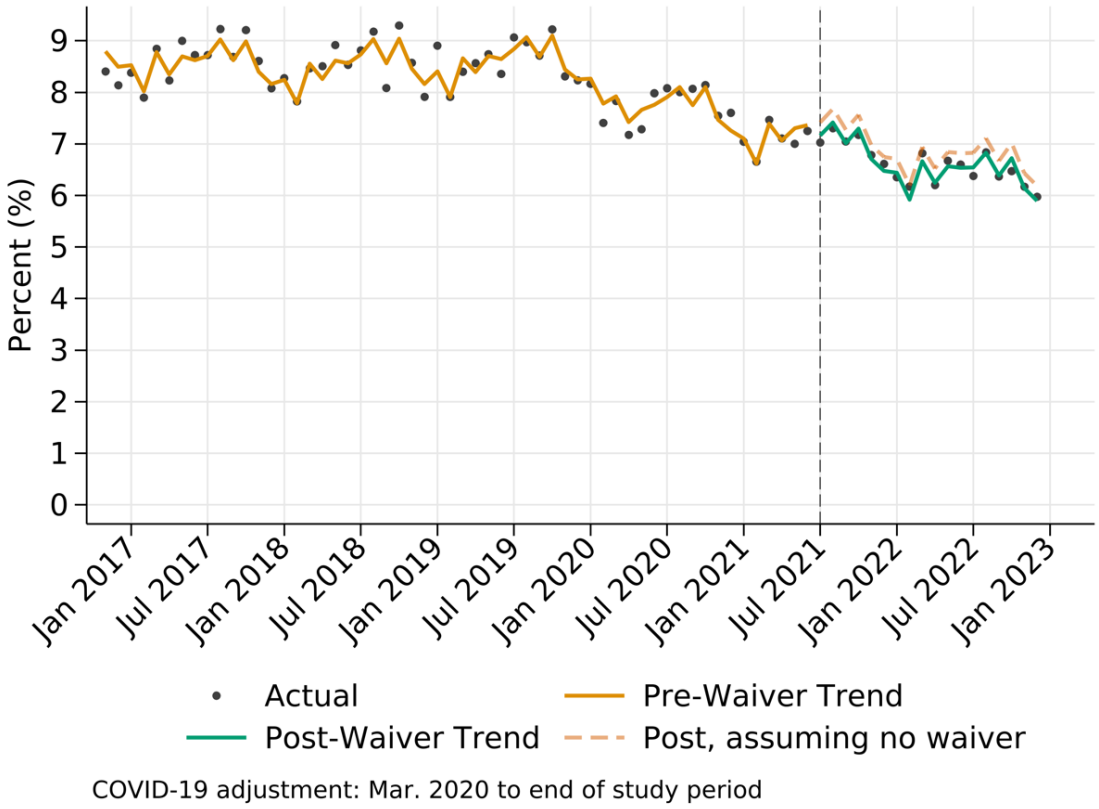


Table 0.5 Contraceptive Care – All Women

	Baseline	SP Waiver Implementation	Difference
Average Predicted Outcome, July 2021	7.2976*	7.0399*	-0.2577*
	(7.2288, 7.3664)	(6.9796, 7.1002)	(-0.3205, -0.1948)
Slope	-0.0026	-0.0046	-0.002
	(-0.0056, 0.0003)	(-0.0137, 0.0044)	(-0.0102, 0.0062)
Average Predicted Outcome, Dec 2022	6.8652*	6.5738*	-0.2914*
	(6.7050, 7.0254)	(6.5188, 6.6288)	(-0.4559, -0.1269)
N	21,571,397		

*Notes: 95% confidence intervals in parentheses. SP = Standard Plan. *p < 0.05.*

Prenatal and Postpartum Care (PPC): Postpartum Care

Postpartum care was roughly 2.5 percentage points lower immediately after Transformation. However, the rate had a higher growth rate post-Transformation and by March 2023 had not only recovered but surpassed the estimated rate without Transformation. The March 2023 rate was 2.5 percentage points higher post-Transformation.

Figure 0.10 Postpartum care

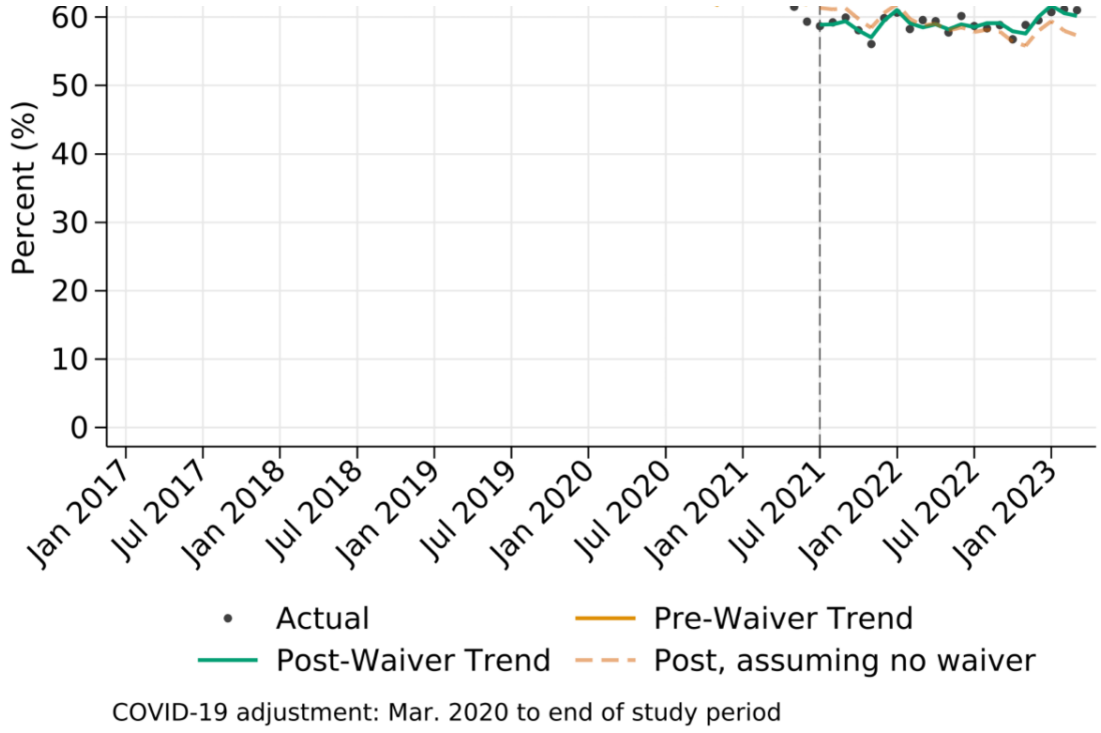


Table 0.6 postpartum care

	Baseline	SP Waiver Implementation	Difference
Average Predicted Outcome, July 2021	61.6013*	59.1358*	-2.4655*
	(60.7766, 62.4261)	(58.4658, 59.8059)	(-3.5579, -1.3731)
Slope	-1.426*	-1.1611*	0.2649*
	(-2.2011, -0.6509)	(-1.9420, -0.3803)	(0.1656, 0.3641)
Average Predicted Outcome, Mar 2023	57.3072*	60.1388*	2.8316*
	(54.8530, 59.7614)	(59.4793, 60.7983)	(0.3159, 5.3472)
N	151,467		

Child and Adolescent Well-care visits (WCV)

The modified WCV measure gives the percent of children age 3-21 years of age who received one or more well-care visit with a primary care practitioner or an OB/GYN practitioner during each month. It is a highly seasonal variable, with higher rates during the summer than the rest of the year, except during the COVID-19 PHE. The rate decreased slightly at the time of Transformation, and roughly two thirds of that decrease has been eliminated by March 2023. (.0063 vs .0159)

Figure 0.11 Child and Adolescent Well-care visits

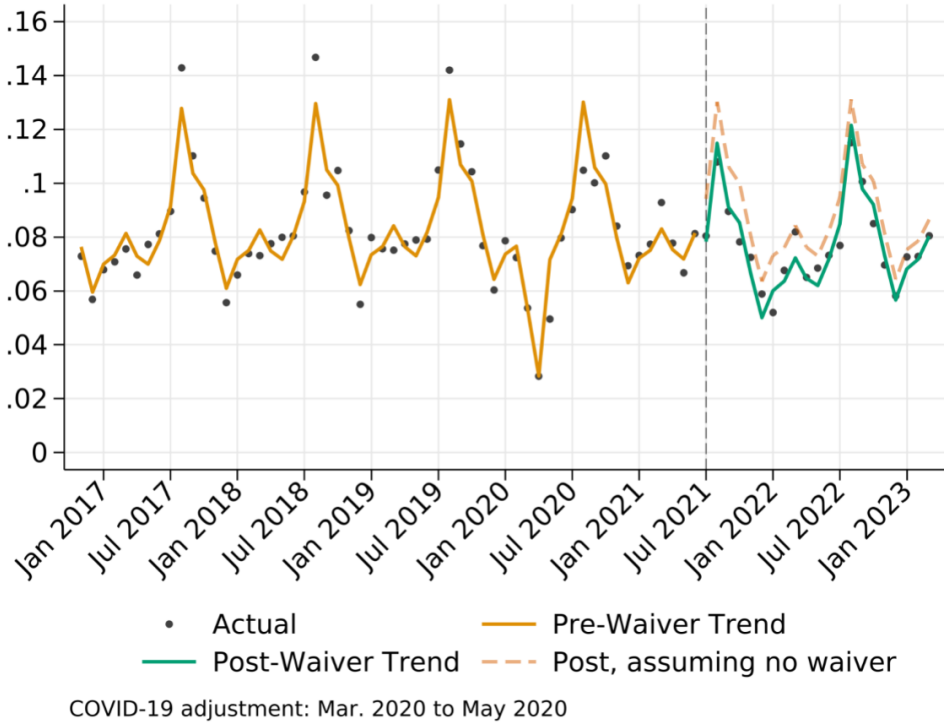


Table 0.7 child and adolescent well-care visits

	Baseline	SP Waiver Implementation	Difference
Average Predicted Outcome, July 2021	0.0874*	0.0715*	-0.0159*
	(0.0872, 0.0876)	(0.0713, 0.0717)	(-0.0162, -0.0156)
Slope	0.0001*	0.0006*	0.0005*
	(0.0001, 0.0001)	(0.0006, 0.0006)	(0.0005, 0.0005)
Average Predicted Outcome, Mar 2023	0.0899*	0.0836*	-0.0063*
	(0.0896, 0.0901)	(0.0834, 0.0838)	(-0.0066, -0.0059)
N	79,605,579		

Well Child Visits in the First 30 Months of Life (W30)

The well-child visit measure (W30) determines the percentage of beneficiaries who turned 30 months old each month and had at least six well-child visits with a primary care physician during their first 30 months of life. The rate was stable prior to SP implementation at 60-70% of children. The rate fell; considerably (almost ten percent) at Transformation. Since then, the rate has increased so that by March 2023 the net estimated decrease was about 3.5 percentage points (vs a baseline rate of 67%)

Figure 0.12 Well child visits in the first 30 months of life (W30)

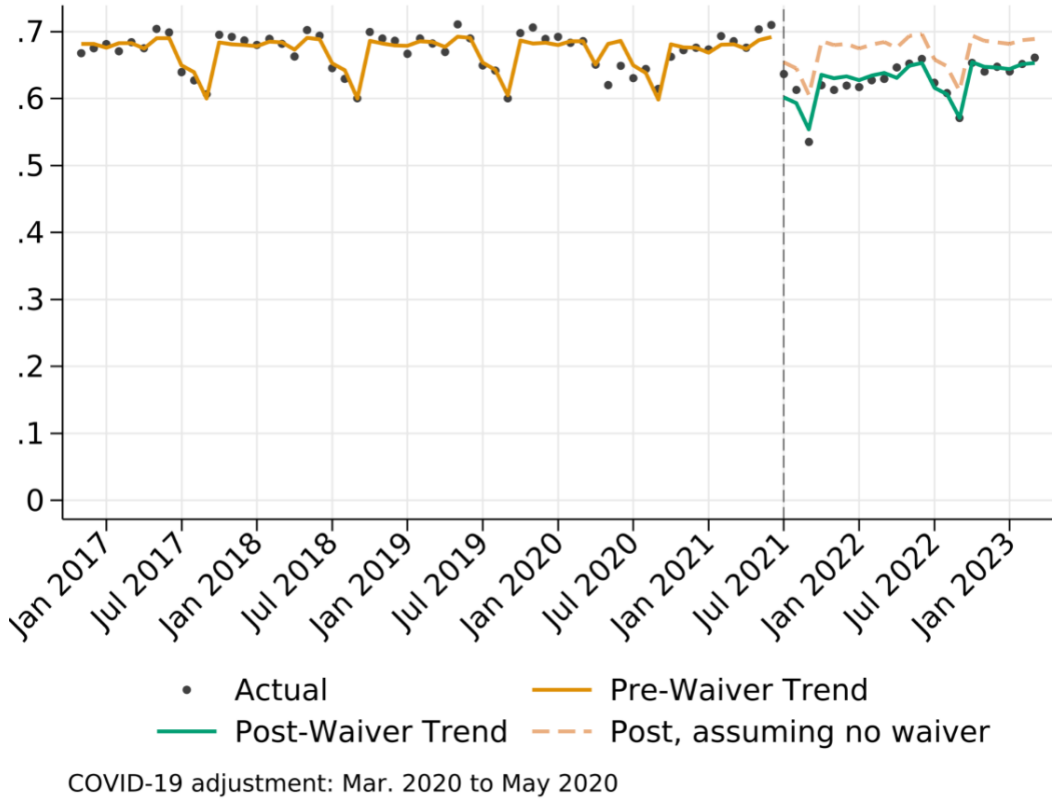


Table 0.8 well child visits in the first 30 months of life (W30)

	Baseline	SP Waiver Implementation	Difference
Average Predicted Outcome, July 2021	0.6733*	0.6206*	-0.0527*
	(0.6699, 0.6767)	(0.6150, 0.6262)	(-0.0593, -0.0461)
Slope	0.0001*	0.0010*	0.0009*
	(0.0000, 0.0002)	(0.0005, 0.0015)	(0.0004, 0.0014)
Average Predicted Outcome, Mar 2023	0.676*	0.6405*	-0.0355*
	(0.6706, 0.6813)	(0.6350, 0.6460)	(-0.0432, -0.0278)
N	414,639		

Weight Assessment and Counseling for Nutrition and Physical Activity for Children/Adolescents (WCC) - BMI Percentile Documentation

This measure captures weight assessment and counseling for children – hence the cyclical pattern of higher pediatric visits in late summer prior to a return to school. Pre-implementation of the waiver, we see an upward trend during the early pandemic period, followed by a gradual decline. There is a notable lower rate starting two months after implementation, where the values generally remain the same except for the "back to school" early fall period of September 2022. Note this seasonality is also observed in 2020 but not in 2021. The graph shows that the post-implementation predictions are lower than the counterfactual, and these differences are statistically significant. The slopes are statistically, but not meaningfully, different; the differences between the predictions are similar July 2021 and February 2023, indicating the bulk of the difference is the decrease occurring at implementation rather than a time trend.

Figure 0.13 Weight Assessment and Counseling for Nutrition and Physical Activity for Children/Adolescents

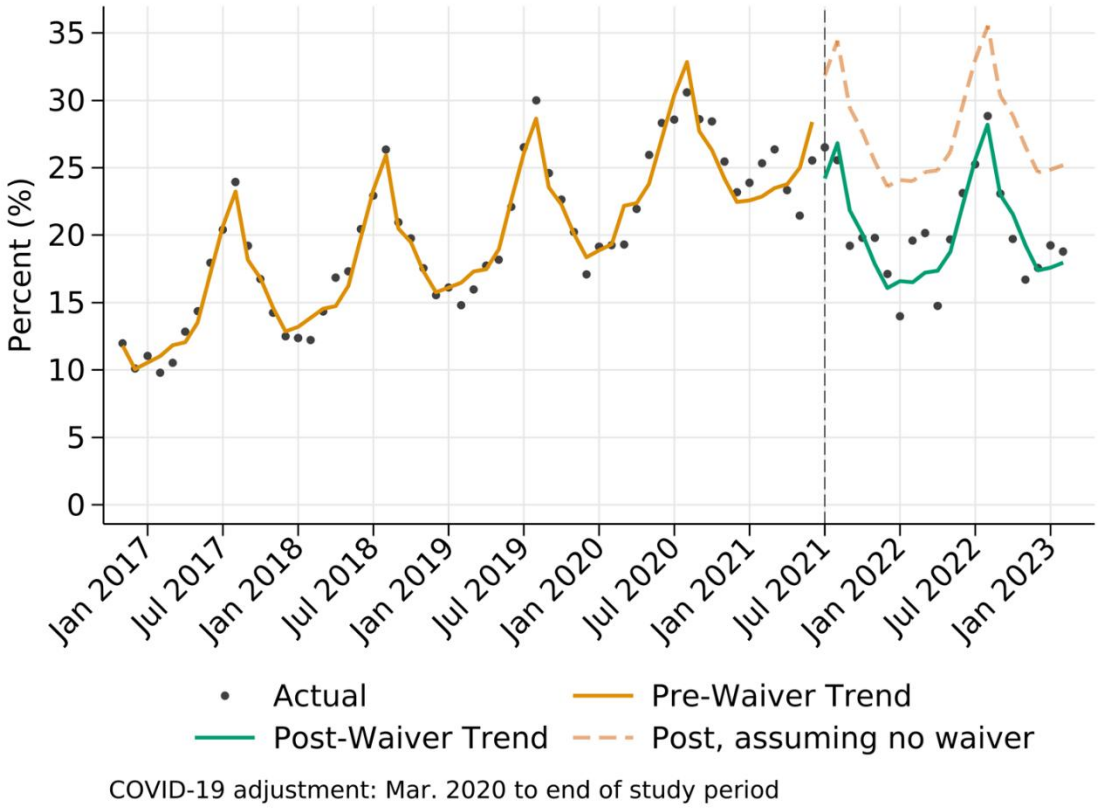


Table 0.9 Weight Assessment and Counseling for Nutrition and Physical Activity for Children/Adolescents

	Baseline	SP Waiver Implementation	Difference
Average Predicted Outcome, July 2021	26.1513*	18.5183*	-7.6329*
	(26.0287, 26.2738)	(18.4300, 18.6066)	(-7.7747, -7.4911)
Slope	0.2259*	0.2466*	0.0207*
	(0.2232, 0.2286)	(0.2324, 0.2608)	(0.0068, 0.0347)
Average Predicted Outcome, Feb 2023	28.1828*	20.9435*	-7.2393*
	(27.8393, 28.5263)	(20.8569, 21.0301)	(-7.5859, -6.8928)
N	11,257,797		

*Notes: 95% confidence intervals in parentheses. SP = Standard Plan. *p < 0.05.*

Weight Assessment and Counseling for Nutrition and Physical Activity for Children/Adolescents (WCC): Counseling for Nutrition

We see a steady upward increase in counseling for nutrition at the beginning of the study, with a jump during the initial pandemic period from January 2020 up through July 2021 with some smaller values immediately preceding the implementation period in April and May 2021. Values start to decrease post-implementation, and we see a slight decrease throughout the post-implementation period with the exception being of late fall 2022 near the start of the school year. The pre-implementation rapid increase is extended and therefore the slow to negative trend post-implementation leads to a sizable gap in February 2023 of over 4 percentage points.

Figure 0.14 Weight Assessment and Counseling for Nutrition and Physical Activity for Children/Adolescents (WCC): Counseling for Nutrition

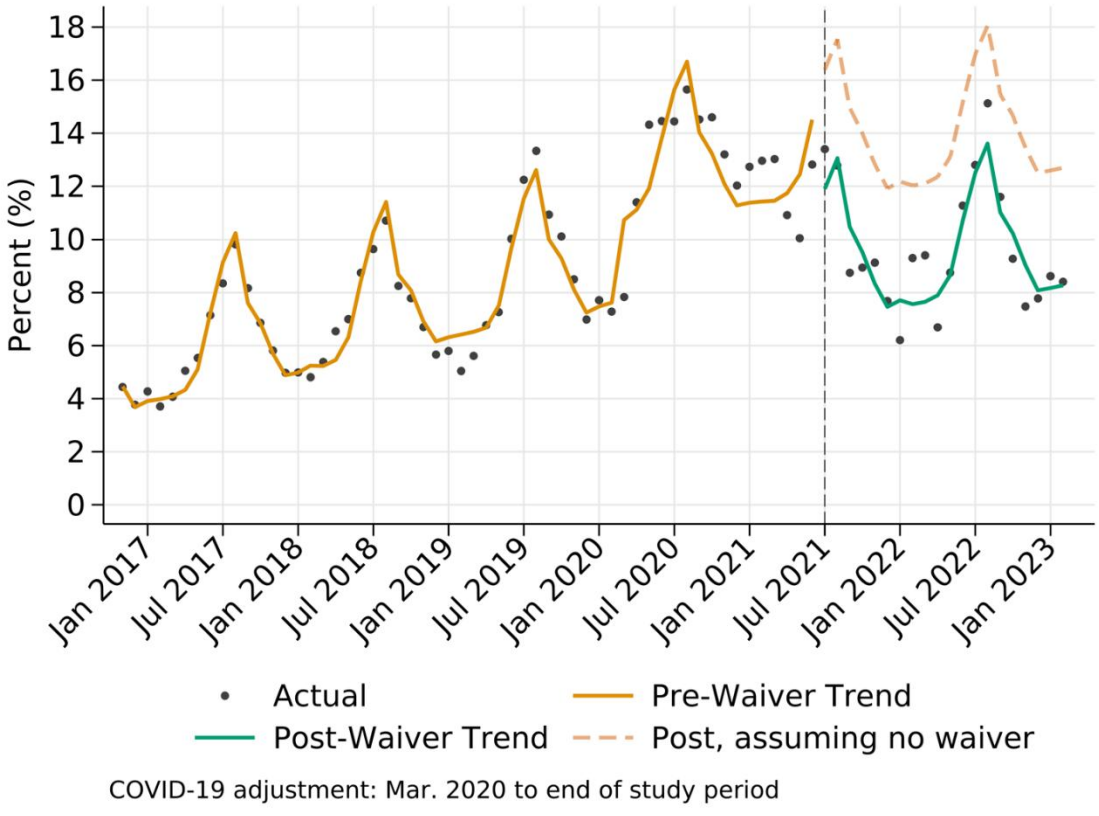


Table 0.10 Weight Assessment and Counseling for Nutrition and Physical Activity for Children/Adolescents (WCC): Counseling for Nutrition

	Baseline	SP Waiver Implementation	Difference
Average Predicted Outcome, July 2021	13.1533*	8.665*	-4.4883*
	(13.0666, 13.2400)	(8.6075, 8.7225)	(-4.5903, -4.3864)
Slope	0.0986*	0.1019*	0.0032
	(0.0969, 0.1003)	(0.0919, 0.1118)	(-0.0065, 0.0130)
Average Predicted Outcome, Feb 2023	14.1999*	9.7732*	-4.4268*
	(13.9515, 14.4484)	(9.7170, 9.8294)	(-4.6746, -4.1790)
N	11,257,797		

*Notes: 95% confidence intervals in parentheses. SP = Standard Plan. *p < 0.05.*

Weight Assessment and Counseling for Nutrition and Physical Activity for Children/Adolescents (WCC): Counseling for Physical Activity

This metric was on a sustained upward trend throughout the pre-implementation period, increasing from near zero prior to 2019, around 3 percent in January 2020 to roughly six in the first half of 2021. (Note that the low values prior to 2019 lead to negative predictions.) Post-implementation, the trend stalled and reversed. The difference in the slopes means that the roughly 2 percentage point gap at implementation has expanded to roughly 4.5 percentage points in February 2023.

Figure 0.15 Weight Assessment and Counseling for Nutrition and Physical Activity for Children/Adolescents (WCC): Counseling for Physical Activity

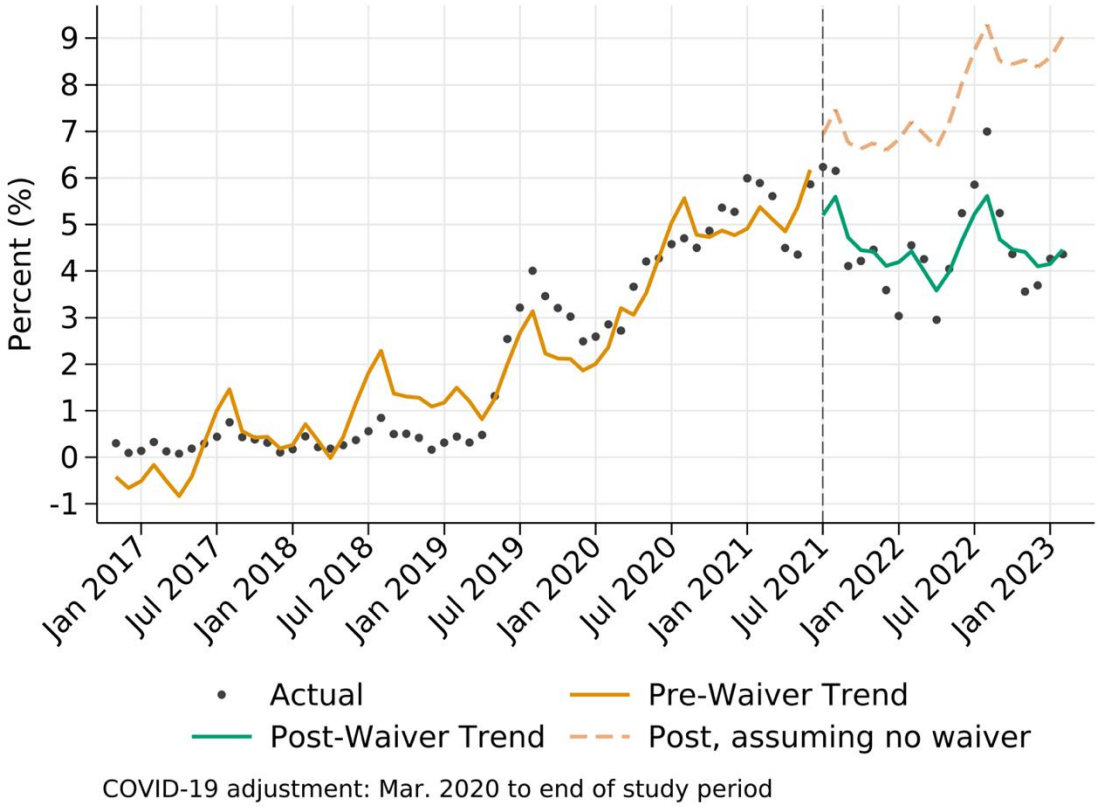


Table 0.11 Weight Assessment and Counseling for Nutrition and Physical Activity for Children/Adolescents (WCC): Counseling for Physical Activity

	Baseline	SP Waiver Implementation	Difference
Average Predicted Outcome, July 2021	6.1041*	4.3752*	-1.7288*
	(6.0445, 6.1637)	(4.3345, 4.4160)	(-1.7984, -1.6593)
Slope	0.0703*	-0.0797*	-0.15*
	(0.0694, 0.0713)	(-0.0865, -0.0728)	(-0.1567, -0.1434)
Average Predicted Outcome, Feb 2023	9.0702*	4.4908*	-4.5795*
	(8.9017, 9.2388)	(4.4507, 4.5308)	(-4.7464, -4.4126)
N	11,257,797		

*Notes: 95% confidence intervals in parentheses. SP = Standard Plan. *p < 0.05.*

Appropriate Treatment for Upper Respiratory Infection (URI)

Effective management of upper respiratory infection means that providers prescribe antibiotics appropriately. This measure calculates the rate of appropriate treatment. This measure was improving during the pre-implementation period but began decreasing after implementation. Both trends are statistically significant, and thus the difference is as well. Despite no change in July 2021 in the rates, by February 2023 the rate was 3.4 percentage points lower than projected in the absence of the waiver.

Figure 0.16 Appropriate Treatment For Upper Respiratory Infection Rate

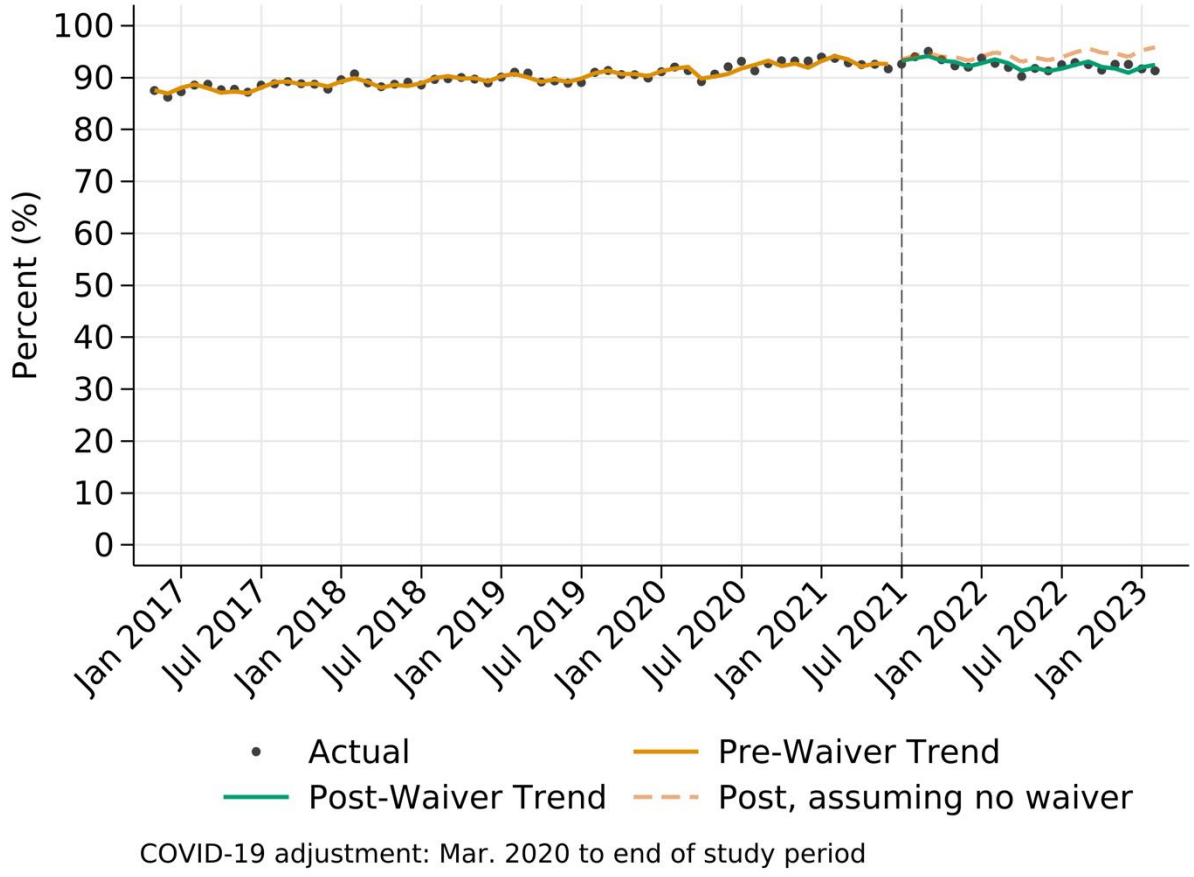


Table 0.12 Appropriate Treatment For Upper Respiratory Infection Rate

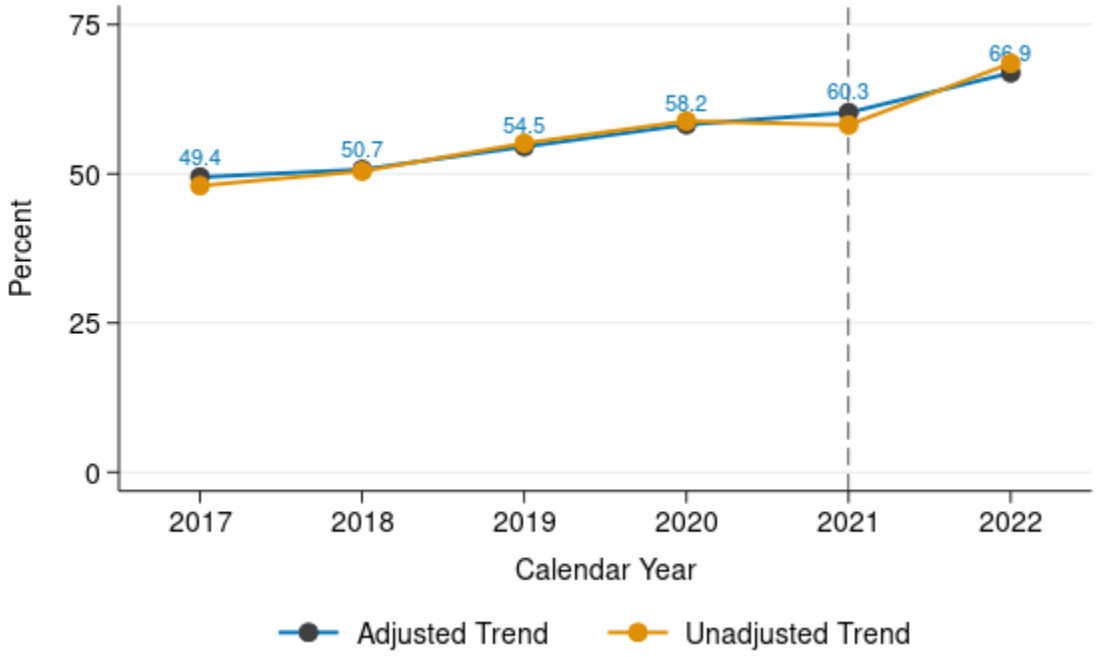
	Baseline	SP Waiver Implementation	Difference
Average Predicted Outcome, July 2021	93.4359*	93.1861*	-0.2498
	(93.1714, 93.7005)	(93.0296, 93.3426)	(-0.5578, 0.0582)
Slope	0.0813*	-0.084*	-0.1652*
	(0.0757, 0.0868)	(-0.1169, -0.0510)	(-0.1978, -0.1327)
Average Predicted Outcome, Feb 2023	95.131*	91.7415*	-3.3895*
	(94.3265, 95.9355)	(91.5891, 91.8939)	(-4.2053, -2.5737)
N	1,366,969		

*Notes: 95% confidence intervals in parentheses. SP = Standard Plan. *p < 0.05.*

Avoidance of Antibiotic Treatment for Acute Bronchitis/Bronchiolitis (AAB)

This metric measures the percentage of episodes for beneficiaries ages 3 months and older with a diagnosis of acute bronchitis/bronchiolitis that did not result in an antibiotic dispensing event. Higher is better for this metric. The AAB measure increased by about 2.7 percentage points per year from 2017 through 2021. Between 2021 and 2022 the measure increased by 6.6 percentage points to 66.9%.

Figure 0.17 Trends in Avoidance of Antibiotic Treatment for Acute Bronchitis/Bronchiolitis



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 (indicator flags).

Pharmacotherapy Management of COPD Exacerbation (PCE): Corticosteroid use within 14 days.

This metric examines the percentage of COPD exacerbations for members 40 years of age and older who had an acute inpatient discharge or ED visit and who were dispensed appropriate medications. Higher is better for this metric. Analyses of systemic corticosteroids within 14 days of the hospital event and bronchodilator prescriptions within 30 days of the hospital event are analyzed separately. Just after the pandemic began, there was a notable drop in the percent of beneficiaries who received systemic corticosteroids within 14 days; values fell from near 70 in early 2020 to 60 by the summer; the pandemic may have affected the population eligible for this metric, in addition to the more typical disruption to the healthcare system. The metric had a slow but steady recovery up to the time of implementation. There was no systematic jump at implementation, but overall, the upward trend reversed; the slope post-implementation was negative. It is noteworthy that the post-implementation values are generally higher than the highest of the pre-implementation period; this may be a situation where the recovery from COVID plateaued, meaning the post-pandemic recovery trend was unsustainable, more than the implementation per se affecting outcomes. Said another way, the trend just prior to the implementation period was a rather steep increase, but this could be a manifestation of the recovery from the COVID-era decrease. The projected trend in the immediate post-implementation period would have been substantially higher than the range seen in the pre-implementation, which suggests that the projected trend may not be a reasonable estimate of the trend that would have occurred in the absence of implementation.

Figure 0.18 Pharmacotherapy Management of COPD Exacerbation (PCE): Corticosteroid use within 14 days.

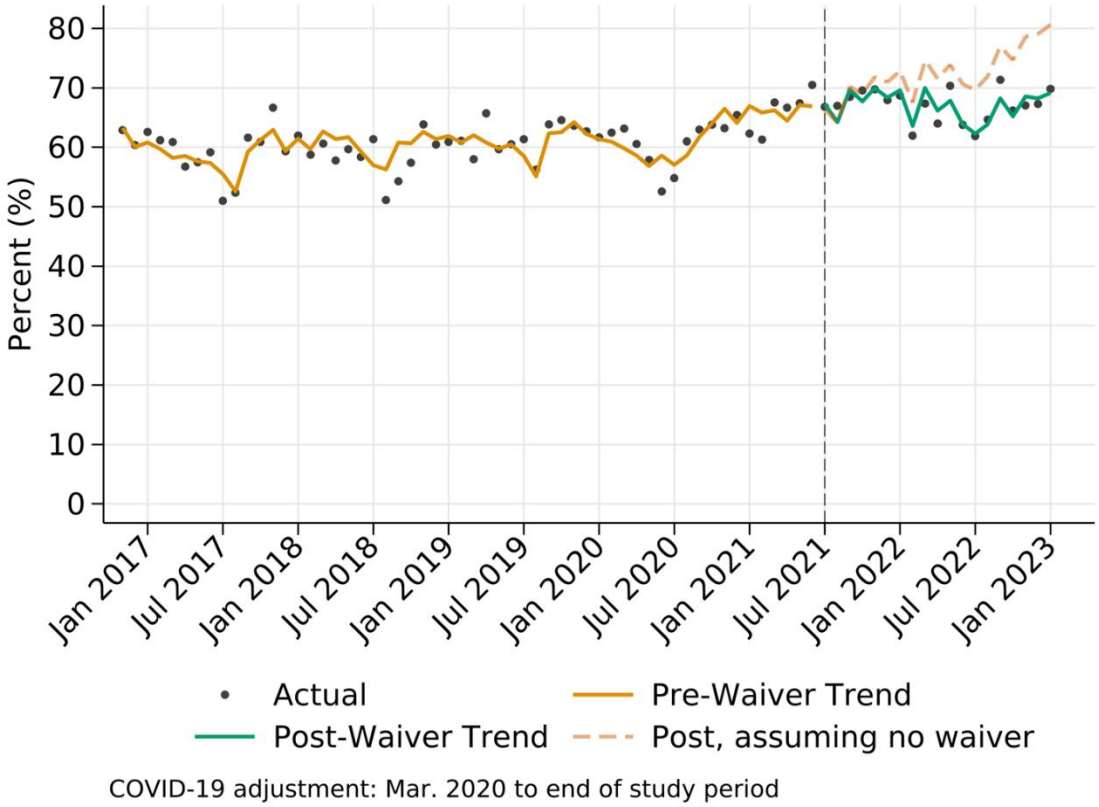


Table 0.13 Pharmacotherapy Management of COPD Exacerbation (PCE): Corticosteroid use within 14 days.

	Baseline	SP Waiver Implementation	Difference
Average Predicted Outcome, July 2021	66.8733*	67.6894*	0.8161
	(63.6106, 70.1360)	(64.7825, 70.5963)	(-3.5481, 5.1803)
Slope	0.1129*	-0.5724*	-0.6853*
	(0.0460, 0.1797)	(-1.0012, -0.1437)	(-1.1086, -0.2620)
Average Predicted Outcome, Jan 2023	76.5701*	65.0507*	-11.5194*
	(67.5412, 85.5989)	(62.2999, 67.8015)	(-20.9108, -2.1279)
N	22,055		

*Notes: 95% confidence intervals in parentheses. SP = Standard Plan. *p < 0.05.*

Pharmacotherapy Management of COPD Exacerbation (PCE): Bronchodilator use within 30 days

This measure, which calculates the percent of those admitted for COPD who are prescribed a bronchodilator within 30 days, shows there is no effect of implementation on this measure as the differences in July 2021, February 2023, and slope are all statistically zero.

Figure 0.19 Pharmacotherapy Management of COPD Exacerbation (PCE): Bronchodilator use within 30 days

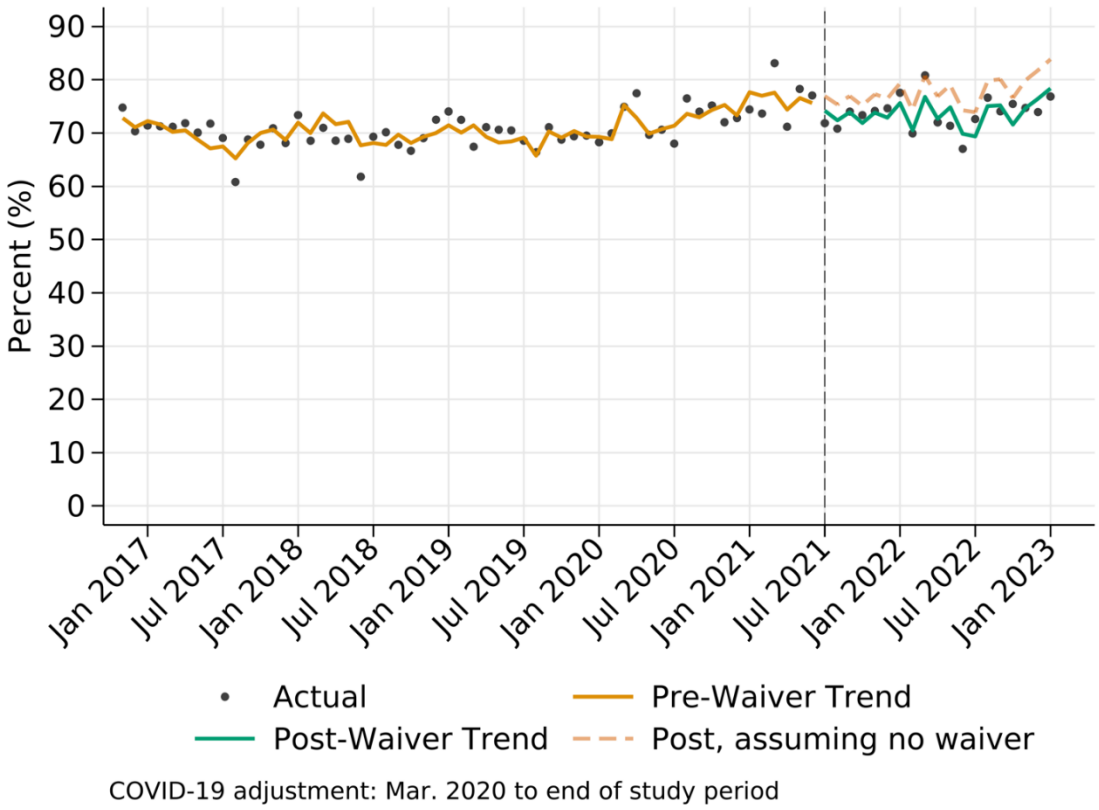


Table 0.14 Pharmacotherapy Management of COPD Exacerbation (PCE): Bronchodilator use within 30 days

	Baseline	SP Waiver Implementation	Difference
Average Predicted Outcome, July 2021	75.2053*	72.4085*	-2.7969
	(72.3999, 78.0107)	(69.6417, 75.1752)	(-6.7362, 1.1425)
Slope	0.0218	-0.1267	-0.1486
	(-0.0389, 0.0826)	(-0.5059, 0.2524)	(-0.5225, 0.2253)
Average Predicted Outcome, Jan 2023	79.4723*	74.0012*	-5.4711
	(71.6655, 87.2791)	(71.5364, 76.4660)	(-13.5951, 2.6529)
N	22,055		

*Notes: 95% confidence intervals in parentheses. SP = Standard Plan. *p < 0.05.*

Statin Therapy for Patients with Cardiovascular Disease (SPC)

Prior to waiver implementation and COVID-19 onset, statin therapy for cardiovascular disease was trending upward and averaged about 65%. In July 2021, the statin therapy was forecast to be 66.5% in the absence of the waiver and 65.9% in the presence of the waiver, indicating no immediate effects of the waiver. During SP implementation a negative but nonsignificant downward trend in statin therapy is observed, corresponding to a 0.07%- point decrease in statin therapy per month. By December 2022, it is estimated that statin therapy for cardiovascular disease is 4.78 percentage points lower than projected in the absence of the waiver.

Figure 0.20 Statin Therapy for Patients with Cardiovascular Disease (SPC)

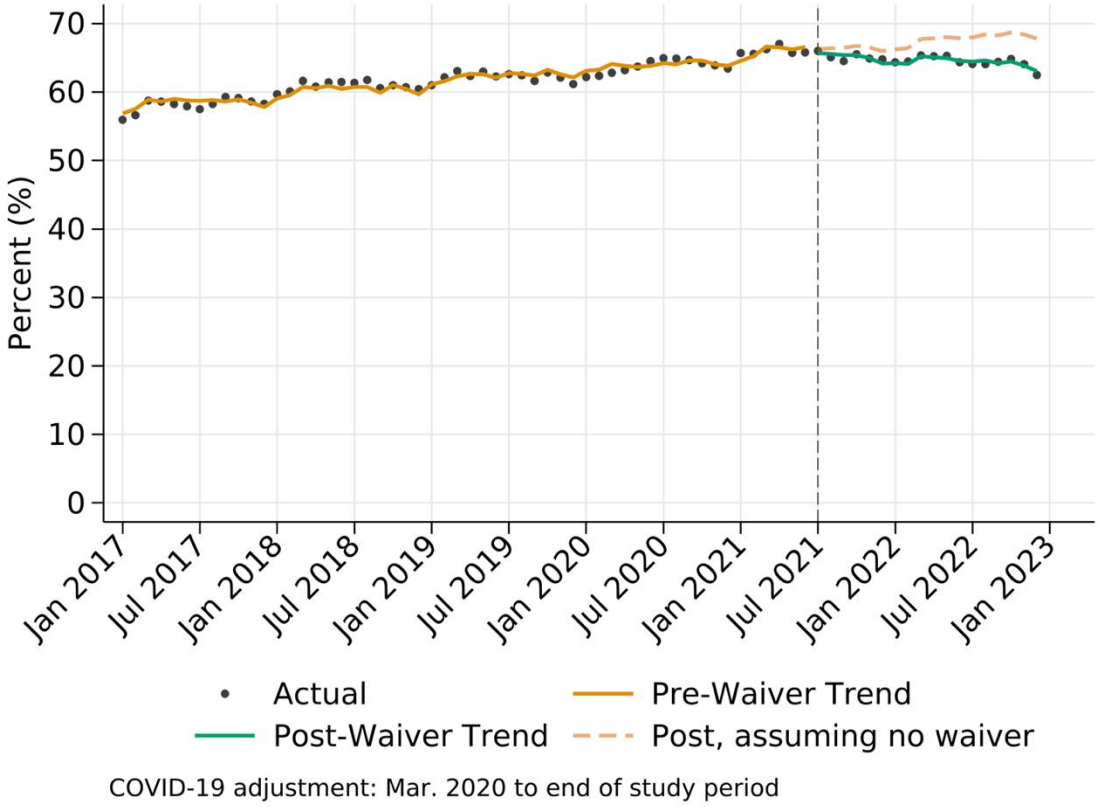


Table 0.15 Statin Therapy for Patients with Cardiovascular Disease (SPC)

	Baseline	SP Waiver Implementation	Difference
Average Predicted Outcome, July 2021	66.5008*	65.9109*	-0.59
	(65.2715, 67.7302)	(64.7846, 67.0372)	(-1.6516, 0.4717)
Slope	0.1787*	-0.0682	-0.2468*
	(0.1318, 0.2255)	(-0.2452, 0.1089)	(-0.4128, -0.0809)
Average Predicted Outcome, Dec 2022	69.9837*	65.1973*	-4.7864*
	(67.0140, 72.9535)	(63.9302, 66.4644)	(-7.9697, -1.6032)
N	327,711		

*Notes: 95% confidence intervals in parentheses. SP = Standard Plan. *p < 0.05.*

Statin Therapy for Patients with Diabetes (SPD)

Prior to waiver implementation and COVID-19 onset, statin therapy among beneficiaries with diabetes was trending upward, with a 0.13 percentage point increase per month. In July 2021, statin therapy was forecast to be 49.5% in the absence of the waiver and 49.2% in the presence of the waiver, indicating no immediate effects of the waiver. During SP implementation, a smaller positive time trend in statin therapy was observed: statin therapy for beneficiaries with diabetes was estimated to increase 0.05 percentage points per month – a not statistically significant 0.08 percentage point decrease in the slope compared to the pre-waiver trend. By December 2022, it was estimated that statin therapy for beneficiaries with diabetes was 1.7 percentage points lower than projected in the absence of the waiver.

Figure 0.21 Statin Therapy for Patients with Diabetes (SPD)

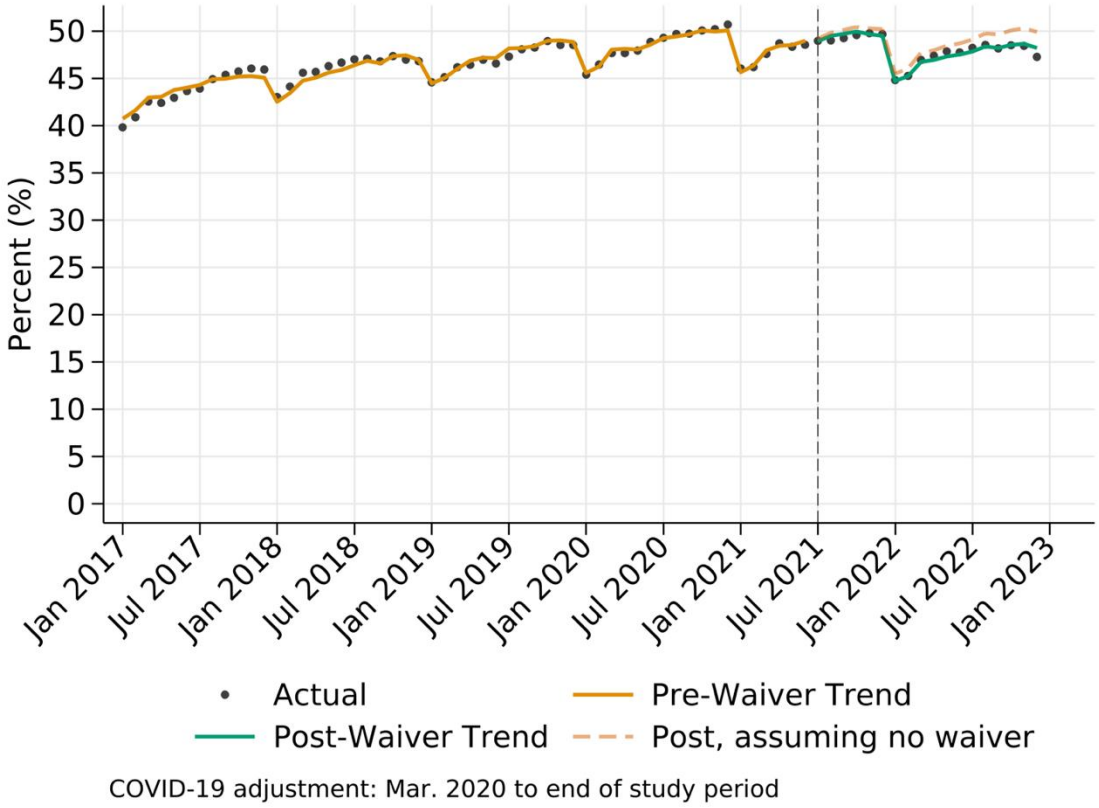


Table 0.16 Statin Therapy for Patients with Diabetes (SPD)

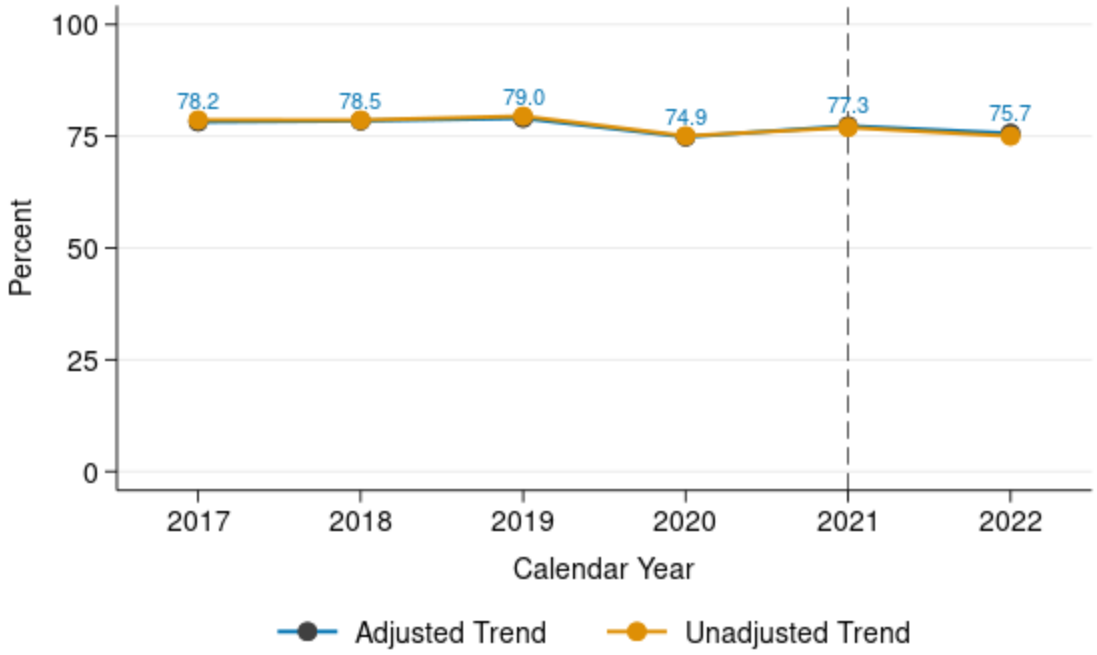
	Baseline	SP Waiver Implementation	Difference
Average Predicted Outcome, July 2021	49.4509*	49.2221*	-0.2287
	(48.7419, 50.1598)	(48.5712, 49.8731)	(-0.7994, 0.3420)
Slope	0.1334*	0.0456*	-0.0878
	(0.1077, 0.1591)	(-0.0497, 0.1408)	(-0.1769, 0.0012)
Average Predicted Outcome, Dec 2022	51.27*	49.5483*	-1.7217*
	(49.6414, 52.8985)	(48.8736, 50.2229)	(-3.4297, -0.0137)
N	1,061,260		

*Notes: 95% confidence intervals in parentheses. SP = Standard Plan. *p < 0.05.*

Diabetes Screening for People with Schizophrenia or Bipolar Disorder who are Using Antipsychotic Medications (SSD)

The percentage of people with schizophrenia or bipolar disorder who are using antipsychotic medications and who were screened for diabetes was steady between 78-79% from 2017 through 2019. The measure fell to 74.9% in 2020 but increased to 77.3% in 2021. In 2022 the measure again dropped to 75.7%, which is still lower than pre-COVID levels.

Figure 0.22 Trends in Diabetes Screening for People with Schizophrenia or Bipolar Disorder who are Using Antipsychotic Medications



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 (indicator flags).

Prevention Quality Indicator 05 (PQI 05): Chronic Obstructive Pulmonary Disease (COPD) or Asthma in Older Adults Admission Rate

The trend in admission rate for COPD and asthma was statistically zero throughout the pre-implementation period, and remained (statistically) unchanged in the post-implementation period. A statistically significant decline of 0.1 percentage points at implementation evaporated by February 2023 so that there currently is no difference in this post-implementation rate from the projected rate.

Figure 0.23 COPD & Asthma Admission Rate

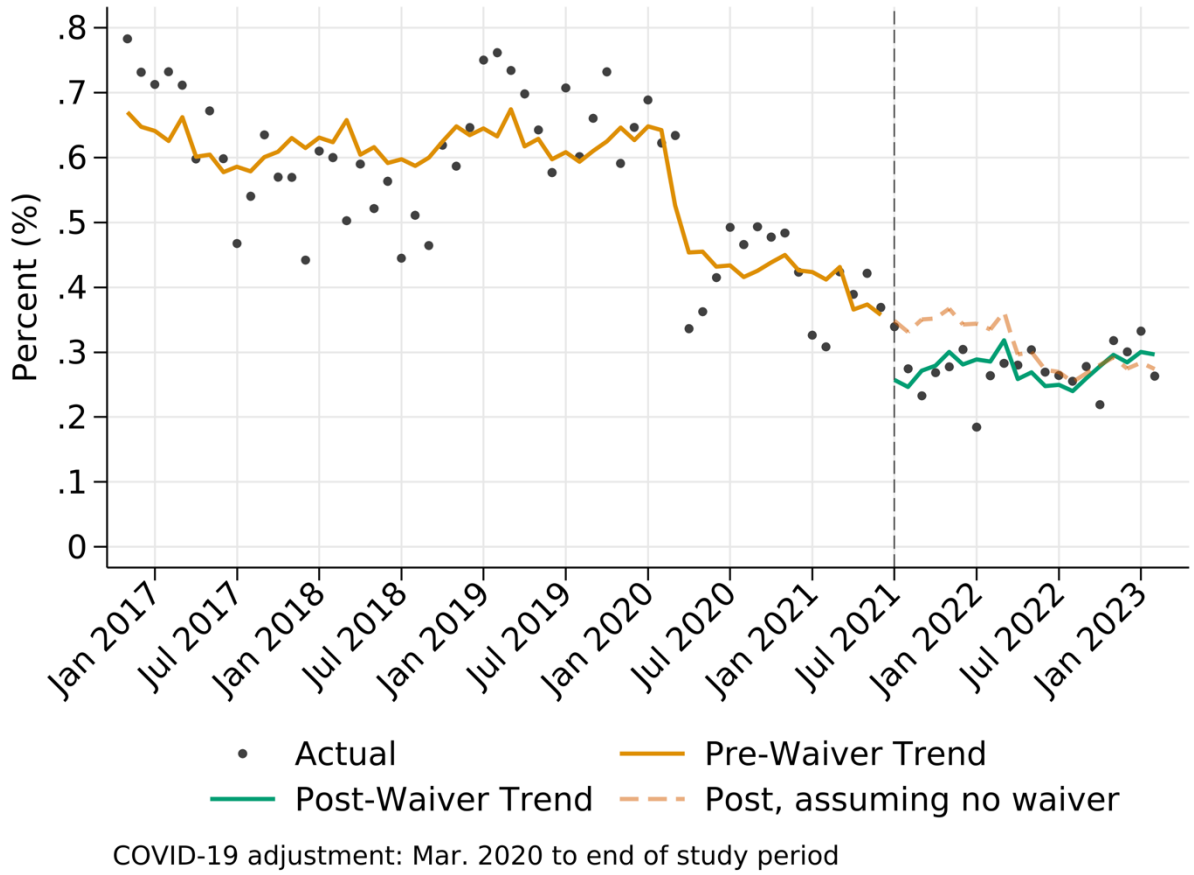


Table 0.17 PQI05: COPD & Asthma Admission Rate

	Baseline	SP Waiver Implementation	Difference
Average Predicted Outcome, July 2021	0.395*	0.3041*	-0.0909*
	(0.3327, 0.4572)	(0.2642, 0.3440)	(-0.1566, -0.0251)
Slope	-0.0008	0.0051	0.0059
	(-0.0036, 0.0019)	(-0.0030, 0.0132)	(-0.0013, 0.0131)
Average Predicted Outcome, Feb 2023	0.3851*	0.407*	0.0219
	(0.2184, 0.5517)	(0.3526, 0.4614)	(-0.1481, 0.1920)
N	2,138,148		

*Notes: 95% confidence intervals in parentheses. SP = Standard Plan. *p < 0.05.*

Prevention Quality Indicator 15 (PQI 15) Asthma in Younger Adults Admission Rate

This measure captures admissions for asthma among younger adults. Lower values are better. This is a rare outcome, and thus even with over 5-million-member months most estimates are imprecise. There was a downward trend in the pre-implementation period, which became more negative after implementation but was not statistically significant. There is no statistical difference in the rate in July 2021 or February 2023.

Figure 0.24 PQI 15: Asthma in Younger Adults Rate

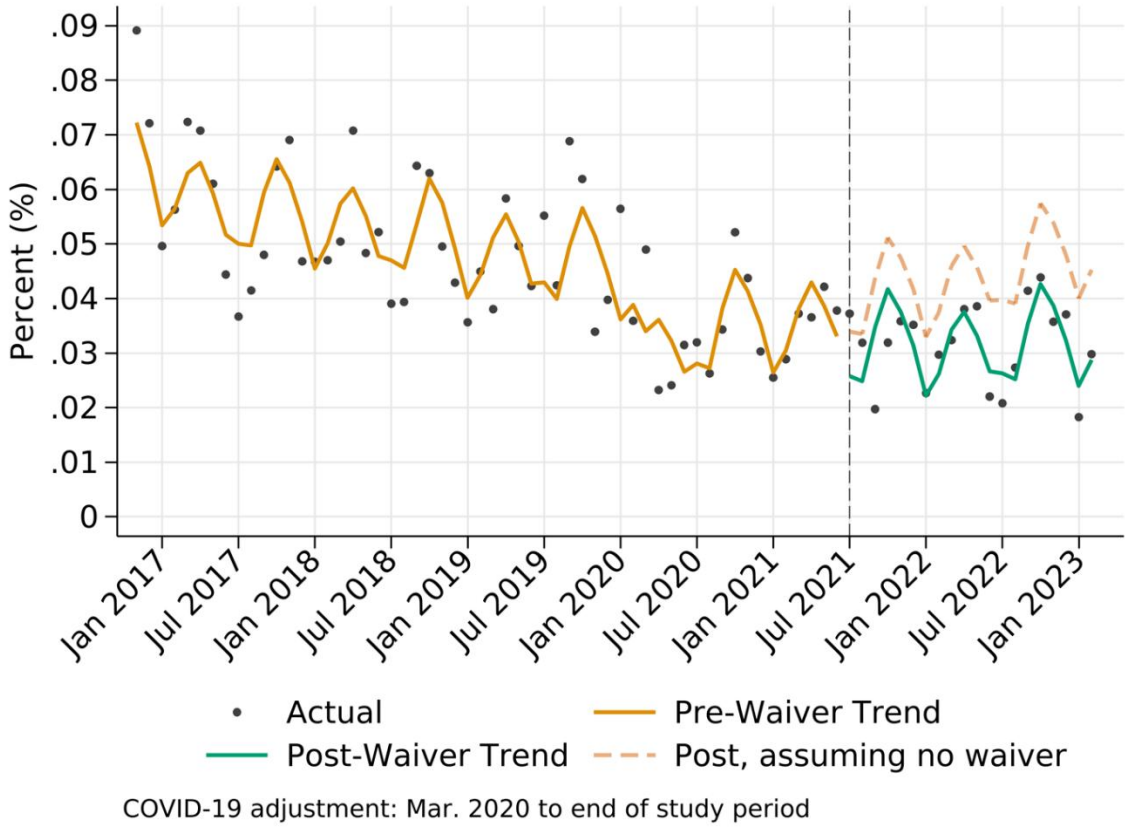


Table 0.18 PQI 15: Asthma in Younger Adults Rate

	Baseline	SP Waiver Implementation	Difference
Average Predicted Outcome, July 2021	0.0404*	0.0323*	-0.0082
	(0.0323, 0.0486)	(0.0267, 0.0378)	(-0.0178, 0.0014)
Slope	-0.0004*	-0.0009	-0.0004
	(-0.0007, -0.0001)	(-0.0018, 0.0001)	(-0.0014, 0.0005)
Average Predicted Outcome, Feb 2023	0.0552*	0.0386*	-0.0165
	(0.0321, 0.0782)	(0.0333, 0.0440)	(-0.0397, 0.0066)
N	5,428,255		

*Notes: 95% confidence intervals in parentheses. SP = Standard Plan. *p < 0.05.*

Pediatric Quality Indicator 14 (PDI14): Asthma Admission Rate

Admissions for pediatric asthma are outcome that can be managed by effective healthcare delivery, reducing these rates over areas with less effective outpatient pediatric asthma management. Prior to COVID-19 and Waiver implementation, asthma admission rates were not changing substantially, with a small, negative, slope estimate. At the time of SP implementation, the asthma admission rate had a statistically significant decrease of 0.0015 percentage points. During implementation, we see a statistically significant 0.0003 percentage point decrease in the slope, indicating that asthma admission rates have been decreasing quicker than expected. By December 2022, asthma admission rates are 0.0074 percentage points lower with the waiver than would have been expected in the absence of the waiver. This decrease is nearly a 50% decrease over the projected admission rates in the absence of the waiver, though the high projected values may be due to confounding from COVID-19 dynamics. Note that for most of the post-implementation period, the seasonal effects are larger than the estimated SP effect.

Figure 0.25 PDI 14: asthma admission rate

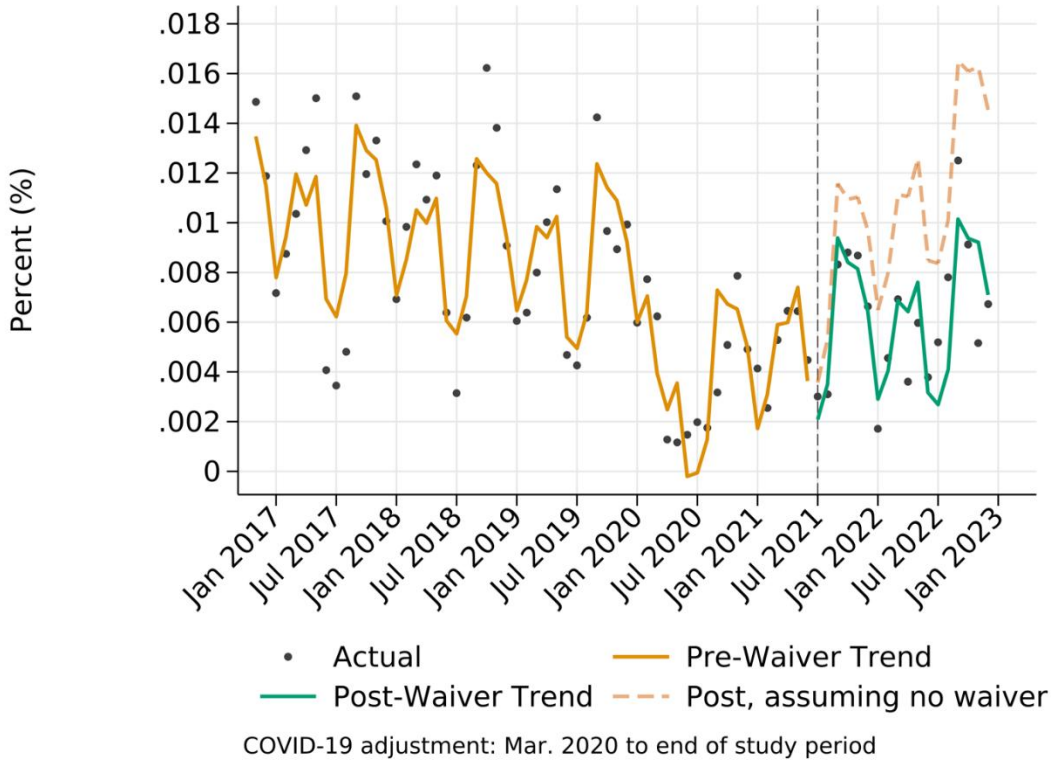


Table 0.19 PDI 14: asthma admission rate

	Baseline	SP Waiver Implementation	Difference
Average Predicted Outcome, July 2021	0.0083*	0.0068*	-0.0015*
	(0.0075, 0.0091)	(0.0061, 0.0076)	(-0.0025, -0.0005)
Slope	0.0000	-0.0004*	-0.0003*
	(-0.0001, -0.0000)	(-0.0005, -0.0003)	(-0.0004, -0.0002)
Average Predicted Outcome, Dec 2022	0.0148*	0.0074*	-0.0074*
	(0.0129, 0.0168)	(0.0067, 0.0082)	(-0.0095, -0.0053)
N	72,961,157		

*Notes: 95% confidence intervals in parentheses. SP = Standard Plan. *p < 0.05.*

Prevention Quality Indicator 08 (PQI 08) Heart Failure Admission Rate

This measure captures admissions for heart failure among younger adults. Lower values are better and reflect effective outpatient management of heart failure. Despite the figure showing an increase to 2019 and subsequent decrease, overall trends are statistically flat in both the pre- and post- implementation time period. There is a notable but (barely) statistically zero effect at implementation. Overall, there is little statistical evidence this rate was changed as a result of the transformation.

Figure 0.26 PQI 08: Heart Failure Admissions Rate

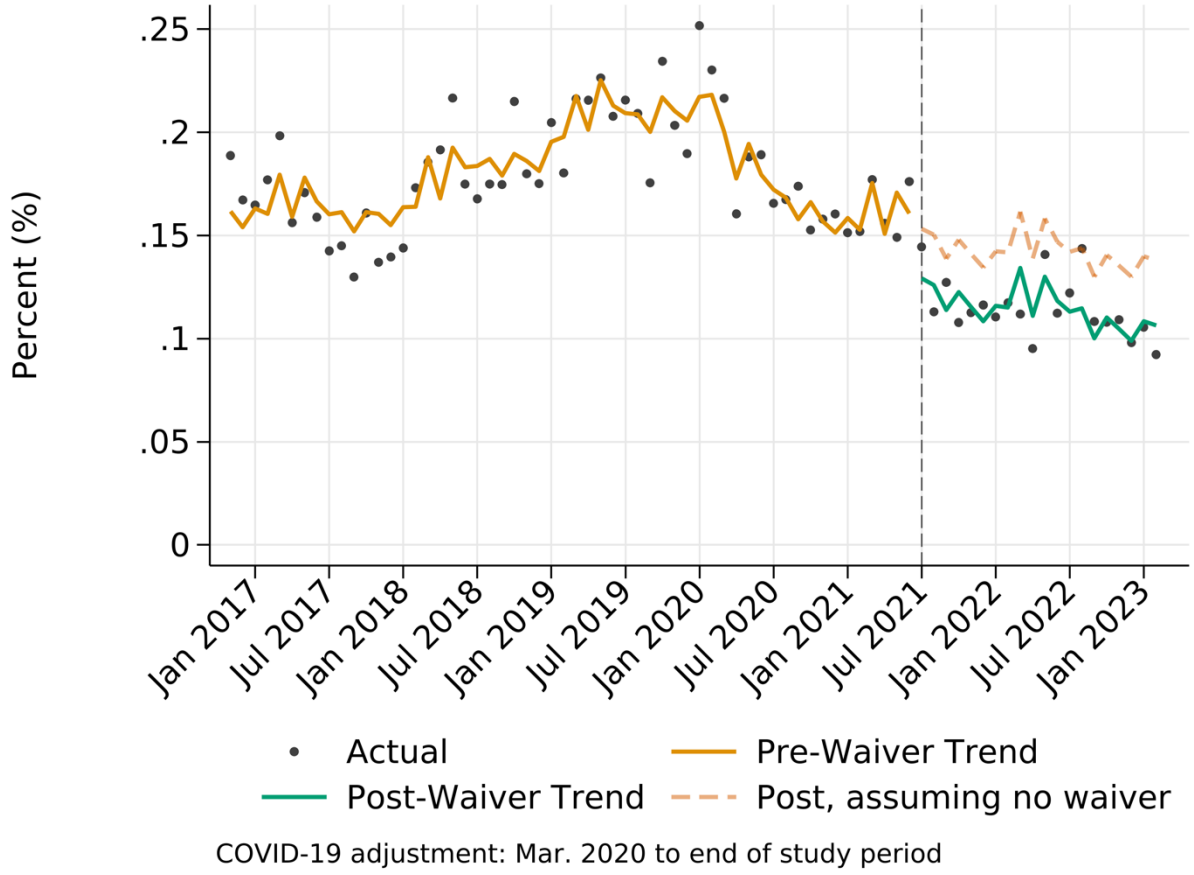


Table 0.20 PQI 08: Heart Failure Admissions Rate

	Baseline	SP Waiver Implementation	Difference
Average Predicted Outcome, July 2021	0.1628*	0.1388*	-0.024
	(0.1369, 0.1888)	(0.1204, 0.1572)	(-0.0502, 0.0021)
Slope	0.0005	0.0001	-0.0004
	(-0.0004, 0.0015)	(-0.0033, 0.0036)	(-0.0036, 0.0027)
Average Predicted Outcome, Feb 2023	0.1957*	0.1638*	-0.0319
	(0.1230, 0.2684)	(0.1453, 0.1823)	(-0.1061, 0.0422)
N	7,558,037		

*Notes: 95% confidence intervals in parentheses. SP = Standard Plan. *p < 0.05.*

Pediatric Quality Indicator 16 (PDI 16) Gastroenteritis Admission Rate

This metric has a fair amount of imprecision – the values are rather unstable. But overall, pre-implementation values had a slight decline, with a considerable decline during the pandemic, with rates beginning to drift upward immediately prior to implementation. The regression model estimates a statistically significant increase of .54 per 100K children at implementation, with a slightly lower slope leading to a not statistically significant lower rate in December 2022. In addition to the not statistically significant results, the clinical significance of the difference is low.

Figure 0.27 Pediatric Quality Indicator 16 (PDI 16) Gastroenteritis Admission Rate

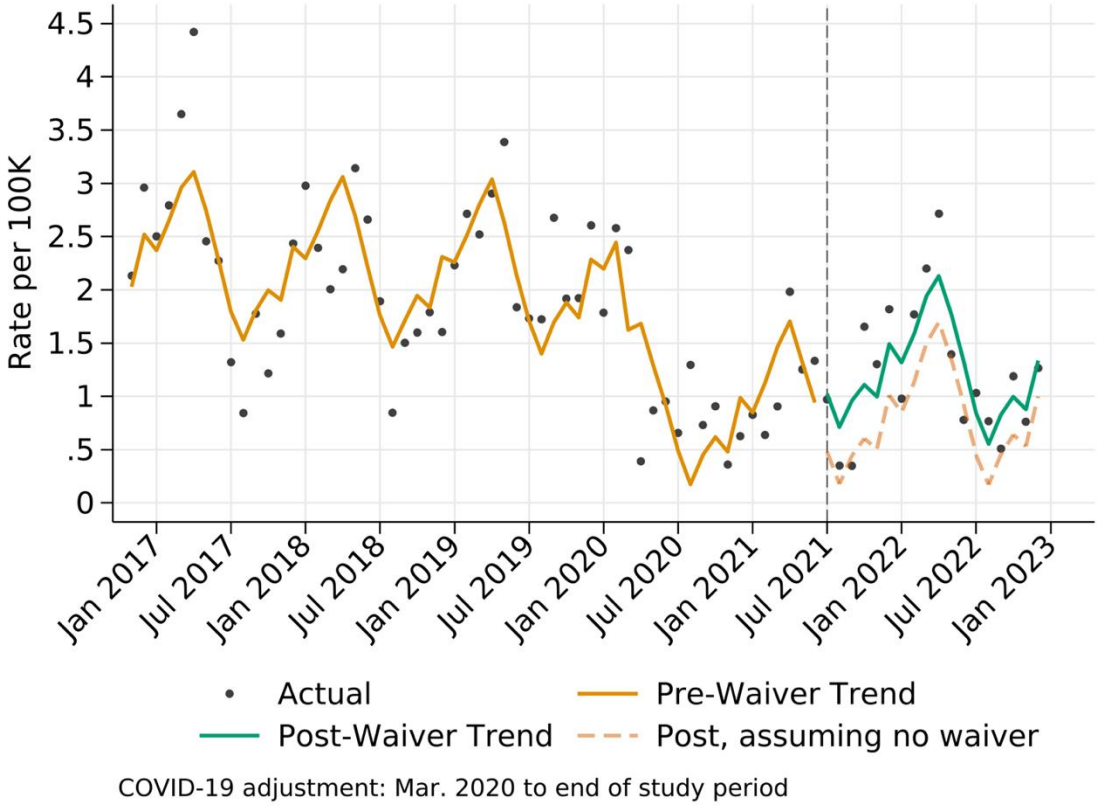


Table 0.21 Pediatric Quality Indicator 16 (PDI 16) Gastroenteritis Admission Rate

	Baseline	SP Waiver Implementation	Difference
Average Predicted Outcome, July 2021	0.9675*	1.5105*	0.543*
	(0.6131, 1.3218)	(1.2276, 1.7934)	(0.0906, 0.9955)
Slope	-0.0057	-0.0181	-0.0124
	(-0.0186, 0.0072)	(-0.0659, 0.0298)	(-0.0586, 0.0339)
Average Predicted Outcome, Dec 2022	0.9867*	1.3196*	0.333
	(0.0173, 1.9561)	(1.0503, 1.5890)	(-0.6815, 1.3475)
N	80,261,898		

*Notes: 95% confidence intervals in parentheses. SP = Standard Plan. *p < 0.05.*

Pediatric Quality Indicator 18 (PDI 18) Urinary Tract Infection Admission Rate

This measure is another preventable admission rate – lower values are better. It shows a slight increase throughout the pre- implementation period. With the low end of .75 per 100,000 lives increasing up to 2.5 at the end of the pre-implementation period. This trend, when extended forward, leads to the projection of 3 to 3.5 admissions per 100,000 in early 2023. At implementation, the rate falls and continues a downward trend throughout 2022 into 2023 where, with only two exceptions, the 14 months after January 2022 are all below the minimum rates in the pre-implementation period (ignoring the very low rate in December 2017).

Figure 0.28 Pediatric Quality Indicator 18 (PDI 18) Urinary Tract Infection Admission Rate

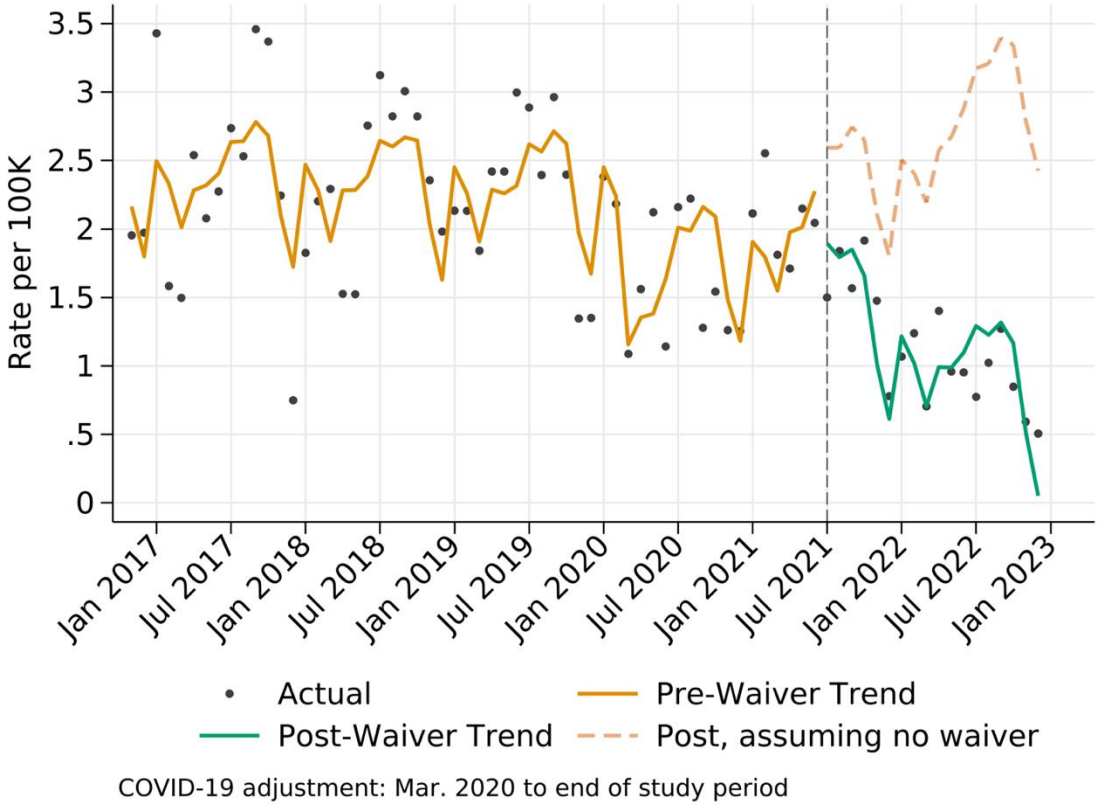


Table 0.22 Pediatric Quality Indicator 18 (PDI 18) Urinary Tract Infection Admission Rate

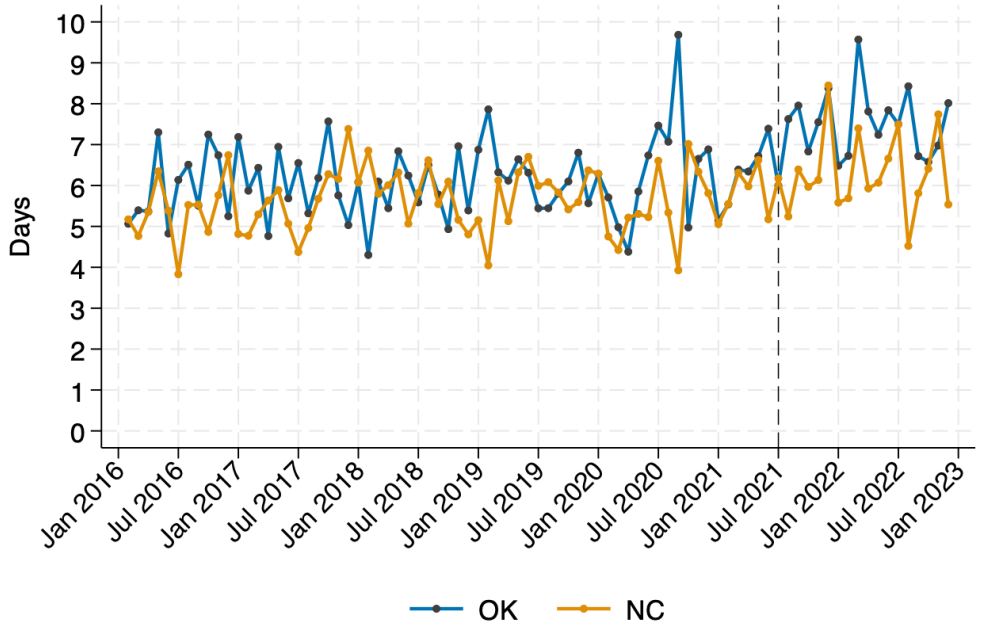
	Baseline	SP Waiver Implementation	Difference
Average Predicted Outcome, July 2021	2.3087*	1.6094*	-0.6993*
	(1.8720, 2.7454)	(1.2894, 1.9294)	(-1.2434, -0.1551)
Slope	-0.0041	-0.1026*	-0.0985*
	(-0.0167, 0.0085)	(-0.1563, -0.0488)	(-0.1507, -0.0462)
Average Predicted Outcome, Dec 2022	3.2208*	0.8477*	-2.3731*
	(2.0719, 4.3697)	(0.5912, 1.1042)	(-3.5455, -1.2006)
N	80,261,898		

*Notes: 95% confidence intervals in parentheses. SP = Standard Plan. *p < 0.05.*

Poor mental health days

We used respondents from Oklahoma (OK) to control for other secular trends during the study period, since OK's Medicaid program didn't implement managed care until almost three years after NC did (April 1, 2024) and thus was still providing coverage that was modeled after NC's program using fee-for service and primary care case management. We found that the number of poor mental health days increased in both states over the study period. After controlling for covariates, we see that NC respondents had 0.7 fewer poor mental health days than OK throughout the time period, but we found no evidence of a change in NC's rates after the launch of SPs.

Figure 0.29 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 0.23 DiD estimates

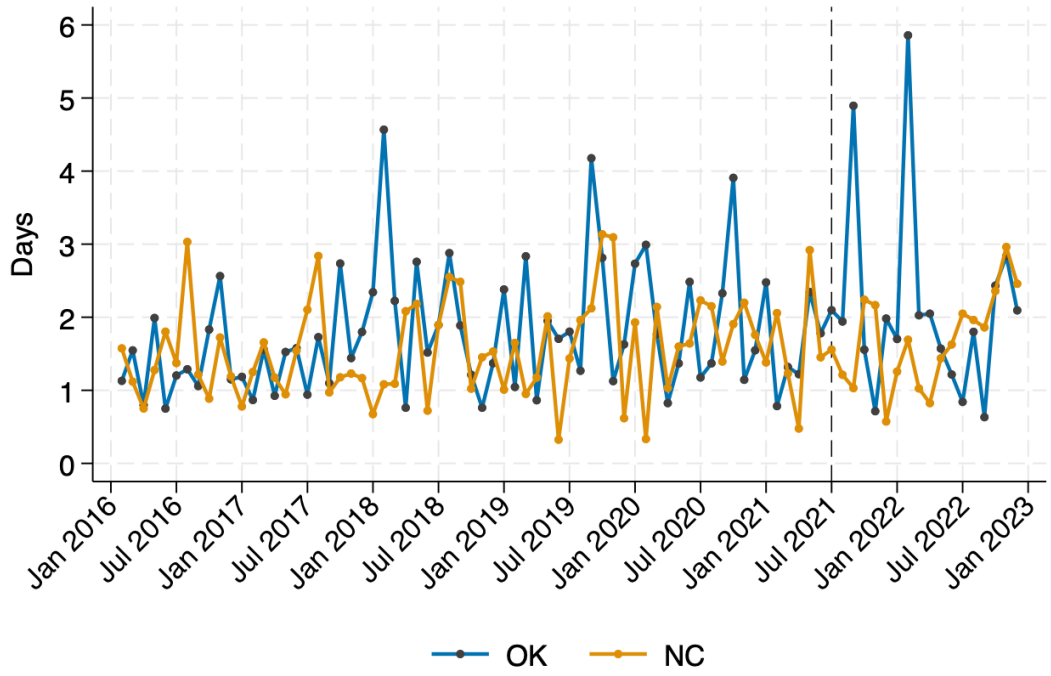
	Unadjusted Model	Adjusted Model
Difference between pre- and post-intervention periods in control group (OK)	1.212*** (0.613, 1.811)	2.291* (0.176, 4.407)
Difference between control (OK) and intervention (NC) groups in the pre-intervention period	-0.699*** (-0.982, -0.417)	-0.584*** (-0.870, -0.299)
DiD estimate (i.e., intervention effect)	-0.722 (-1.602, 0.157)	-0.518 (-1.346, 0.311)
N	22,290	

*Notes: Adjusted model includes sex, age groups, racial categories, income, 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, had a lower household income (< $35,000) and had a valid response to the question. 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. * p<0.05, ** p<0.01, *** p<0.001*

Binge drinking

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 relatively stable throughout 2016 – 2022. Both states looked similar in terms of average number of binge drinking days in the month. There was no discernable change in NC after SP implementation, controlling for trends prior to implementation and trends in OK.

Figure 0.30 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 0.24 DiD estimates

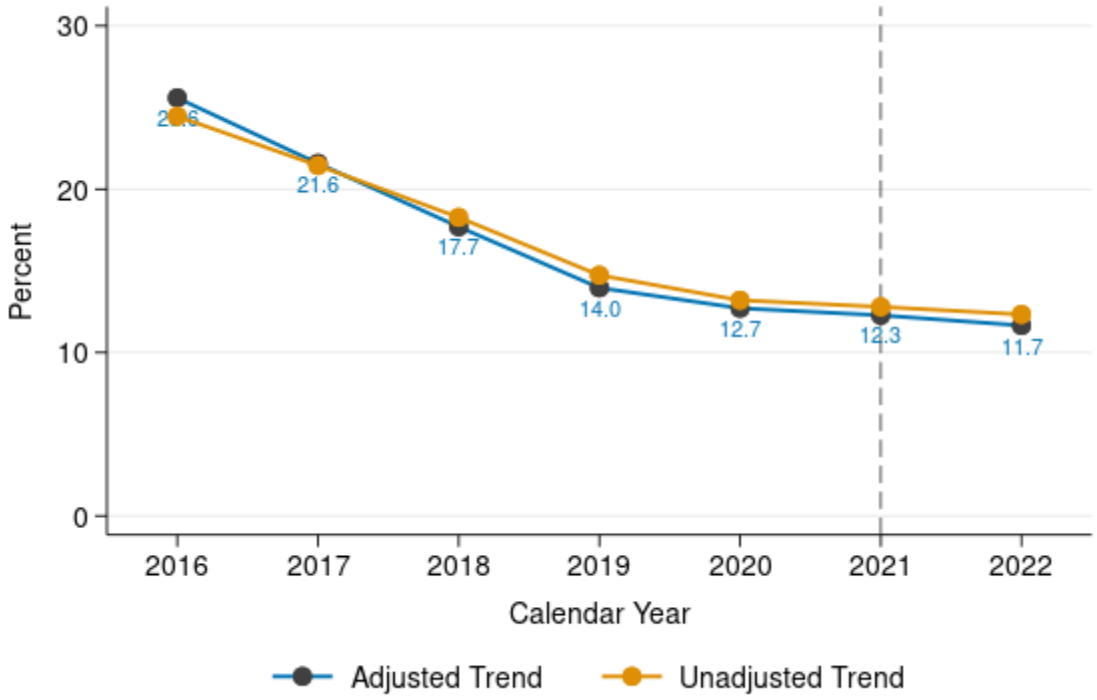
	Unadjusted Model	Adjusted Model
Difference between pre- and post-intervention periods in control group (OK)	0.108 (-0.453, 0.669)	0.518 (-2.048, 3.084)
Difference between control (OK) and intervention (NC) groups in the pre-intervention period	-0.112 (-0.363, 0.139)	-0.216 (-0.469, 0.0373)
DiD estimate (i.e., intervention effect)	0.0665 (-0.688, 0.821)	0.0358 (-0.741, 0.812)
N	6,620	

Notes: Adjusted model includes sex, age groups, racial categories, income, 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, had a lower household income (< $35,000) and had a valid response to the question. 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.

Concurrent Use of Opioids and Benzodiazepines (COB)

The percentage of beneficiaries aged 18 and older with concurrent use of prescription opioids and benzodiazepines has declined since 2016. The steepest decline was between 2016 (25.6%) and 2019 (14.0%). The measure has continued to decline since 2019 but more slowly. In 2022, the measure was 11.7%, the lowest in our analysis period. Lower is better for this metric.

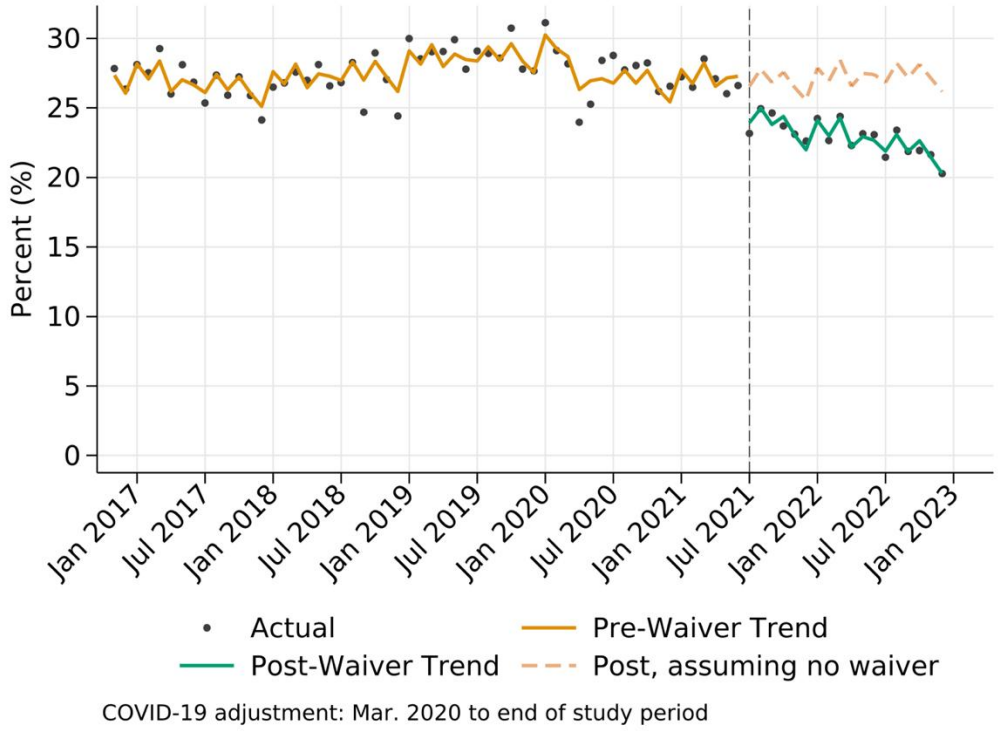
Figure 0.31 Trends in Concurrent Use of Opioids and Benzodiazepines



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 (indicator flags).

Percentage of beneficiaries with access to preventive/ambulatory health services (AAP)

Figure 0.32 Trends in the percent of beneficiaries receiving preventive/ambulatory health services.



Notes: Baseline and SP 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.

The percentage of Medicaid beneficiaries receiving preventive or ambulatory health services in the month just prior to SP implementation was about 28%. This percentage fell to 25% immediately upon implementation and showed a decrease of 2.6 percentage points in July 2021. The trend was increasing very slightly prior to SP implementation. After SP implementation, the trend became negative. By December 2022, the percentage of beneficiaries receiving preventive/ambulatory health services was roughly 6 percentage points lower than expected without SP implementation. Note that this measure is usually calculated at an annual rate, and so is lower than typical measures of this metric. It is, of course, not expected that a beneficiary would have a visit every month. Thus, this result should not necessarily be interpreted as a barrier to access; it may be that more effective management reduced the need for ambulatory visits. Unlike many other metrics, the period immediately prior to the implementation date was relatively steady; the difference between the post-implementation rate and rate projected in the

absence of the implementation is due to the steady decline in actual rates. This is curious and bears further inspection.

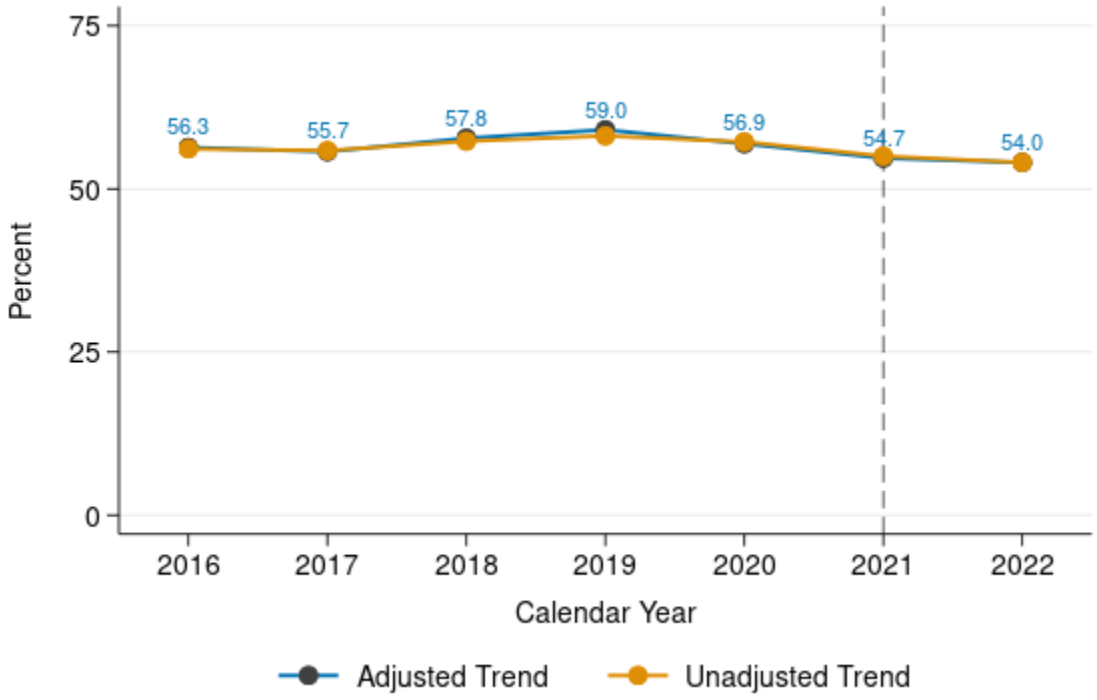
Table 0.25 Percentage of Medicaid beneficiaries receiving preventive/ambulatory health services.

	Baseline	SP Waiver Implementation	Difference
Average Predicted Outcome, July 2021	27.9492*	25.3231*	-2.6261*
	(27.8682, 28.0301)	(25.2578, 25.3883)	(-2.7139, -2.5383)
Slope	0.0299*	-0.162*	-0.1919*
	(0.0273, 0.0325)	(-0.1723, -0.1517)	(-0.2017, -0.1820)
Average Predicted Outcome, Dec 2022	31.1578*	25.2696*	-5.8882*
	(30.9550, 31.3606)	(25.2098, 25.3294)	(-6.0961, -5.6802)
N	29,835,574		

Chlamydia Screening in Women (CHL)

The percentage of women ages 21 to 24 who were identified as sexually active and who had at least one test for chlamydia during the measurement year increased slightly from 2017 (55.7%) to 2019 (59.0%). Since 2019, the measure has declined steadily by about 1.5 percentage points per year. Some of this decline may be due to the national shortage of the reagent used for chlamydia screening that began in the fall of 2020. In 2022 the measure was 54.0%, which is a very minor decrease from the 2021 screening rate

Figure 0.33 Trends in Chlamydia Screening in Women



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 (indicator flags).

Percent of Beneficiaries using Dental Services

Dental visits were carved out of managed care, and so may have had a different effect of SP implementation than other measures. The monthly rate of dental service use (one or more visits) saw a remarkable drop in the early pandemic period, as expected. Overall, the rate recovered after only a few months, by June/July 2020. Little evidence of a time trend is otherwise apparent, but statistically there is a slight downward drift. The post-implementation trend is also statistically negative, but is statistically and qualitatively higher than the pre-implementation trend. We estimate that the roughly half point percentage-point average decrease at implementation persists to a similar effect at January 2023.

Figure 0.34 percent of beneficiaries using dental services

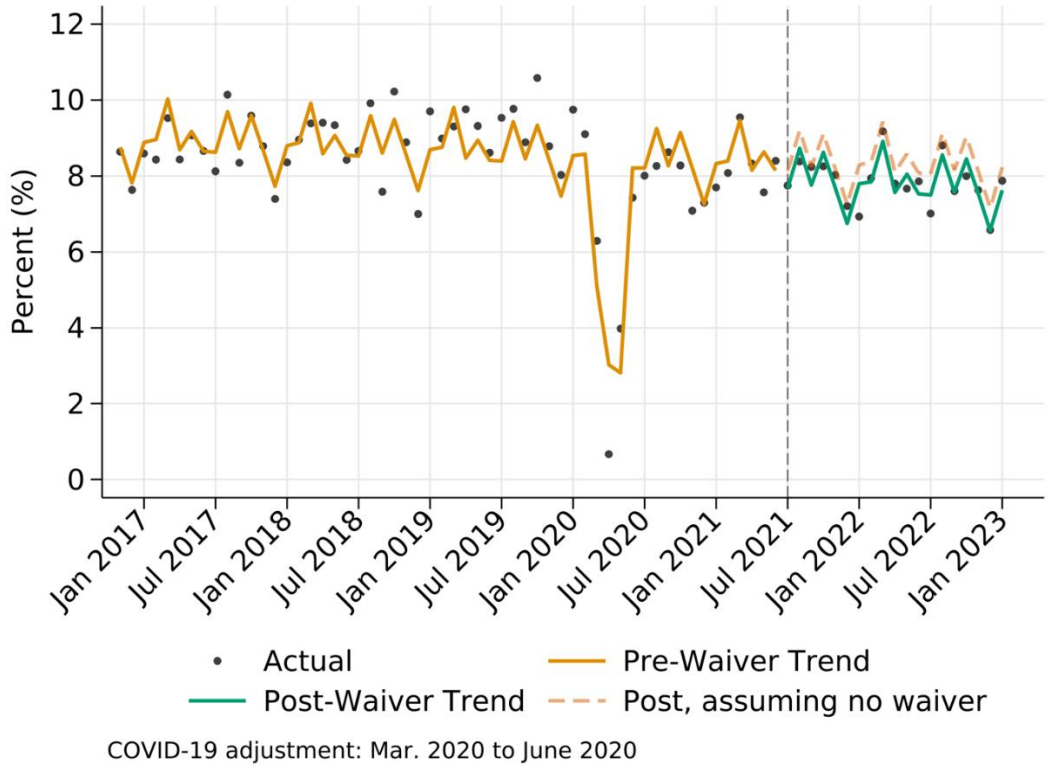


Table 0.26: percent of beneficiaries using dental services

	Baseline	SP Waiver Implementation	Difference
Average Predicted Outcome, July 2021	8.3934*	7.9355*	-0.4579*
	(8.3487, 8.4380)	(7.8862, 7.9847)	(-0.5090, -0.4068)
Slope	-0.0122*	-0.0204*	-0.0082*
	(-0.0134, -0.0110)	(-0.0242, -0.0166)	(-0.0123, -0.0041)
Average Predicted Outcome, Jan 2023	8.1744*	7.5687*	-0.6058*
	(8.1116, 8.2373)	(7.5220, 7.6153)	(-0.6780, -0.5336)
N	24,010,410		

*Notes: 95% confidence intervals in parentheses. SP = Standard Plan. *p < 0.05.*

Appropriate Testing for Pharyngitis (CWP)

This measure assesses the percentage of episodes for members 3 years of age and older with a diagnosis of pharyngitis (sore throat), which are dispensed as an antibiotic and receive a group A streptococcus test for the episode. A higher rate indicates appropriate testing that should be conducted before antibiotic treatment is given and thus a higher level is preferred. The rate in the figure is relatively high but generally flat, with an upward trend slightly more evident in the post-implementation period. The decrease during the pandemic onset is highly evident, with a decrease of nearly 20 percentage points from March 2020 to April 2020. Statistically, the post-implementation trend is higher than the pre-implementation trend, which means a stable increase between the post-implementation result and the projected value in the absence of the waiver. The higher trend means there is a statistical difference between the post-implementation and the projected in February 2023.

Figure 0.35 appropriate testing for pharyngitis

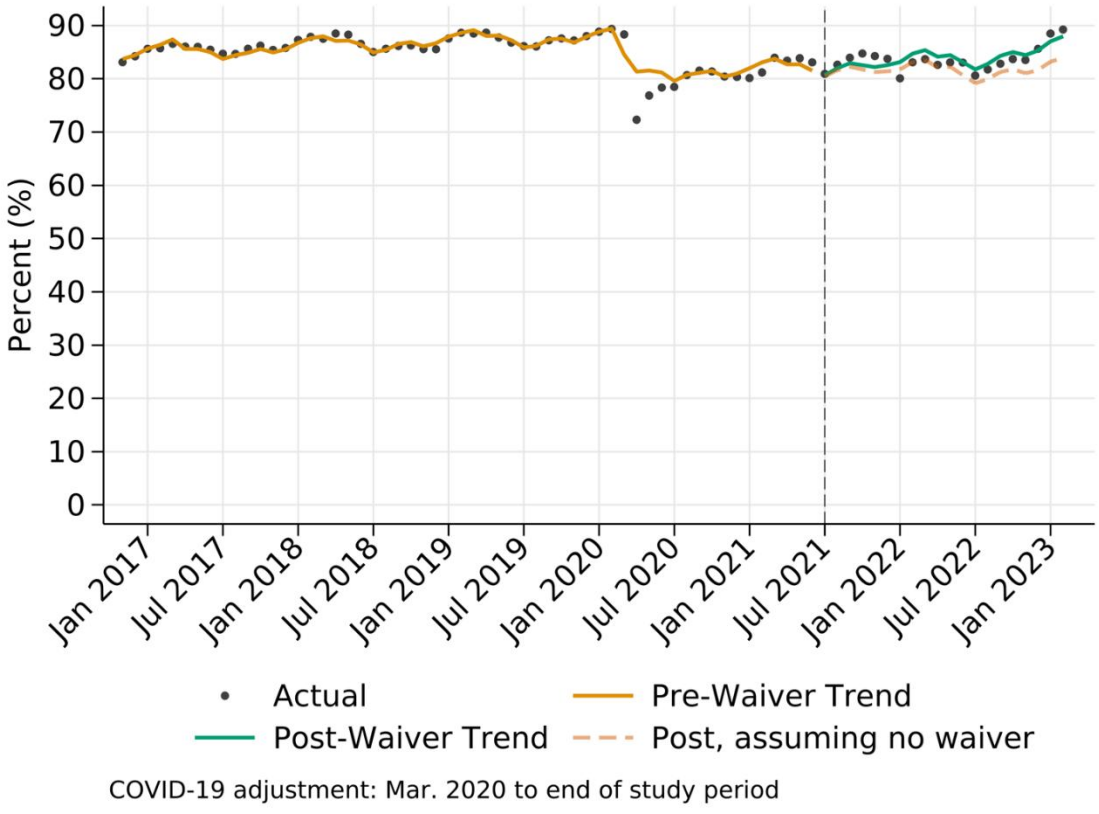


Table 0.27 appropriate testing for pharyngitis

	Baseline	SP Waiver Implementation	Difference
Average Predicted Outcome, July 2021	82.7754*	82.9535*	0.1781
	(82.1569, 83.3939)	(82.5132, 83.3939)	(-0.5730, 0.9292)
Slope	0.0849*	0.2882*	0.2033*
	(0.0759, 0.0939)	(0.2191, 0.3573)	(0.1347, 0.2719)
Average Predicted Outcome, Feb 2023	82.806*	86.8468*	4.0408*
	(81.0909, 84.5210)	(86.5497, 87.1438)	(2.3060, 5.7755)
N	569,243		

*Notes: 95% confidence intervals in parentheses. SP = Standard Plan. *p < 0.05.*

Pediatric Quality Indicators #15 (PDI 15): Diabetes Short-term Complications Admission Rate

This measure calculates the rate of admission for a preventable condition among the pediatric population – for short-term complications from diabetes that require admission (e.g. ketoacidosis). An effective healthcare system will have low values for this, as it is something that is better managed in outpatient settings. Thus, the pattern shown here – an unequivocal reversal in trend and declining values – is one of the strongest results for the managed care transformation in this report.

Prior to Waiver implementation, admissions due to diabetes short-term complications ranged from about 0.004% (4 per 100,000) to 0.007%, and had a statistically flat trend prior to COVID-19. The average predicted admission rate in July 2021 was 0.0022 percentage points lower than expected, suggesting the Waiver implementation was associated with a small immediate decrease in preventable diabetes admissions among pediatric beneficiaries. The post-implementation trend was a steeper negative trend than that prior to the Waiver implementation, with an estimated monthly decrease of -0.0022%, which was statistically significantly different from 0. Overall, predicted diabetes admissions were projected to be 0.0092% in the absence of the waiver (92 per 100,000) and 0.0027% (2.7 per 100,000) in the presence of the Waiver implementation. This represents a 75% decrease over expected admissions for short-term diabetes complications. It is important to note, however, that this is a rare outcome, and thus a few admissions could affect the rate considerable. Because of its rarity, the implications across a broad population are smaller, although, obviously, very important to the children who “avoided” an admission.

Figure 0.36 Pediatric Quality Indicators #15 (PDI15): Diabetes Short-term Complications Admission Rate

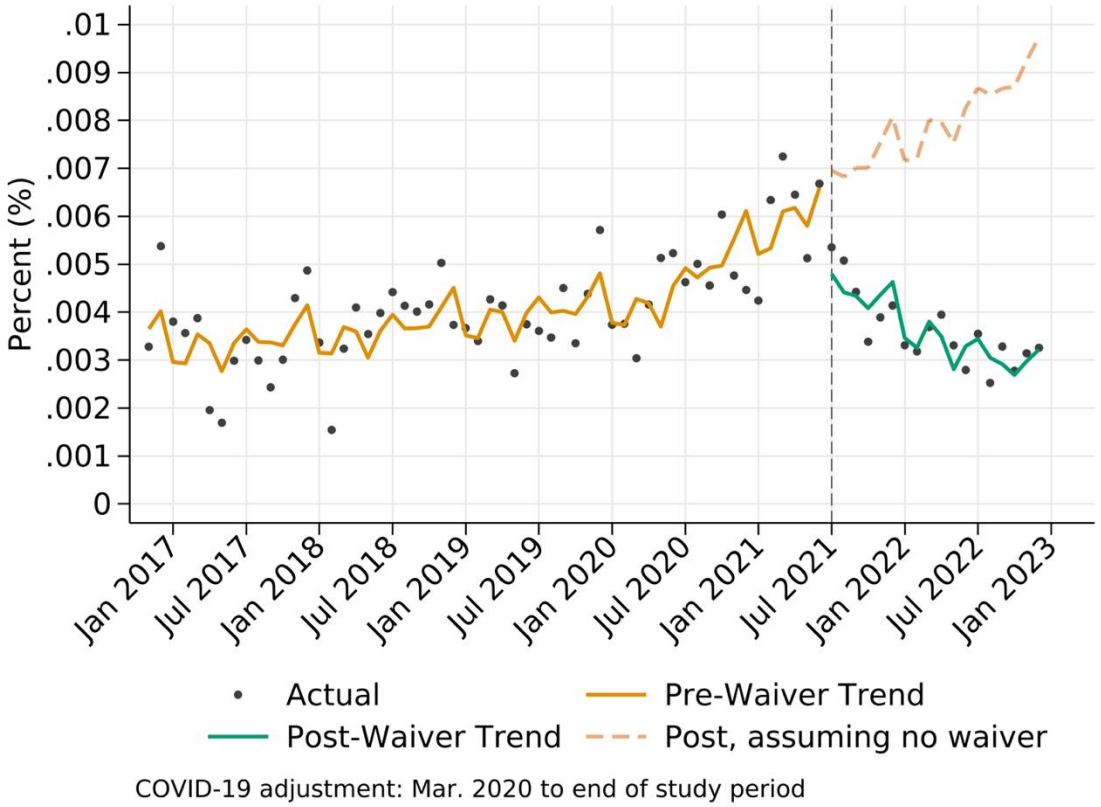


Table 0.28 Pediatric Quality Indicators #15 (PDI15): Diabetes Short-term Complications Admission Rate

	Baseline	SP Waiver Implementation	Difference
Average Predicted Outcome, July 2021	0.0065*	0.0044*	-0.0022*
	(0.0056, 0.0075)	(0.0037, 0.0051)	(-0.0033, -0.0010)
Slope	0.0000	-0.0002*	-0.0003*
	(-0.0000, 0.0000)	(-0.0004, -0.0001)	(-0.0004, -0.0001)
Average Predicted Outcome, Dec 2022	0.0092*	0.0027*	-0.0065*
	(0.0067, 0.0116)	(0.0021, 0.0033)	(-0.0090, -0.0040)
N	53,936,713		

*Notes: 95% confidence intervals in parentheses. SP = Standard Plan. *p < 0.05.*

Plan All-Cause Readmissions (PCR)

The all-cause (observed) readmission rate gives the percent of hospitalized beneficiaries who were re-hospitalized within 30 days and captures the ability of the healthcare system to keep the beneficiary from being readmitted to the hospital. Lower is better for this metric. There is a notable downward drift to the metric after managed care implementation; the estimated difference of 5.16 by March 2023 is nearly a 50 percent reduction from the estimated rate without Transformation.

Figure 0.37 Plan All-Cause Readmissions (PCR)

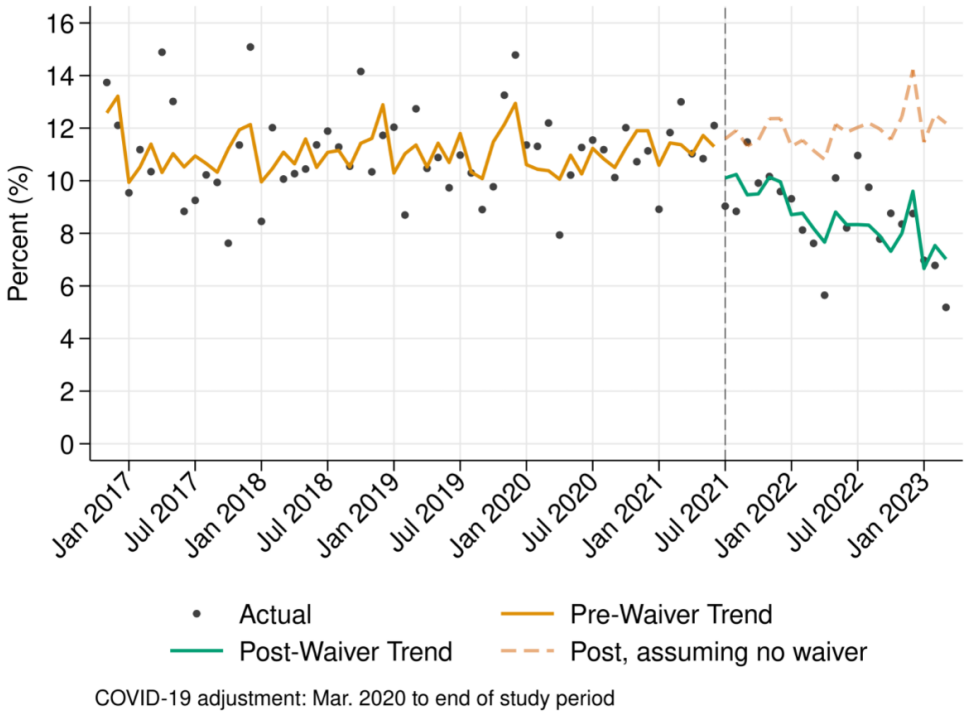


Table 0.29 Plan All-Cause Readmissions (PCR)

	Baseline	SP Waiver Implementation	Difference
Average Predicted Outcome, July 2021	11.5541*	10.0637*	-1.4903
	(9.9439, 13.1643)	(8.8176, 11.3099)	(-3.5302, 0.5496)
Slope	-0.0109	-0.1949	-0.184
	(-0.0548, 0.0329)	(-0.3995, 0.0098)	(-0.3837, 0.0158)
Average Predicted Outcome, Mar 2023	13.1487*	7.9793*	-5.1694*
	(8.2351, 18.0622)	(6.8174, 9.1412)	(-10.2075, -0.1313)
N	35,367		

*Notes: 95% confidence intervals in parentheses. SP = Standard Plan. *p < 0.05.*

Pregnancy Risk Screening

Pregnancy risk screening had a flat (technically, positive and statistically significant but very small) trend prior to waiver implementation and COVID-19 onset, though it did begin to decrease during COVID-19. At the time of implementation in July 2021 there was no apparent immediate effect of the waiver. During implementation, the trend became significantly zero. By February 2023, 44.37% of pregnancies were estimated to be receiving risk screening, which was about the same as the projected value of 45.51% in the absence of the waiver.

Figure 0.38 Pregnancy Risk Screening

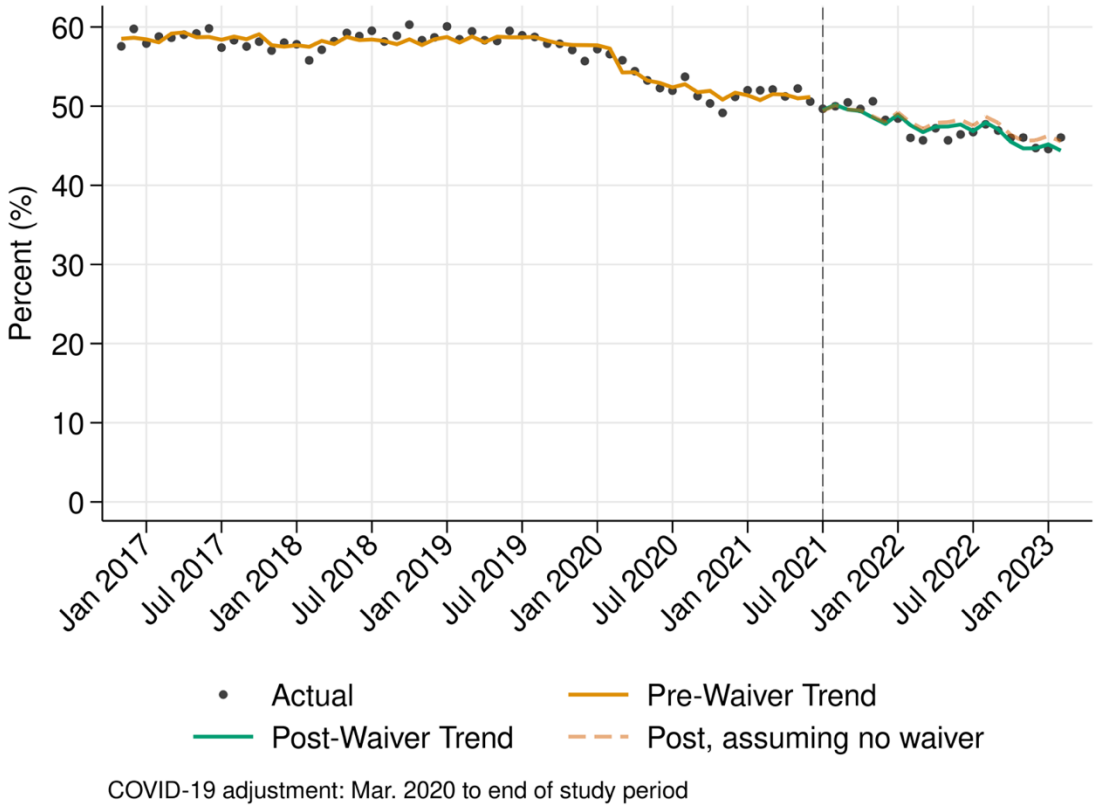


Table 0.30 Pregnancy Risk Screening

	Baseline	SP Waiver Implementation	Difference
Average Predicted Outcome, July 2021	50.6816*	50.7953*	0.1137
	(49.9469, 51.4163)	(50.2007, 51.3898)	(-0.8463, 1.0736)
Slope	0.0312*	-0.0349	-0.0661
	(0.0130, 0.0494)	(-0.1280, 0.0582)	(-0.1575, 0.0253)
Average Predicted Outcome, Feb 2023	45.5109*	44.3687*	-1.1422
	(43.3946, 47.6271)	(43.7547, 44.9827)	(-3.3282, 1.0438)
N	300,569		

*Notes: 95% confidence intervals in parentheses. SP = Standard Plan. *p < 0.05.*

Use of Imaging Studies for Low Back Pain

This metric plots the percentage of beneficiaries who have a primary diagnosis of low back pain and did *not* have an imaging study, such as an X-ray, an MRI, or a CT scan within 28 days of the diagnosis. Evidence has shown that such imaging is typically not warranted and may unnecessarily increase costs, thus higher values (not receiving imaging) are better. Pre-implementation, this measure has a small slope of -0.03 that is statistically significant different from zero. At the point of implementation in July 2021, the model identifies a decrease of approximately 2.6 percentage points in the measure. The pre-implementation slope of -0.3 reverses sign post-implementation to .17 percentage point per month; the change is statistically significant. The higher trend leads to the observed 71.99 percentage points in February 2023 compared to the projected counterfactual of 71.26 percentage points, a difference of .73 percentage points that is not statistically significant.

Figure 0.39 Use of Imaging Studies for Low Back Pain

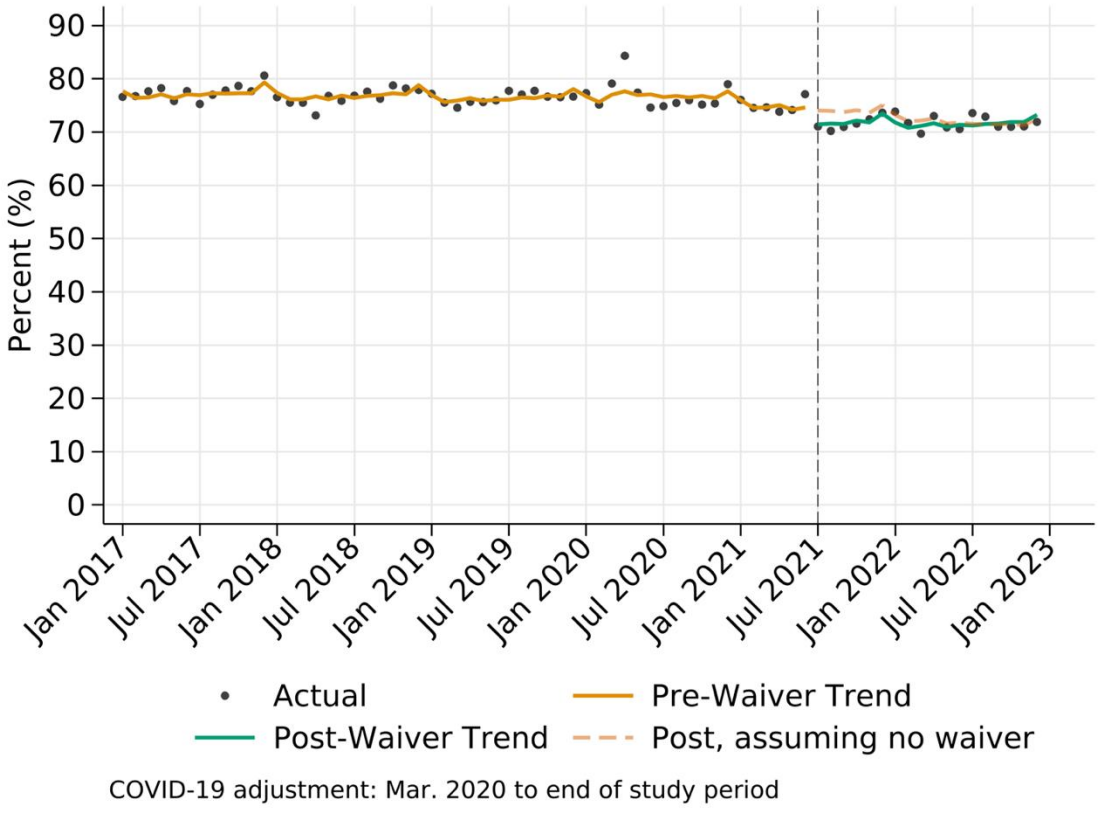


Table 0.31 Use of Imaging Studies for Low Back Pain

	Baseline	SP Waiver Implementation	Difference
Average Predicted Outcome, July 2021	74.5605*	71.9649*	-2.5955*
	(73.6782, 75.4428)	(70.9177, 73.0121)	(-3.9800, -1.2110)
Slope	-0.0287*	0.1671*	0.1958*
	(-0.0545, -0.0028)	(0.0234, 0.3107)	(0.0547, 0.3368)
Average Predicted Outcome, Dec 2022	71.2615*	71.994*	0.7324
	(68.7981, 73.7249)	(70.9896, 72.9984)	(-1.9269, 3.3918)
N	151,097		

*Notes: 95% confidence intervals in parentheses. SP = Standard Plan. *p < 0.05.*

Qualitative Findings

The qualitative evaluation highlights the experiences before and during the first two years of the transition to managed care, providing insights into provider, PHP, and beneficiary perceptions of access to and quality of healthcare. Participants from healthcare organizations shared barriers due to PCP assignment, prior authorization, and the availability of specialists who accept Medicaid or certain PHPs, which prevent them from providing timely care to their patients. Improvement in these barriers was reported during the second year (2023) of transition for some PHPs. Participating beneficiaries consistently reported better access to PCPs but faced challenges finding specialists and accessing prescription medications. The detailed results are reported below.

a. Provider perception of the impact on healthcare access leading up to managed care transition

Qualitative findings from before the transition to Medicaid managed care (2020-2021) showed that participants from healthcare organizations understood the goals of the transition and could foresee how it might improve the quality of care in the future. However, several participants shared concerns about patient access to care and care continuity during the transition. Many participants expressed concerns that patient care may be delayed due to unawareness of the transition among their patients and issues with auto-enrollment and PCP assignment. Some participating healthcare organizations and PHPs expressed concerns about specialists contracting with fewer PHPs or not contracting at all because of the administrative requirements, which could lead to access issues for beneficiaries. A health system leader described the impact of specialists not contracting on patient access as follows:

> So, even if they get auto-enrolled to a plan that we're in—let's just say—one of their specialists did not sign that contract, right?... Then what happens to that piece when they [patients] need specialty or subspecialty services and are now out of network? And we don't have complete visibility into which specialists are in which networks at this point, so we don't even have the ability from a primary care standpoint to start to figure out how to communicate to somebody that there isn't an orthopedic physician that's in the network in this area.

Participants from healthcare organizations shared how they proactively worked to alleviate these concerns about access to healthcare. First, they took additional steps to share DHHS resources about the transition with their patients and educate them about different PHPs. Second, several participants from healthcare organizations decided to contract with all PHPs to maintain care continuity. Third, because some specialty practices had not contracted with all PHPs, primary care practices started identifying in-network specialists for referral at more distant geographic locations to prevent care delays.

b. Provider perception of the impact on healthcare access during the first two years of transition (July 2021 to May 2023)

Findings from 2022 interviews with healthcare organizations highlighted several challenges when working with the PHPs that contributed to administrative burden and impacted patient access to care. The major challenges described were attribution errors (incorrect list of beneficiaries on the provider panel), prior authorizations, and referrals. Early findings from 2023 showed improvements in administrative processes (e.g., attribution and prior authorization) and care delivery (e.g., referrals) compared to the previous years of the transition. However, some concerns remained, causing delays in patient care.

Many participants described having patients on their panel who were not theirs before the transition or losing their patients because they were assigned to other PCPs. Many participants described working with their patients to correct PCP assignments to ensure care continuity. The prior authorization process was a major hurdle to accessing healthcare services in 2022 and 2023 data. Participants described how each PHP handled prior authorization for the same medications or services differently, causing delays in access to care. They described the services and medications that Medicaid previously approved or did not require prior authorization as either not approved or requiring prior authorization under the PHPs, creating frustrations for providers and patients. A medical director at a health-system-affiliated practice described their frustration as:

> It seems that every EpiPen now requires prior authorization, which is just an insane waste of time. I mean, there isn't a workaround. It's a life-saving and emergent treatment. And why am I delaying? If I think this kid needs an EpiPen, I want them to have it in their hands today because they just experienced a peanut allergy and reaction. I want them to have it. Why am I then having to jump these hoops to go through this process? That's the most frustrating one.

This concern slightly improved in 2023, but prior authorization was still an issue for some PHPs. An owner and a provider of a pediatric practice described this frustration as:

> But it has created a lot more administrative burden. For example, prior authorizations have just been a nightmare. One of our good examples is the babies who need their RSV vaccine, their SYNAGIS vaccine. Each PHP has a completely different process for how that preapproval happens. For some of them, it was pretty straightforward and seamless, while for others, it was a nightmare.

Similar concerns were shared about referrals in both years, as referrals became even more difficult after the transition. The commonly reported specialists that were hard to find included mental health providers,

cardiologists, neurologists, otolaryngologists, gastroenterologists, dermatologists, and dentists. An administrator for an FQHC summed it as:

> It is almost impossible to get a specialist to see a Medicaid patient. One, a lot of them are not contracted with all the plans or stopped accepting Medicaid patients altogether... Medicaid was never a great payer, but it was an easy payer...You didn't have to have approval to send somebody to a specialist. And now, all of those things are added to it.

Preserving access to Medicaid patients was a key consideration for health organization leadership when deciding whether to maintain PHP contracts in 2022 and 2023. A medical director from a health-system-affiliated practice suggested, "not taking all PHPs…is creating a gap for patients" and, therefore, a disruption in access to care. As a result, most participants from healthcare organizations decided to continue contracting with all five PHPs. Most participants described their commitment to providing quality patient care despite the administrative challenges of dealing with five PHPs. The organizational mission akin to "serving all patients regardless of their insurance status" was cited by FQHCs, LHDs, and some health systems as an essential decision-making factor to contract with all PHPs despite the challenges of working with Medicaid health plans. For other participants, the administrative burdens are so significant that there are barriers to providing basic levels of care. This leaves providers uncertain if they will continue contracting with PHPs. As one provider from an independent pediatric practice noted:

> I don't want to say that [patients] are not given the best care, but if there's roadblock after roadblock in patient care or it takes double the amount of time for me to send a claim to that company compared to another company, then it's at some point just not worth it for us.

c. Beneficiary experiences of accessing healthcare after the transition

Early results from beneficiary interviews and a focus group in 2023 suggest mixed experiences when accessing primary and specialty care. Some participants described no difference in accessing care after transitioning to managed care. Others described new co-pays, not having medications covered, and limitations to where they can access care.

Most participating beneficiaries could keep the same PCP they had before the transition, but a few reported issues with the PCP assignment, which took several calls to be corrected. A few participants described difficulty accessing their PCP due to the co-pay after the transition and the lack of after-hours services offered by the PCP, making it hard for them to take time off from work. Many participants described working closely with their PCPs to identify in-network specialists and were satisfied with the services they received. Many of these participating beneficiaries had established PCPs before the transition

to managed care and saw specialists within the same health system as their PCP, which made finding specialists easy. An adult beneficiary described their experience as:

> Medicaid has covered everything. I've had a baby, and I had gallbladder surgery to get it removed. Um, and then it covered all of my follow-up appointments.

However, some reported dissatisfaction and challenges accessing specialty services (e.g., mental health, ophthalmology, dentistry) or medications. They described being "given the run-around" when figuring out which specialists are covered. These participants reported needing services or referrals to places that are out-of-network with their PHP. A few caregivers described waiting to see a specialist only to find out at the visit that they do not take the plan, resulting in out-of-pocket expenses. More work is needed to determine the causes of the variation in accessing specialty services by Medicaid beneficiaries.

Some participants shared barriers they faced in getting their medications on time. They described the ease of getting prior authorization before the transition and how it had become difficult, resulting in long waits for medications and out-of-pocket expenses. A participant with Type I diabetes caring for a child with asthma described issues with accessing medication as:

> So, there may be three or four days you go without medication because you're still waiting for a representative to return your phone call if you had to leave a message if they were busy. Or the representative at the time wasn't sure what was in your plan, so they needed to look and give you a callback.

Overall, participants from healthcare organizations shared barriers due to PCP assignment, prior authorization, and the availability of specialists, which prevent them from providing timely access to their patients. Ultimately, patient care is affected, or patients are denied care. If providers choose not to contract with plans moving forward, beneficiaries' access options could be diminished. Similarly, beneficiaries consistently reported challenges in finding specialists and out-of-pocket expenditures for out-of-network referrals, which can deter healthcare access.

Hypothesis 1.2: 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.

While care for beneficiaries with severe behavioral health disorders have not yet been brought under Tailored Plans, care for many mental illnesses and substance use disorders are provided by SPs for those beneficiaries that enrolled in a managed care plan. Therefore, behavioral health service use is also expected to increase in terms of access to high quality care and improved behavioral health outcomes. We examined a variety of metrics, capturing the experience of different populations served by Medicaid, to measure improvement in these domains and examine a few subpopulation strata.

We found significant progress by SPs in engaging beneficiaries with behavioral health needs in care in 9 of 30 metrics. Six measures of behavioral health care and quality worsened, however, even after adjusting for COVID-19 effects. The remaining 15 metrics showed no difference between the pre- and post- SP implementation periods.

Table 0.32 Summary of Metric Results for Hypothesis 1.2

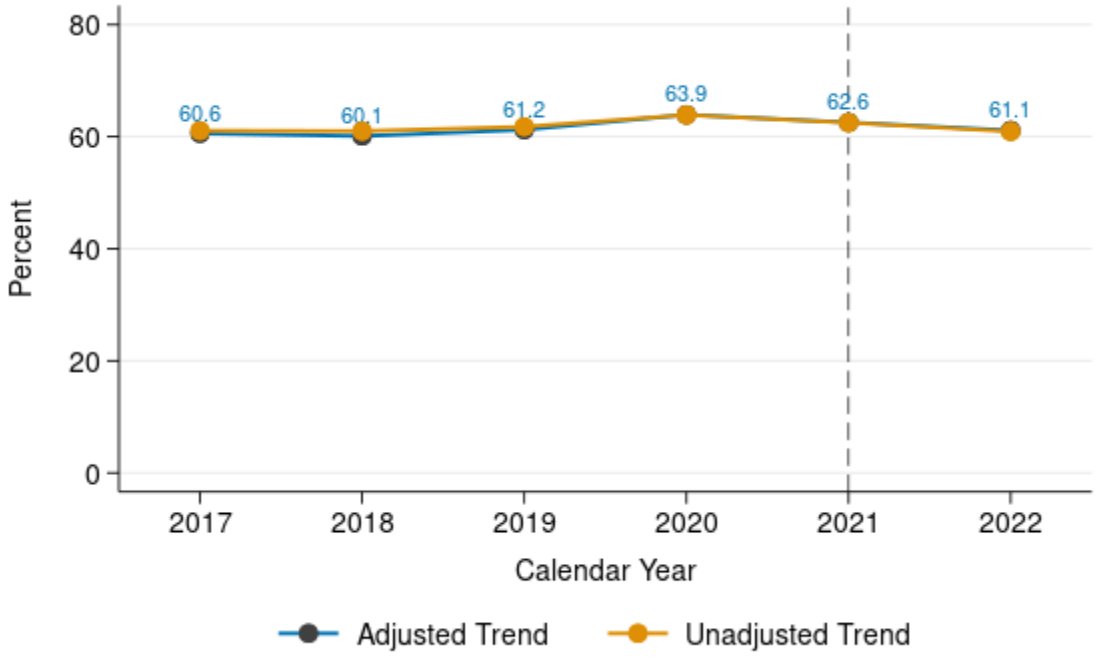
SP/AMH Measure Set	Measure (Metric abbreviation)	Adjusted waiver effects at endpoint	Progress * (Yes/No/No difference)
	Adherence to Antipsychotic Medications for Individuals with Schizophrenia (SAA)	--	Worsened
	Antidepressant Medication Management (AMM) – Acute phase	4.0% pts	Improved
	Antidepressant Medication Management (AMM) – Continuation phase	3.9% pts	Improved
	Metabolic Monitoring for Children and Adolescents on Antipsychotics (APM) – percent receiving blood glucose testing	-3.9% pts	Worsened
	Metabolic Monitoring for Children and Adolescents on Antipsychotics (APM) – percent receiving cholesterol testing	-2.2% pts	Worsened
SP	Use of First Line Psychosocial Care for Children and Adolescents on Antipsychotics (APP)	3.1% pts (NS)	No Difference
SP	Follow-up After Hospitalization for Mental Illness (FUH) by MH providers within 7 days after discharge	3.9% pts	No Difference
SP	Follow-up After Hospitalization for Mental Illness (FUH) by MH providers within 30 days after discharge	9.3% pts (NS)	No Difference
	Follow-up After Hospitalization for Mental Illness (FUH) by primary care providers within 7 days after discharge	-4.7% pts	No Difference
	Follow-up After Hospitalization for Mental Illness (FUH) by primary care providers within 30 days after discharge	-9.1% pts (NS)	No Difference
	Follow-up After Hospitalization for Mental Illness (FUH) with enhanced BH services within 7 days after discharge	2.1% pts	Improved
	Follow-up After Hospitalization for Mental Illness (FUH) with enhanced BH services within 30 days after discharge	4.8% pts	Improved
	Follow-up After Hospitalization for Mental Illness (FUH) by any type of providers within 7 days after discharge	4.5% pts (NS)	No Difference
	Follow-up After Hospitalization for Mental Illness (FUH) by by any type of providers within 30 days after discharge	6.3% pts (NS)	No Difference
SP	Follow-up Care for Children Prescribed ADHD Medication (ADD)	-4.4% pts (NS)	No Difference

	Initiation of Alcohol Abuse or Dependence Treatment (IET)	1.1% pts	Improved
	Engagement in Alcohol Abuse or Dependence Treatment (IET)	-0.4% pts (NS)	No Difference
	Initiation of Opioid Use Treatment (IET)	4.8% pts	Improved
	Engagement in Opioid Use Treatment (IET)	4.8% pts	Improved
	Initiation of Other Drug Use Treatment (IET)	2.0% pts (NS)	No Difference
	Engagement in Other Drug Use Treatment (IET)	0.9% pts (NS)	No Difference
	Initiation of any type of Substance Use Treatment (IET)	5.1% pts	Improved
	Engagement in any type of Substance Use Treatment (IET)	5.8% pts	Improved
	Follow-Up After Emergency Department Visit for Alcohol and Other Drug Abuse or Dependence (FUA) within 7 days	-4.9% pts (NS)	No Difference
	Follow-Up After Emergency Department Visit for Alcohol and Other Drug Abuse or Dependence (FUA) within 30 days	-6.6% pts (NS)	No Difference
	Follow-Up After Emergency Department Visit for Mental Illness (FUM) within 7 days	-9.6% pts (NS)	No Difference
	Follow-Up After Emergency Department Visit for Mental Illness (FUM) within 30 days	-7.4% pts (NS)	No Difference
	Continuity of Pharmacotherapy for OUD (POD / SUD22)	--	Worsened
	Use of Behavioral Health Care for People with SMI/SUD/SED	-3.5% pts	Worsened
	Access to Preventive/Ambulatory Health Services) among beneficiaries with SUD (SUD32)	-2.2% pts	Worsened

Adherence to antipsychotic medications for individuals with schizophrenia (SAA)

The percentage of beneficiaries ages 18 and older during the measurement year with schizophrenia or schizoaffective disorder who were dispensed and remained on an antipsychotic medication for at least 80 percent of their treatment period held constant at about 60-61% between 2017 and 2019. The measure peaked at 63.9% in 2020. It declined slightly to 61.1% in 2022, a similar level to the pre-COVID period. Note, for this metric, the sample included people who were ever enrolled in a Standard Plan.

Figure 0.40 Trends in adherence to antipsychotic medications for individuals with schizophrenia



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 (indicator flags).

Antidepressant Medication Management (AMM): Effective Acute Phase Treatment

This measure sees a steady upward drift through the pre-implementation phase with some evidence of a pandemic increase in spring of 2020. At implementation there's a slight (not statistically significant) increase in the trend, but the increase in July 2021 is a statistically significant 2.2 percentage points. The projected rates largely follow the actual rates, although a slightly larger post-implementation trend means that the increase post-implementation steadily increase throughout the period to a statistically significant difference of 4.05 percentage points in June 2022, when the measure ends. This measure requires a 231 day look forward period and therefore this measure was only calculated through June 2022.

Figure 0.41 Antidepressant Medication Management (AMM): Effective Acute Phase Treatment

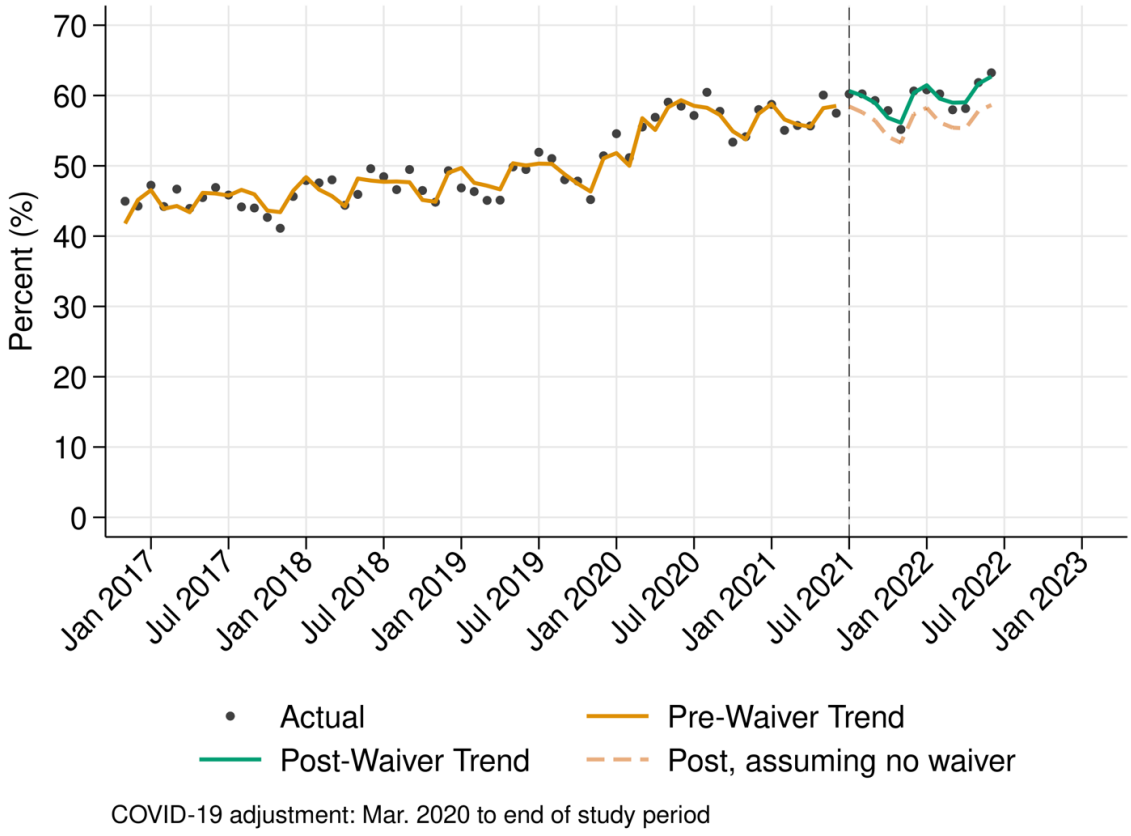


Table 0.33 Antidepressant Medication Management (AMM): Effective Acute Phase Treatment

	Baseline	SP Waiver Implementation	Difference
Average Predicted Outcome, July 2021	57.9351*	60.1252*	2.1901*
	(56.6297, 59.2405)	(58.7760, 61.4744)	(0.2186, 4.1615)
Slope	0.1397*	0.3088*	0.1691
	(0.1003, 0.1791)	(0.0635, 0.5541)	(-0.0740, 0.4122)
Average Predicted Outcome, Jun 2022	58.706*	62.7559*	4.0499*
	(55.9478, 61.4642)	(61.3388, 64.1731)	(1.0743, 7.0256)
N	83,282		

*Notes: 95% confidence intervals in parentheses. SP = Standard Plan. *p < 0.05.*

Antidepressant Medication Management (AMM): Effective Continuation Phase Treatment

The pattern for this measure is similar to its companion measure which measures performance during the acute phase of treatment: an increase throughout the pre-implementation period, with a notable increase at implementation and similar post-implementation trends. The differences between the post-implementation and projected rates in the absence of the waiver are roughly four percentage points, roughly equal to the improvement over two years. Because this measure is tied to the date of the diagnosis and looks ahead for changes in care, the data points appear to end earlier than other metrics.

Figure 0.42 Antidepressant Medication Management (AMM): Effective Continuation Phase Treatment

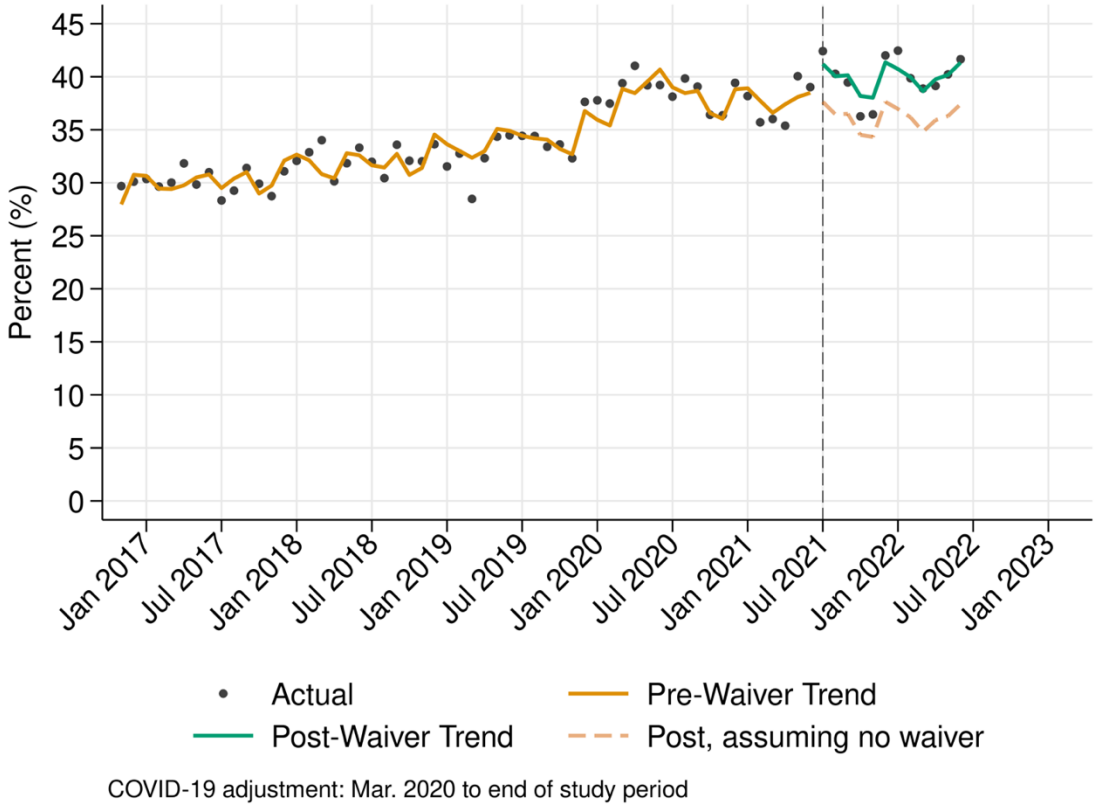


Table 0.34 Antidepressant Medication Management (AMM): Effective Continuation Phase Treatment

	Baseline	SP Waiver Implementation	Difference
Average Predicted Outcome, July 2021	38.4215*	41.9867*	3.5653*
	(37.1534, 39.6895)	(40.6615, 43.3119)	(1.6449, 5.4856)
Slope	0.1411*	0.1734	0.0323
	(0.1045, 0.1777)	(-0.0671, 0.4139)	(-0.2064, 0.2710)
Average Predicted Outcome, Jun 2022	38.2715*	42.1925*	3.921*
	(35.5862, 40.9568)	(40.7899, 43.5951)	(1.0152, 6.8268)
N	83,282		

*Notes: 95% confidence intervals in parentheses. SP = Standard Plan. *p < 0.05.*

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Metabolic Monitoring for Children and Adolescents on Antipsychotics (APM): Glucose test

This metric fell dramatically during the early pandemic period and recovered to pre-pandemic levels by late summer 2020, surpassing historical values by early 2021. This increase leads to a projected long-term positive trend that was not sustained post-implementation. There is a slight downward shift for May and June 2021, leading to a sizable "immediate" implementation effect of over 1.1 percentage points. A statistically negative trend post-implementation, combined with a flat pre-implementation trend, leads to a rapidly expanding gap between projected and realized outcomes post-implementation. This pre-implementation trend, notably, is quite steep and is possibly an artifact of the pandemic recovery.

Figure 0.43 Metabolic Monitoring for Children and Adolescents on Antipsychotics (APM): Glucose test

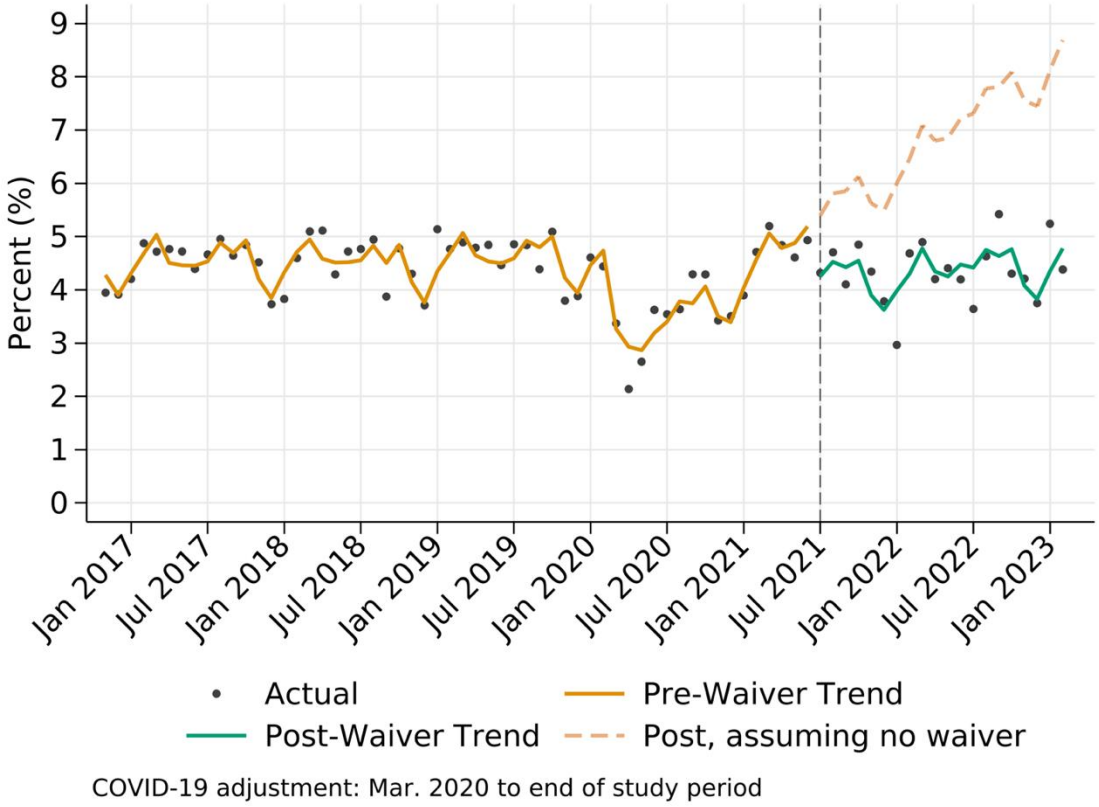


Table 0.35 Metabolic Monitoring for Children and Adolescents on Antipsychotics (APM): Glucose test

	Baseline	SP Waiver Implementation	Difference
Average Predicted Outcome, July 2021	5.2873*	4.1467*	-1.1406*
	(4.9809, 5.5937)	(3.8898, 4.4036)	(-1.5224, -0.7588)
Slope	-0.0027	-0.1484*	-0.1457*
	(-0.0109, 0.0054)	(-0.1856, -0.1113)	(-0.1818, -0.1095)
Average Predicted Outcome, Feb 2023	8.2273*	4.3189*	-3.9084*
	(7.4017, 9.0530)	(4.0636, 4.5742)	(-4.7630, -3.0538)
N	387,570		

*Notes: 95% confidence intervals in parentheses. SP = Standard Plan. *p < 0.05.*

Metabolic Monitoring for Children and Adolescents on Antipsychotics (APM): Cholesterol test

This metric shows a familiar pattern of rapid decline during the early pandemic and a recovery to pre-pandemic levels. The model extrapolates this trend forward to considerable improvements during the post-implementation period that exceed the realized data. In this case, the values start their downward trend in early 2021 which extends to early 2022 before reversing.

Figure 0.44 Metabolic Monitoring for Children and Adolescents on Antipsychotics (APM): Cholesterol test

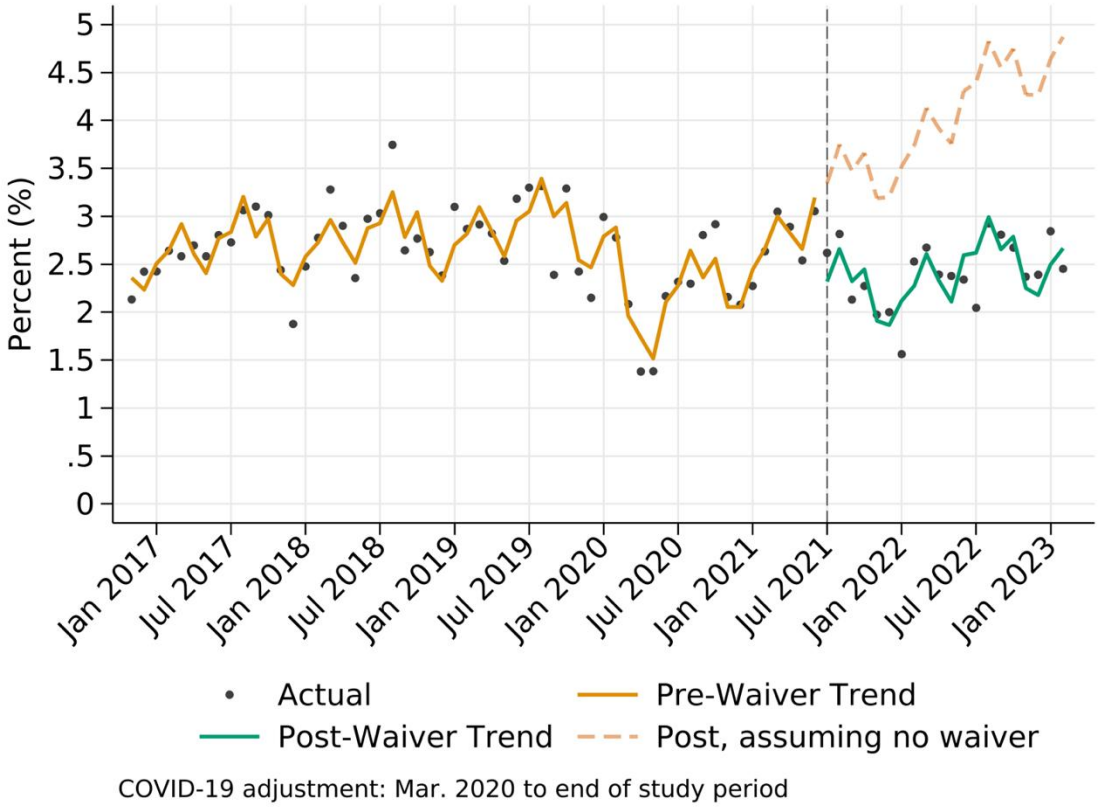


Table 0.36 Metabolic Monitoring for Children and Adolescents on Antipsychotics (APM): Cholesterol test

	Baseline	SP Waiver Implementation	Difference
Average Predicted Outcome, July 2021	3.1626*	2.1343*	-1.0283*
	(2.9324, 3.3928)	(1.9511, 2.3174)	(-1.3126, -0.7441)
Slope	0.0058	-0.0562*	-0.0621*
	(-0.0002, 0.0119)	(-0.0836, -0.0289)	(-0.0888, -0.0354)
Average Predicted Outcome, Feb 2023	4.8671*	2.6592*	-2.2079*
	(4.2448, 5.4895)	(2.4657, 2.8527)	(-2.8468, -1.5690)
N	387,570		

*Notes: 95% confidence intervals in parentheses. SP = Standard Plan. *p < 0.05.*

Use of First-Line Psychosocial Care for Children and Adolescents on Antipsychotics (APP)

This measure shows an increase until early 2019, and then declines throughout the rest of the pre-implementation period from just over 50% to approaching 40% by July 2021. The model estimates a very small and not statistically significant effect in July 2021 implementation with a 1.6 percentage point increase due to implementation of managed care. A slightly higher (but not statistically significant) slope in the post-implementation period leads to an increasing difference between post-implementation and the projected outcomes in the absence of the waiver leading to a roughly 3 percentage point difference in December 2022. However, the difference in the slopes and the most recent period are both not statistically significant. The sample size is smaller than many of the other metrics, which may contribute to the lack of statistical significance.

Figure 0.45 Use of First-Line Psychosocial Care for Children and Adolescents on Antipsychotics (APP)

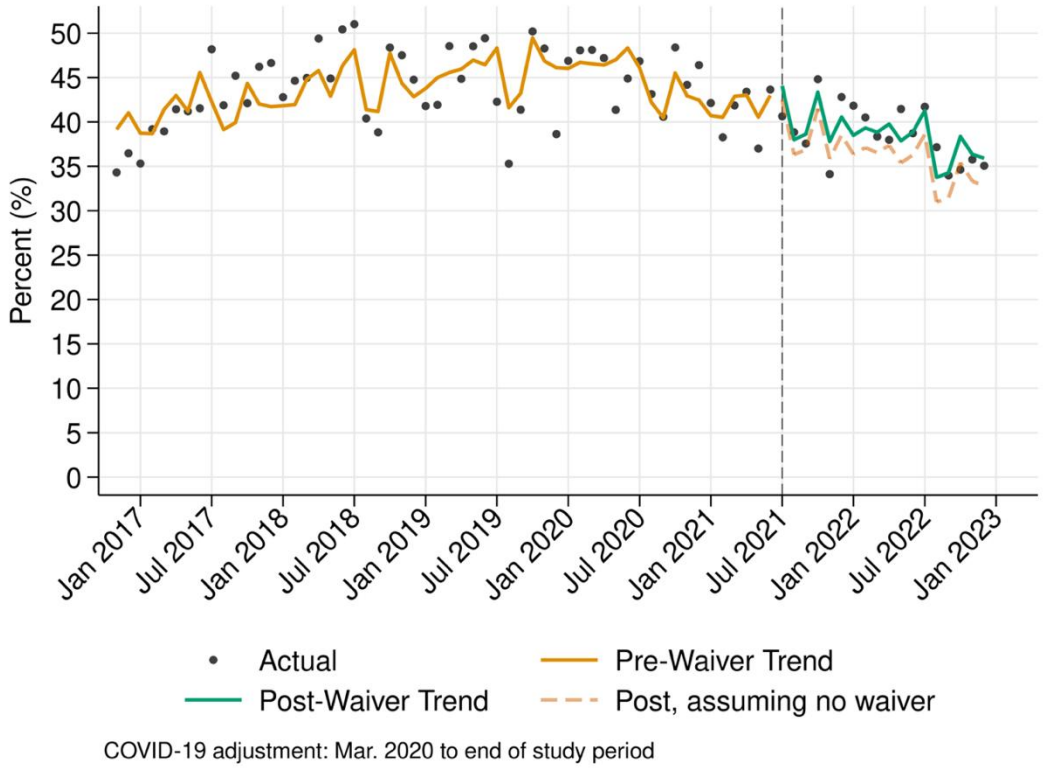


Table 0.37 Use of First-Line Psychosocial Care for Children and Adolescents on Antipsychotics (APP)

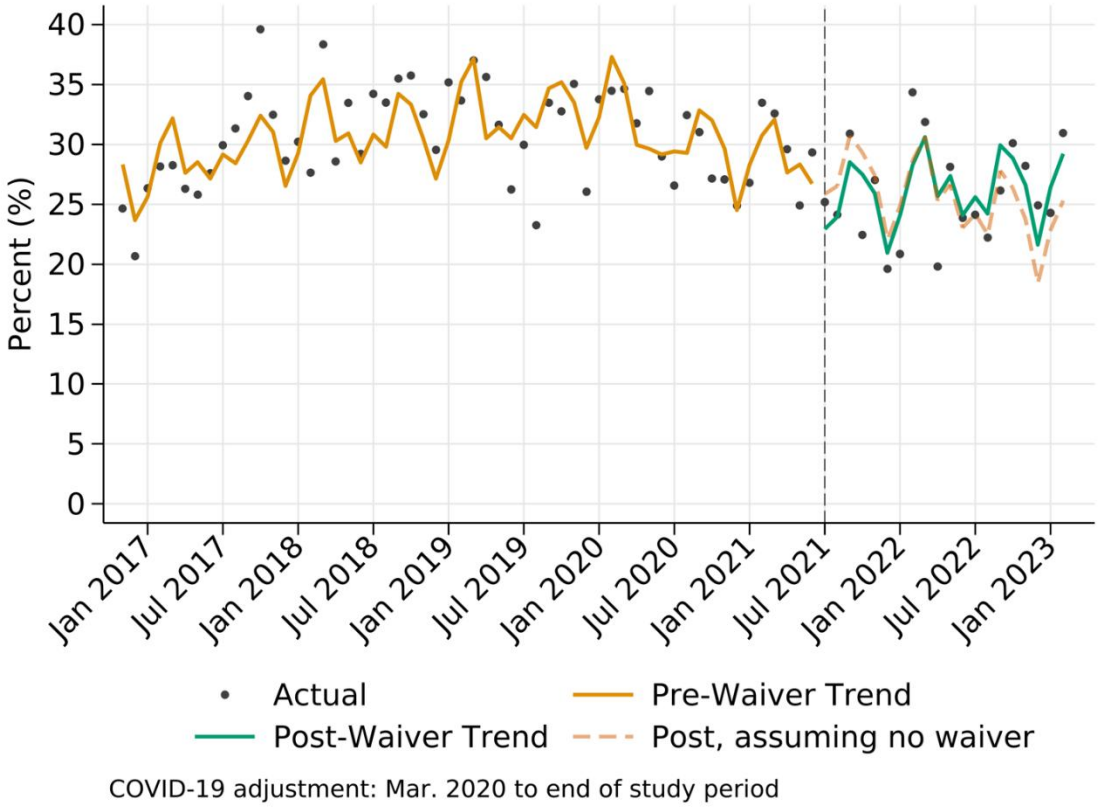
	Baseline	SP Waiver Implementation	Difference
Average Predicted Outcome, July 2021	39.3999*	40.9796*	1.5797
	(36.1215, 42.6782)	(38.1793, 43.7800)	(-2.7786, 5.9380)
Slope	0.1651*	0.2557	0.0907
	(0.0832, 0.2469)	(-0.1859, 0.6973)	(-0.3439, 0.5253)
Average Predicted Outcome, Dec 2022	32.3451*	35.4661*	3.121
	(23.4927, 41.1975)	(32.7132, 38.2190)	(-6.0831, 12.3250)
N	17,824		

*Notes: 95% confidence intervals in parentheses. SP = Standard Plan. *p < 0.05.*

Follow-Up After Hospitalization for Mental Illness (FUH) by Mental Health Providers within 7 Days After Discharge

This is the first of eight measures that look at follow up after hospitalization. Like other health conditions, behavioral health conditions that progress to crisis may require admission to a hospital. Although inpatient settings can sometimes stabilize exacerbated symptoms, it is critical that someone who requires admission receive follow up care in order to manage their conditions in an outpatient setting --- where treatment can focus on prevention and management rather than crisis. Thus, a "warm handoff" of someone at discharge to an outpatient-based provider can lead to better outcomes for the individual. These "follow up" measures are based on this concept across two dimensions: does the beneficiary receive follow up care from an appropriate provider within 7 days of discharge or within 30 days of discharge? The second dimension examines the type of provider who provided the follow up. The traditional measure only includes follow up with a mental health provider, but here we expand that definition by also looking at follow up with a primary-care provider, follow-up with enhanced behavioral health services, and finally with any of the three provider types (mental health, primary care, or enhanced behavioral health providers).

Figure 0.46 Follow-Up After Hospitalization for Mental Illness: Visit with Mental Health Providers– 7 Days



Pre-implementation this measure had an upward trend. At the point of implementation in July 2021, the model identifies an increase of approximately 0.15 percentage points in the measure the pre-implementation slope, which increased during post-implementation to a statistically significant slope of 0.51 percentage points. The difference in these trends were not statistically significant, meaning that in February 2023 there was no difference compared to the rate projected in the absence of the waiver.

Table 0.38 Follow-Up After Hospitalization for Mental Illness: Visit with Mental Health Providers – 7 Days

	Baseline	SP Waiver Implementation	Difference
Average Predicted Outcome, July 2021	27.4093*	24.504*	-2.9053
	(24.4621, 30.3565)	(22.2005, 26.8076)	(-6.6976, 0.8870)
Slope	0.1472*	0.5064*	0.3592
	(0.0701, 0.2244)	(0.1225, 0.8903)	(-0.0166, 0.7349)
Average Predicted Outcome, Feb 2023	23.0333*	26.952*	3.9187
	(14.2534, 31.8132)	(24.7248, 29.1791)	(-5.0965, 12.9338)
N	18,351		

*Notes: 95% confidence intervals in parentheses. SP = Standard Plan. *p < 0.05.*

Follow-Up After Hospitalization for Mental Illness: Visit with Mental Health Providers– 30 Days

Pre-implementation this measure was largely flat with near zero but statistically positive trend. There was no immediate change at the point of implementation in July 2021. The model identifies an increase in the slope of just over half a percentage point a month. These trend differences project out to February 2023 having a difference in the measure of approximately 9 percentage points compared to the projected rate in the absence of the waiver, but the difference is not quite statistically significant.

Figure 0.47 Follow-Up After Hospitalization for Mental Illness: Visit with Mental Health Providers– 30 Days

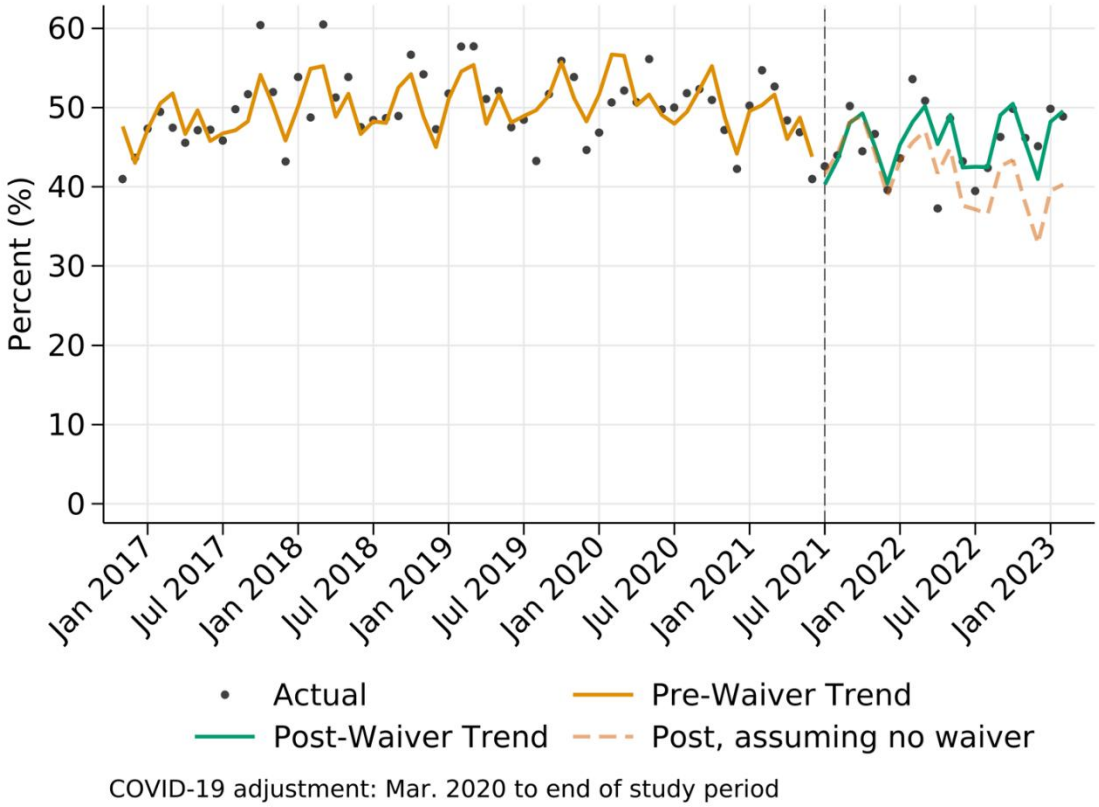


Table 0.39 Follow-Up After Hospitalization for Mental Illness: Visit with Mental Health Providers– 30 Days

	Baseline	SP Waiver Implementation	Difference
Average Predicted Outcome, July 2021	45.5869*	44.2739*	-1.313
	(42.436248.7376)	(41.6656, 46.8822)	(-5.4674, 2.8414)
Slope	0.1036*	0.6603*	0.5567*
	(0.0204, 0.1868)	(0.2477, 1.0730)	(0.1528, 0.9605)
Average Predicted Outcome, Feb 2023	37.2273*	46.4914*	9.2641
	(27.8847, 46.5700)	(44.0217, 48.9611)	(-0.3436, 18.8717)
N	18,351		

*Notes: 95% confidence intervals in parentheses. SP = Standard Plan. *p < 0.05.*

Follow-Up After Hospitalization for Mental Illness: Visit with Primary Care Provider – 7 Days

Pre-implementation this measure was increasing at a rate of .18 percentage points per month. At the point of implementation in July 2021, the model identifies a statistically significant decrease of approximately 3.5 percentage points. The slopes between pre- and post-implementation were not statistically significant, and trend differences project out to February 2023 having a difference that is not statistically different.

Figure 0.48 Follow-Up After Hospitalization for Mental Illness: Visit with Primary Care Provider– 7 Days

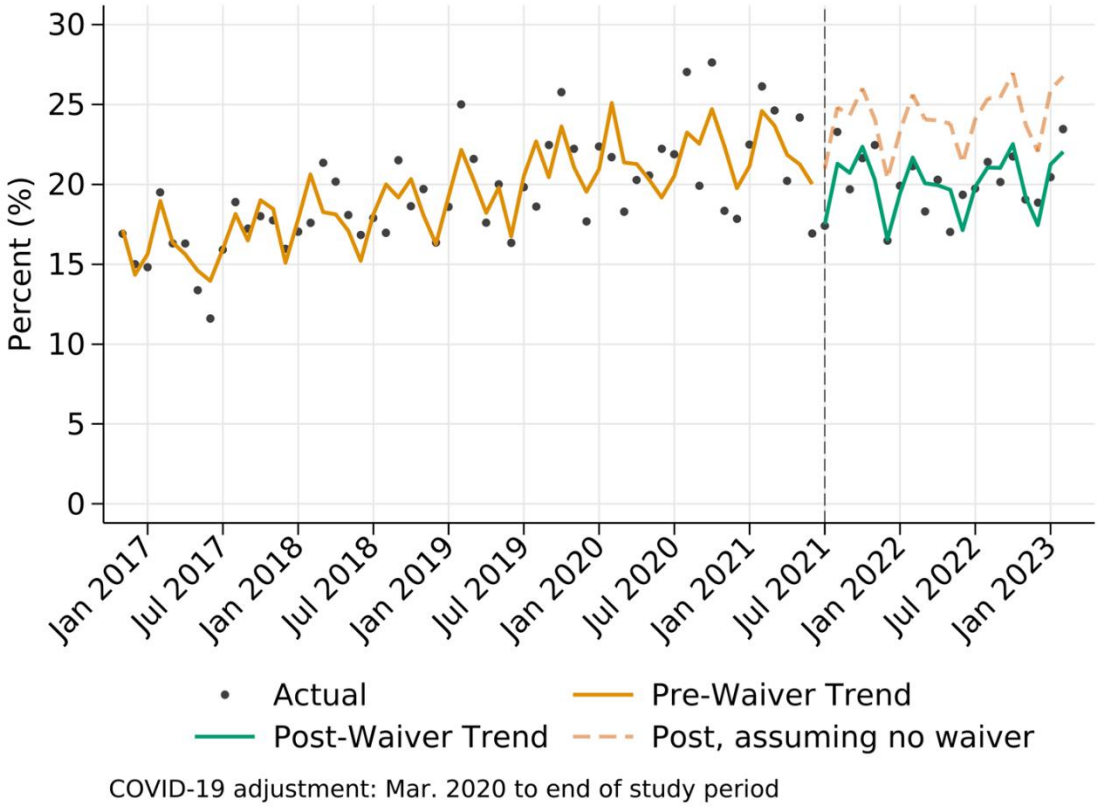


Table 0.40 Follow-Up After Hospitalization for Mental Illness: Visit with Primary Care Provider– 7 Days

	Baseline	SP Waiver Implementation	Difference
Average Predicted Outcome, July 2021	23.0609*	19.5845*	-3.4764*
	(20.4157, 25.7062)	(17.4619, 21.7072)	(-6.9021, -0.0507)
Slope	0.1808*	0.1155	-0.0652
	(0.1151, 0.2464)	(-0.2257, 0.4568)	(-0.4001, 0.2697)
Average Predicted Outcome, Feb 2023	24.9746*	20.2588*	-4.7158
	(17.2082, 32.7409)	(18.2252, 22.2923)	(-12.7073, 3.2756)
N	18,351		

*Notes: 95% confidence intervals in parentheses. SP = Standard Plan. *p < 0.05.*

Follow-Up After Hospitalization for Mental Illness: Visit with Primary Care Provider– 30 Days

Pre-implementation this measure had a slight upward trend. At the point of implementation in July 2021, the model identifies a statistically significant decrease of approximately 5 percentage points in the measure. Like many other measures in this family, in February 2023 the estimated difference is not statistically significant but is clinically meaningful; here, the difference between the post-implementation project and the estimate in the absence of transformation is over 9 percentage points.

Figure 0.49 Follow-Up After Hospitalization for Mental Illness: Visit with Primary Care Provider– 30 Days

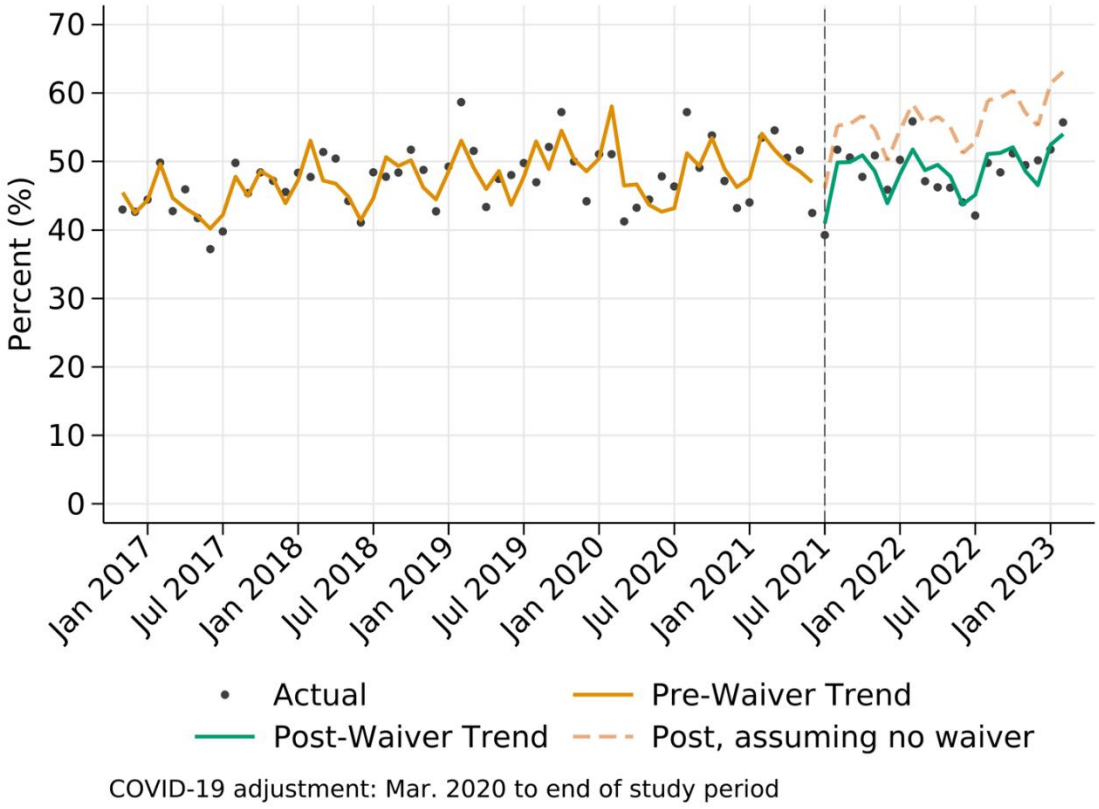


Table 0.41 Follow-Up After Hospitalization for Mental Illness: Visit with Primary Care Provider– 30 Days

	Baseline	SP Waiver Implementation	Difference
Average Predicted Outcome, July 2021	52.1112*	46.9465*	-5.1647*
	(48.9640, 55.2584)	(44.3612, 49.5318)	(-9.2969, -1.0325)
Slope	0.2183*	0.0106	-0.2076
	(0.1365, 0.3000)	(-0.4029, 0.4241)	(-0.6121, 0.1968)
Average Predicted Outcome, Feb 2023	59.1055*	49.9955*	-9.11
	(49.7560, 68.4549)	(47.5180, 52.4729)	(-18.7377, 0.5177)
N	18,351		

*Notes: 95% confidence intervals in parentheses. SP = Standard Plan. *p < 0.05.*

Follow-Up After Hospitalization for Mental Illness: Enhanced Behavior Health Visits– 7 Days

Pre-implementation this measure was noisy with a statistically zero trend, but this became positive at implementation with a statistically significant difference in trend of approximately 0.13 percentage points per month. In July 2021, the model identifies no change in the measure at implementation. This small increase in trend projects out to February 2023 having a difference in the measure of approximately 2.1 percentage points compared to the projected rate in the absence of the waiver.

Figure 0.50 Follow-Up After Hospitalization for Mental Illness: Enhanced Behavior Health Visits– 7 Days

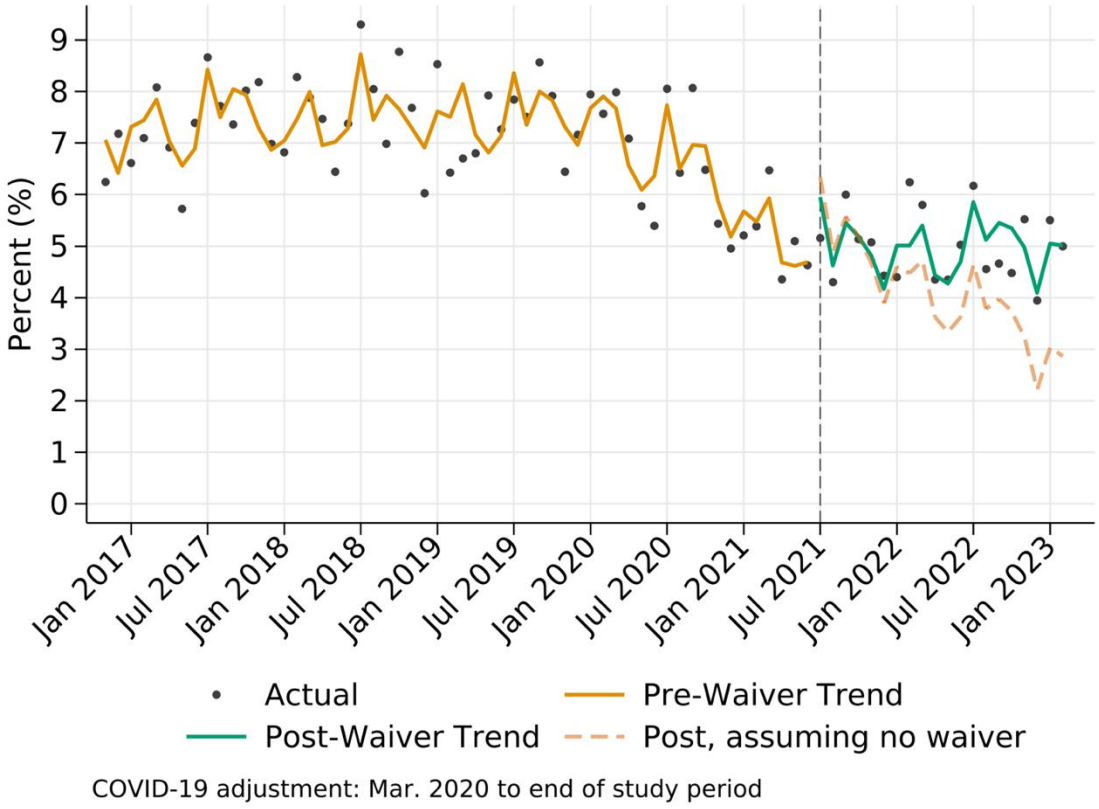


Table 0.42 Follow-Up After Hospitalization for Mental Illness: Enhanced Behavior Health Visits– 7 Days

	Baseline	SP Waiver Implementation	Difference
Average Predicted Outcome, July 2021	5.2297*	4.8349*	-0.3948
	(4.6302, 5.8291)	(4.3230, 5.3467)	(-1.1861, 0.3964)
Slope	0.0038	0.1374*	0.1337*
	(-0.0149, 0.0225)	(0.0574, 0.2175)	(0.0558, 0.2115)
Average Predicted Outcome, Feb 2023	3.2268*	5.3715*	2.1447*
	(1.4607, 4.9929)	(4.8684, 5.8746)	(0.3251, 3.9643)
N	112,284		

*Notes: 95% confidence intervals in parentheses. SP = Standard Plan. *p < 0.05.*

Follow-Up After Hospitalization for Mental Illness: Enhanced Behavior Health Visits– 30 Days

Pre-implementation of this measure was flat with a not statistically significant trend, but the slope increased at the time of implementation in July 2021. There was no discontinuity in July 2021, but the higher trend led to a higher projected rate post-implementation of almost 5 percentage points higher. Combined with the results for follow up by primary care providers, the increase shown here helps attenuate some of the effects from the decreased follow up rate among PCPs.

Figure 0.51 Follow-Up After Hospitalization for Mental Illness: Enhanced Behavior Health Visits– 30 Days

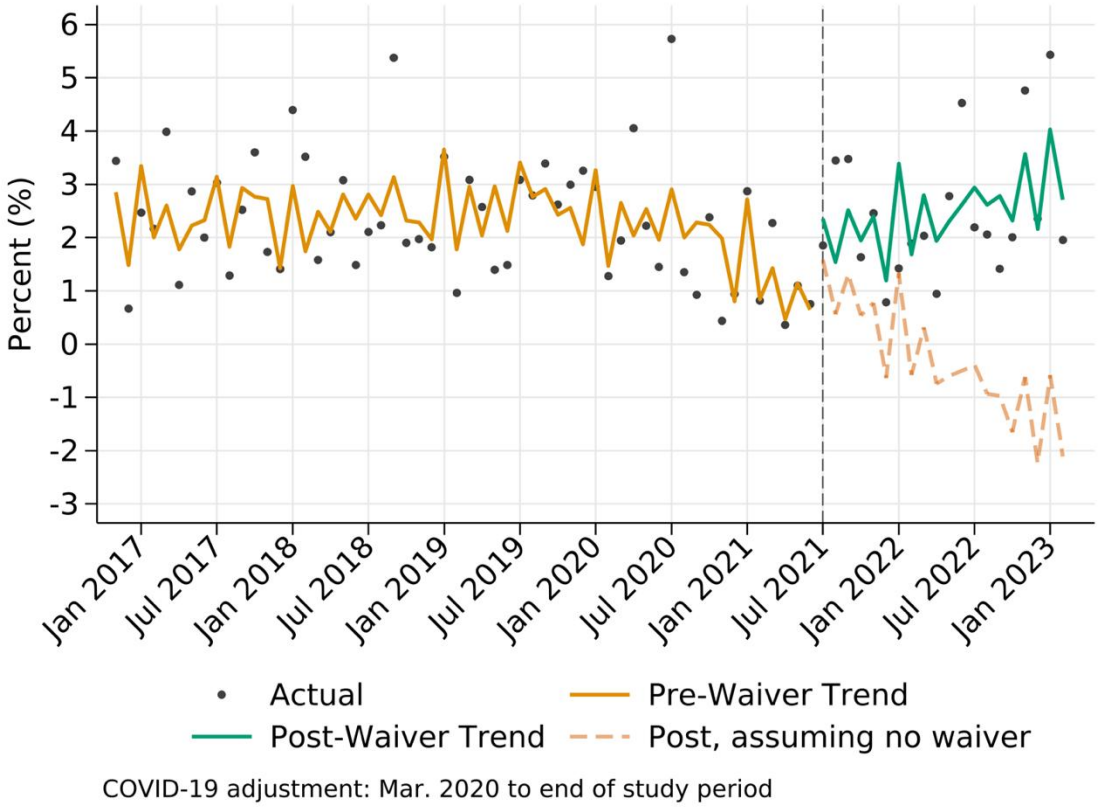


Table 0.43 Follow-Up After Hospitalization for Mental Illness: Enhanced Behavior Health Visits– 30 Days

	Baseline	SP Waiver Implementation	Difference
Average Predicted Outcome, July 2021	0.8405*	1.6086*	0.768
	(0.0842, 1.5969)	(0.8155, 2.4016)	(-0.3478, 1.8838)
Slope	0.0049	0.2183*	0.2134*
	(-0.0213, 0.0310)	(0.0973, 0.3393)	(0.0956, 0.3313)
Average Predicted Outcome, Feb 2023	-1.3788	3.4446*	4.8234*
	(-3.8069, 1.0492)	(2.5958, 4.2934)	(2.2538, 7.3930)
N	18,351		

*Notes: 95% confidence intervals in parentheses. SP = Standard Plan. *p < 0.05.*

Follow-Up After Hospitalization for Mental Illness: Visit with Any Provider – 7 Days

In contrast to the previous three measures focused on specific types of providers, this measure captures follow up to ANY (Medicaid) provider (that is paid by Medicaid). As such, it has a pattern similar to the general takeaway of the previous metrics; a small increase over time pre-implementation, with faster growth post-implementation, but no statistical difference in rate of follow up in February 2023. Note that the decrease in follow up to primary care providers was partially mitigated by an increase among enhanced behavior health visits to lead to no difference.

Figure 0.52 Follow-Up After Hospitalization for Mental Illness: Visit with Any Provider – 7 Days

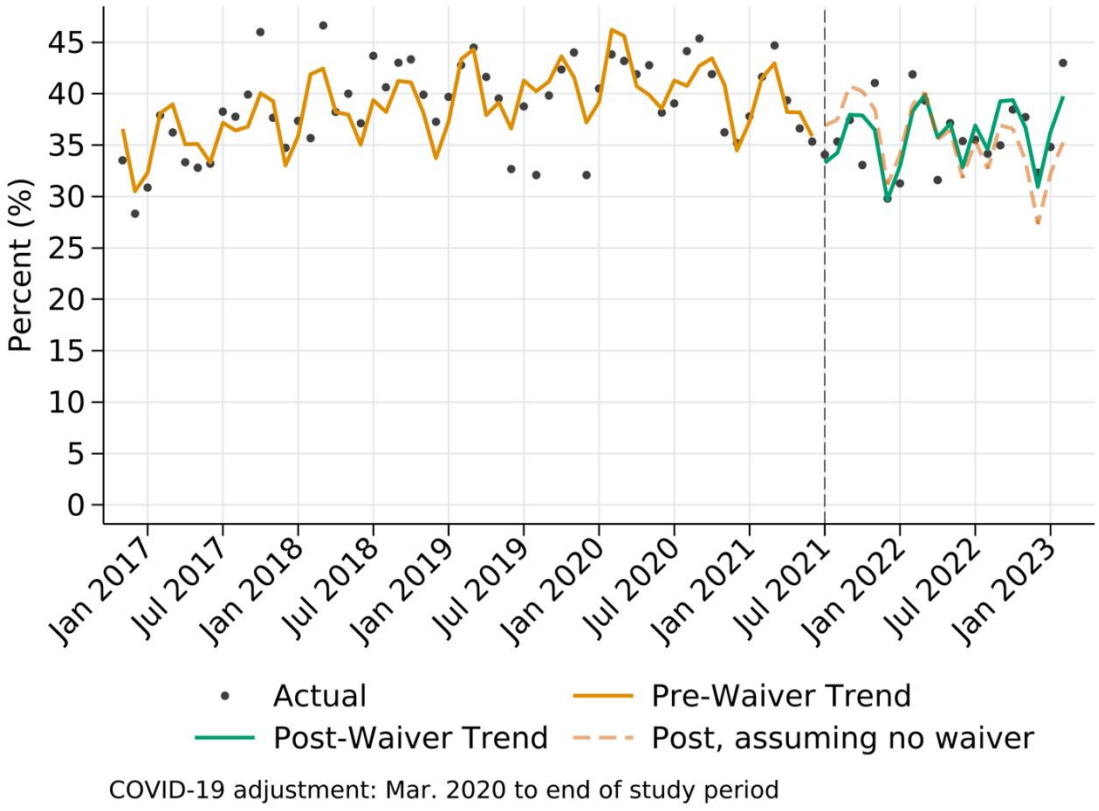


Table 0.44 Follow-Up After Hospitalization for Mental Illness: Visit with Any Provider – 7 Days

	Baseline	SP Waiver Implementation	Difference
Average Predicted Outcome, July 2021	37.7492*	34.097*	-3.6521
	(34.6255, 40.8728)	(31.5878, 36.6063)	(-7.7091, 0.4048)
Slope	0.1745*	0.6023*	0.4279*
	(0.0931, 0.2558)	(0.1940, 1.0106)	(0.0281, 0.8276)
Average Predicted Outcome, Feb 2023	32.5124*	36.9895*	4.4772
	(23.2534, 41.7713)	(34.5794, 39.3997)	(-5.0525, 14.0069)
N	18,351		

*Notes: 95% confidence intervals in parentheses. SP = Standard Plan. *p < 0.05.*

Follow-Up After Hospitalization for Mental Illness: Visit with Any Provider – 30 Days

The pattern of this measure is, perhaps unsurprisingly, similar to the 7-day measure. It shows a faster increase post-implementation, but no difference at implementation or at last observed period (February 2023). However, the difference is more favorable to transformation in February 2023 than at the time of implementation – the faster increase post-implementation means, if trends continue, eventually the difference will be statistically significant.

Figure 0.53 Follow-Up After Hospitalization for Mental Illness: Visit with Any Provider – 30 Days

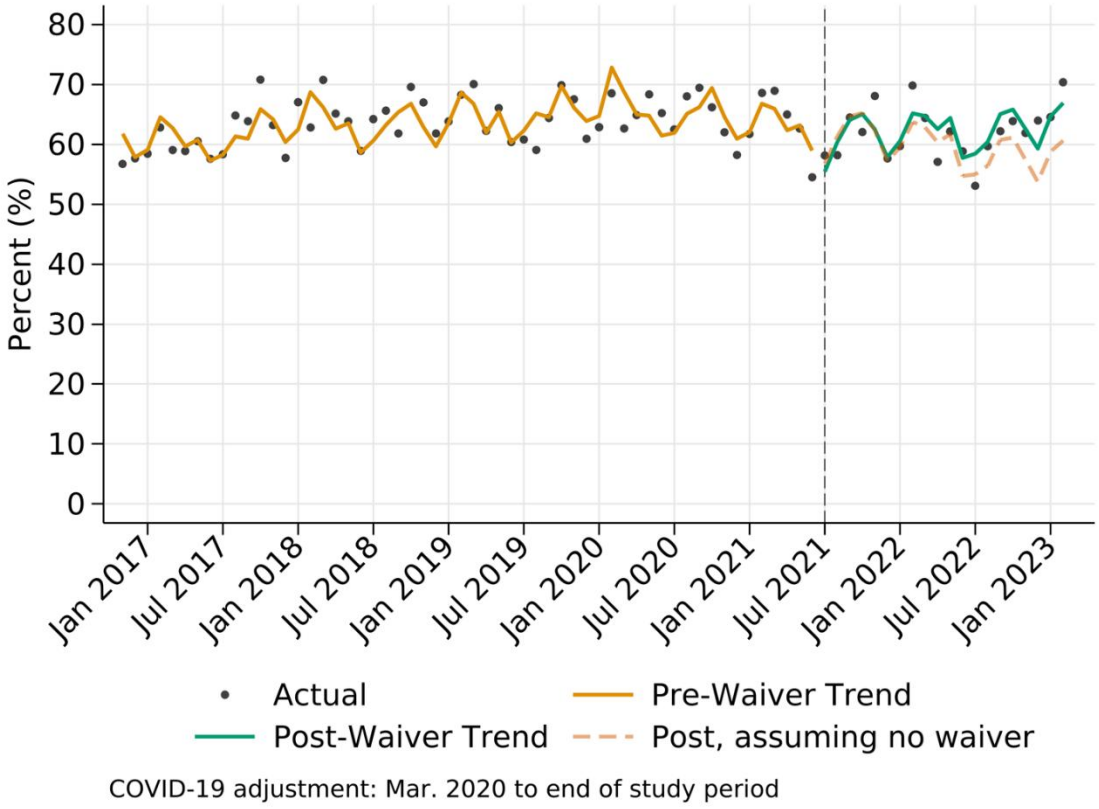


Table 0.45 Follow-Up After Hospitalization for Mental Illness: Visit with Any Provider – 30 Days

	Baseline	SP Waiver Implementation	Difference
Average Predicted Outcome, July 2021	62.0365*	60.6359*	-1.4006
	(59.0005, 65.0726)	(58.1188, 63.1531)	(-5.4018, 2.6006)
Slope	0.1662*	0.5717*	0.4055*
	(0.0862, 0.2462)	(0.1752, 0.9683)	(0.0175, 0.7935)
Average Predicted Outcome, Feb 2023	56.6206*	62.9246*	6.304
	(47.6223, 65.6189)	(60.5691, 65.2801)	(-2.9451, 15.5531)
N	18,351		

*Notes: 95% confidence intervals in parentheses. SP = Standard Plan. *p < 0.05.*

Follow-Up Care for Children Prescribed ADHD Medication (ADD)

This measure examines the percent of children between 6 and 12 years of age who were diagnosed with ADHD and received a follow up visit to a prescribing provider within 30 days after the initial ADHD medication prescription. Higher is better for this metric. It had a steady decline throughout the pre-implementation period, from the mid-30s in early 2017 to approximately 25 in mid-2021. Both the pre-implementation and post-implementation trends are statistically zero. By February 2023, the post-implementation rate was roughly 4.4 percentage points lower – but not statistically significant -- than the projected rate in the absence of the waiver.

Figure 0.54 Follow-Up Care for Children Prescribed ADHD Medication (ADD)

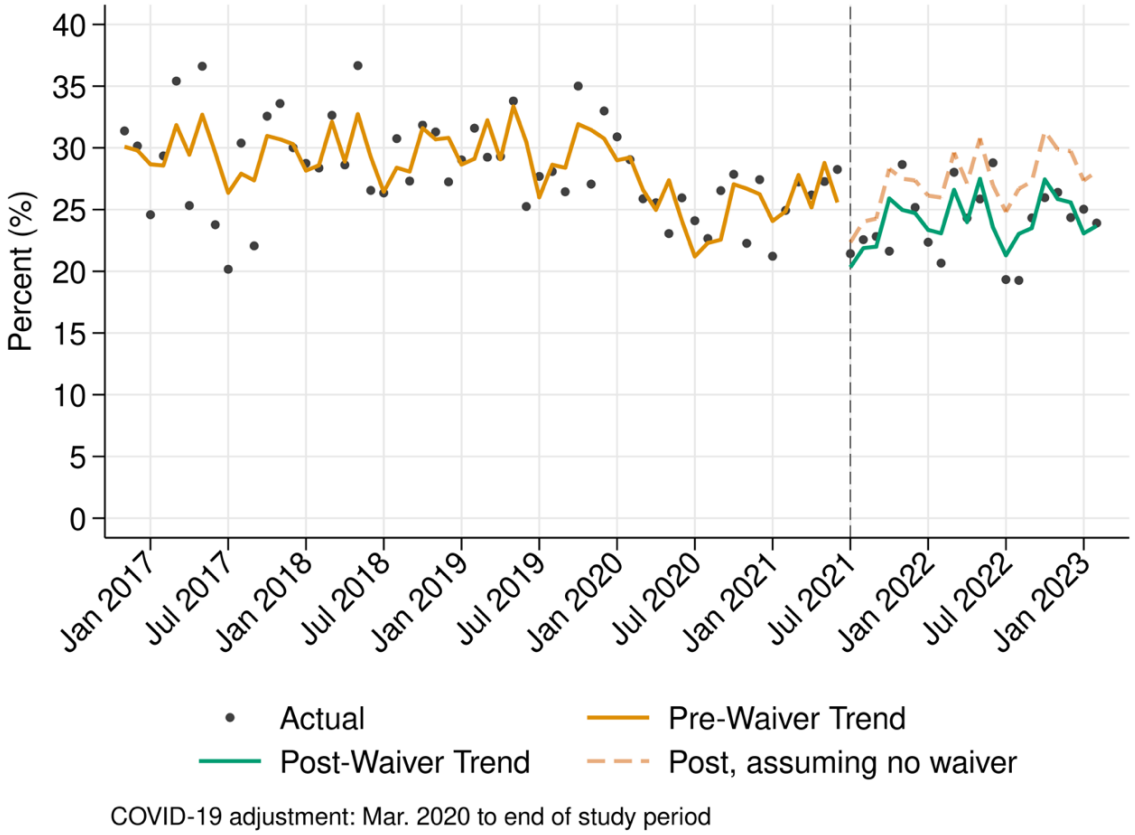


Table 0.46 Follow-Up Care for Children Prescribed ADHD Medication (ADD)

	Baseline	SP Waiver Implementation	Difference
Average Predicted Outcome, July 2021	26.8813*	24.8604*	-2.0209
	(25.0606, 28.7019)	(23.5071, 26.2136)	(-4.3097, 0.2678)
Slope	0.0521	-0.0733	-0.1254
	(-0.0014, 0.1056)	(-0.3060, 0.1595)	(-0.3519, 0.1011)
Average Predicted Outcome, Feb 2023	30.3981*	25.9945*	-4.4036
	(24.9817, 35.8144)	(24.6120, 27.3770)	(-9.9272, 1.1200)
N	48,154		

*Notes: 95% confidence intervals in parentheses. SP = Standard Plan. *p < 0.05.*

Initiation and Engagement of Alcohol and Other Drug Abuse or Dependence Treatment (IET) – Initiation for Alcohol

This measure shows little trend in the pre-implementation, save the typical March 2022 dip. The overall trend is generally flat, with a slight downward slope post 2019, although across the entire period, it is statistically positive. At implementation, there's a slight decrease of quarter of a percentage point but that is not statistically significant. Slopes are statistically identical, and in December 2022 there is no difference in the post-implementation rate from the rate projected forward pre-implementation. Overall, this measure shows little change in the post- implementation period.

Figure 0.55 Initiation and Engagement of Alcohol and Other Drug Abuse or Dependence Treatment (IET) – Initiation for Alcohol

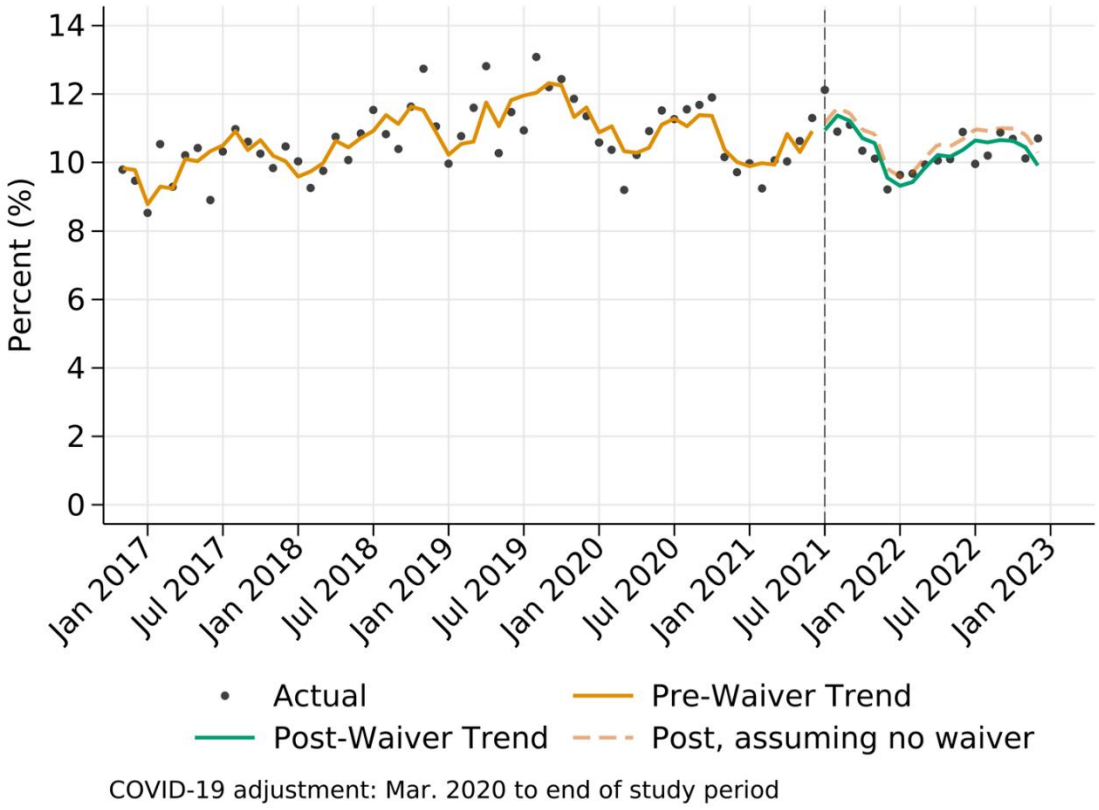


Table 0.47 Initiation and Engagement of Alcohol and Other Drug Abuse or Dependence Treatment (IET) – Initiation for Alcohol

	Baseline	SP Waiver Implementation	Difference
Average Predicted Outcome, July 2021	10.7839*	10.5736*	-0.2102
	(10.1277, 11.4401)	(9.9929, 11.1544)	(-1.0847, 0.6642)
Slope	0.024*	0.0141	-0.0099
	(0.0054, 0.0425)	(-0.0778, 0.1059)	(-0.0998, 0.0800)
Average Predicted Outcome, Dec 2022	11.2679*	10.8889*	-0.379
	(9.4741, 13.0617)	(10.3183, 11.4594)	(-2.2503, 1.4922)
N	146,986		

*Notes: 95% confidence intervals in parentheses. SP = Standard Plan. *p < 0.05.*

Initiation and Engagement of Alcohol and Other Drug Abuse or Dependence Treatment (IET) – Engagement for Alcohol

This measure has a low baseline rate with a high of just under 3% in July 2020. We see a general downward trend since 2019, throughout the period both pre- implementation and post-implementation. There's a slight increase in the rate at implementation in July 2021, but this change is not statistically significant. The trend, however, is more positive in the post-implementation period and it's statistically different. This leads to an ever-increasing difference throughout the remainder of the observed post-implementation period. By December 2022 the post-implementation rate is roughly one percentage point higher than the projected rate in the absence of the waiver. This difference is statistically different from the projected rate.

Figure 0.56 Initiation and Engagement of Alcohol and Other Drug Abuse or Dependence Treatment (IET) – Engagement for Alcohol

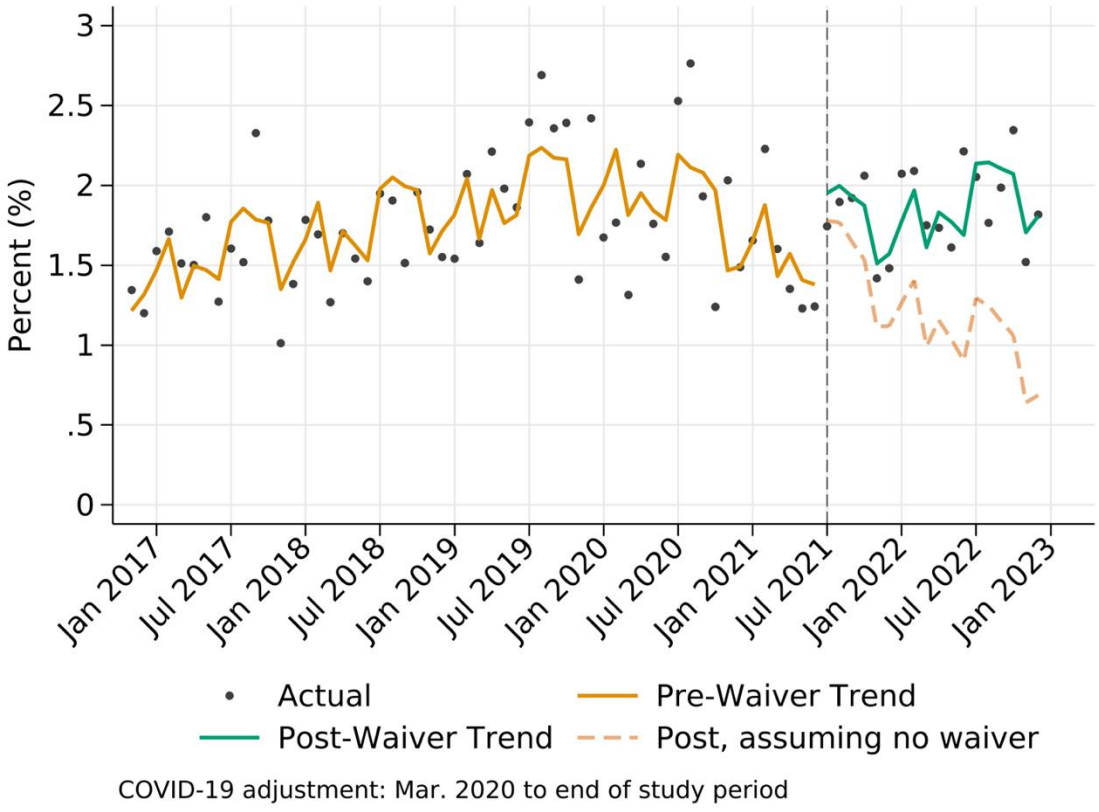


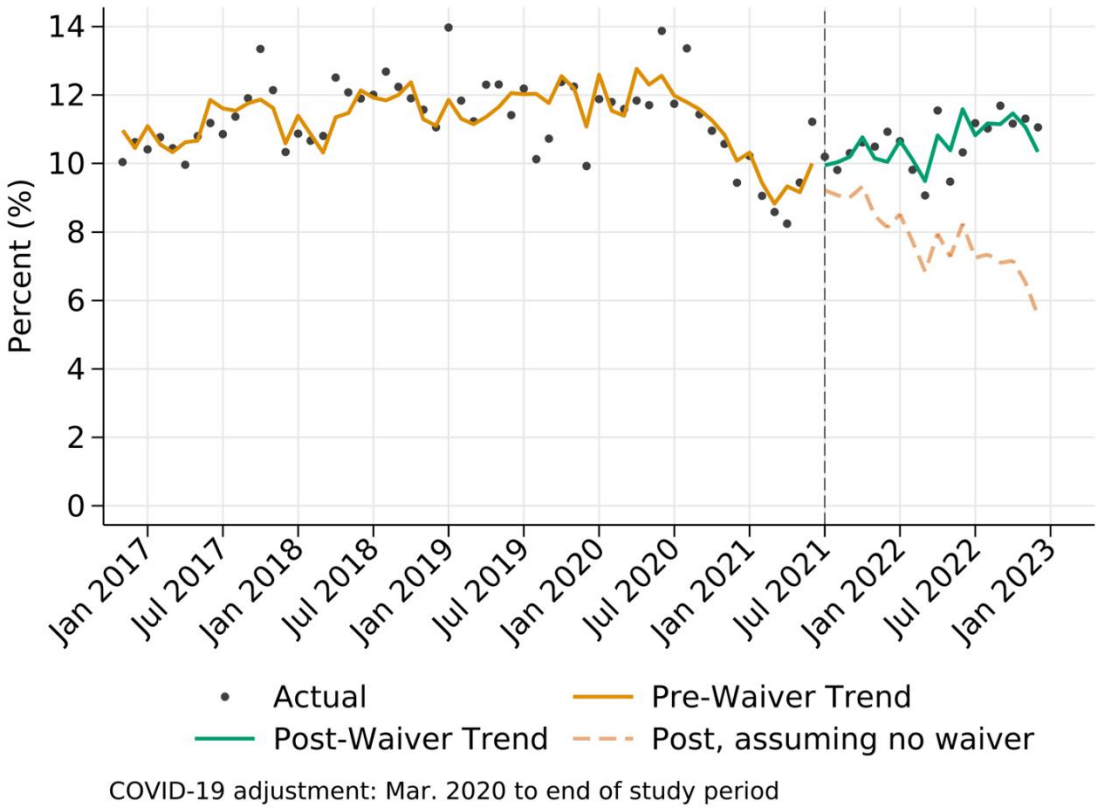
Table 0.48 Initiation and Engagement of Alcohol and Other Drug Abuse or Dependence Treatment (IET) – Engagement for Alcohol

	Baseline	SP Waiver Implementation	Difference
Average Predicted Outcome, July 2021	1.4758*	1.648*	0.1722
	(1.2072, 1.7445)	(1.3909, 1.9052)	(-0.2040, 0.5484)
Slope	0.0128*	0.0686*	0.0558*
	(0.0045, 0.0210)	(0.0288, 0.1085)	(0.0168, 0.0949)
Average Predicted Outcome, Dec 2022	0.8795*	2.0011*	1.1216*
	(0.1334, 1.6256)	(1.7396, 2.2626)	(0.3335, 1.9097)
N	146,986		

*Notes: 95% confidence intervals in parentheses. SP = Standard Plan. *p < 0.05.*

Initiation and Engagement of Alcohol and other Drug Abuse or Dependence Treatment (IET) – Initiation for Opioids

Figure 0.57 Initiation and Engagement of Alcohol and Other Drug Abuse or Dependence Treatment (IET) – Initiation for Opioids



For this measure, we see a decline through the pre-implementation period, with a slope increase post-implementation reversing the downward trend showing from January 2020 through July 2021. The statistically significant higher slope in the post-implementation period leads to a statistically different estimate in December 2022 between the post-implementation estimate and the rate expected projecting the pre-implementation period forward.

Table 0.49 Initiation and Engagement of Alcohol and Other Drug Abuse or Dependence Treatment (IET) – Initiation for Opioids

	Baseline	SP Waiver Implementation	Difference
Average Predicted Outcome, July 2021	9.1707*	9.8918*	0.7211
	(8.5201, 9.8214)	(9.3143, 10.4694)	(-0.1382, 1.5804)
Slope	0.036*	0.2744*	0.2384*
	(0.0168, 0.0552)	(0.1812, 0.3676)	(0.1475, 0.3292)
Average Predicted Outcome, Dec 2022	5.689*	10.4625*	4.7735*
	(3.8924, 7.4856)	(9.8753, 11.0498)	(2.8967, 6.6504)
N	146,986		

*Notes: 95% confidence intervals in parentheses. SP = Standard Plan. *p < 0.05.*

Initiation and Engagement of Alcohol and Other Drug Abuse or Dependence Treatment (IET) – Engagement for Opioids

This measure shows a pattern typical of the others in this family, with a steady decline from the beginning of the study period up through July 2021, where the trend rather immediately reverses and begins to increase. There's a small effect immediately in July 2021, but a much higher trend in the post-implementation period leads to a projected increase in the rate of engagement for opioids of nearly five percentage points at the end of the study period in December 2022. This implies a tripling of the engagement rate from a projected rate of just under two percent based on the pre-implementation trend to roughly six percent based on the post-implementation experience. This result is, of course, statistically significant as one might expect with a magnitude such as this. The magnitude of the difference is considerable, and the difference comes from the projected trend pre-implementation. As in previous metrics where there is a marked trend, we note that here as well and suggest that the reader recognizes the importance of that trend in driving the conclusion.

Figure 0.58 Initiation and Engagement of Alcohol and Other Drug Abuse or Dependence Treatment (IET) – Engagement for Opioids

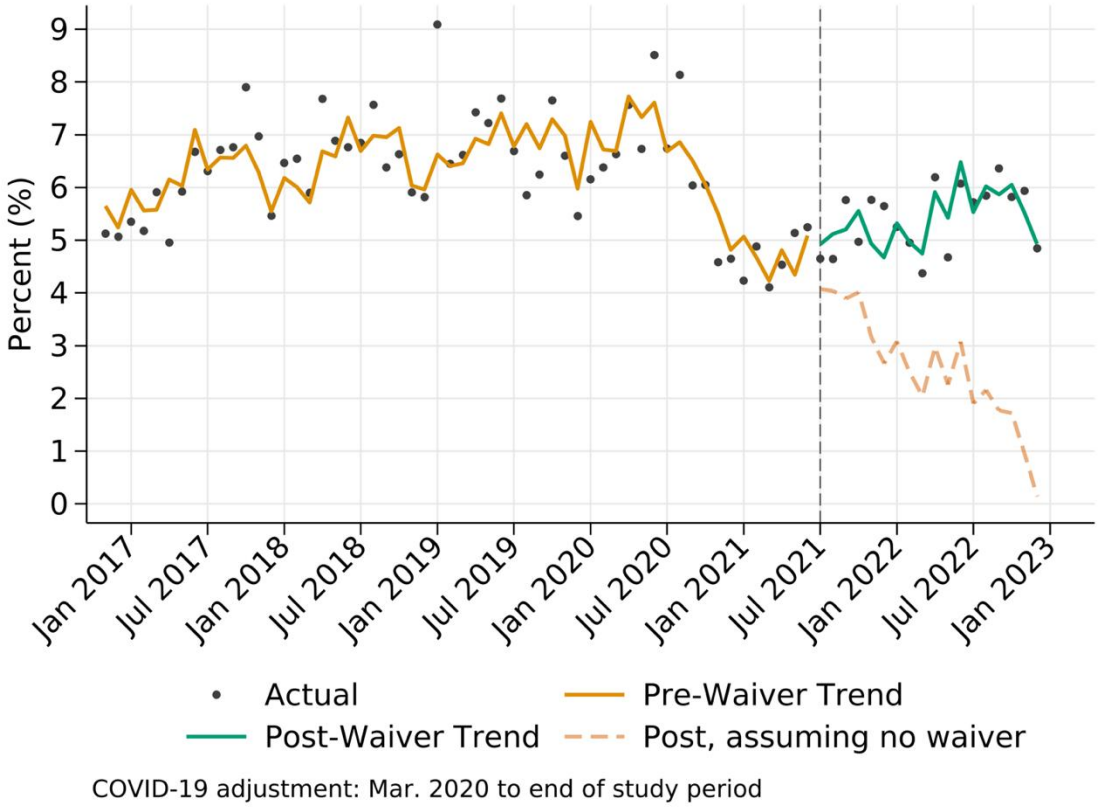


Table 0.50 Initiation and Engagement of Alcohol and Other Drug Abuse or Dependence Treatment (IET) – Engagement for Opioids

	Baseline	SP Waiver Implementation	Difference
Average Predicted Outcome, July 2021	4.0391*	4.8838*	0.8447*
	(3.5547, 4.5236)	(4.4598, 5.3079)	(0.2002, 1.4892)
Slope	0.0339*	0.2661*	0.2322*
	(0.0194, 0.0484)	(0.1949, 0.3373)	(0.1628, 0.3016)
Average Predicted Outcome, Dec 2022	0.3691	5.1613*	4.7922*
	(-1.0123, 1.7505)	(4.7255, 5.5970)	(3.3515, 6.2329)
N	146,986		

*Notes: 95% confidence intervals in parentheses. SP = Standard Plan. *p < 0.05.*

Initiation and Engagement of Alcohol and Other Drug Abuse or Dependence Treatment (IET) – Initiation for Other Substances

After around 2019, the rate of initiation of treatment for other drugs and substances has a long downward trend throughout the pre-implementation period, with a flattening to increasing rate in the post-implementation period. There's little evidence of an immediate effect but instead, appears to be an inflection around July 2021, with a statistically higher trend occurring in the post-implementation period. By December 2022, the last value observed in this data, the rate is 2.0 percentage points higher in the post-implementation period relative to the projection period, but this difference is not statistically significant.

Figure 0.59 Initiation and Engagement of Alcohol and Other Drug Abuse or Dependence Treatment (IET) – Initiation for Other Substances

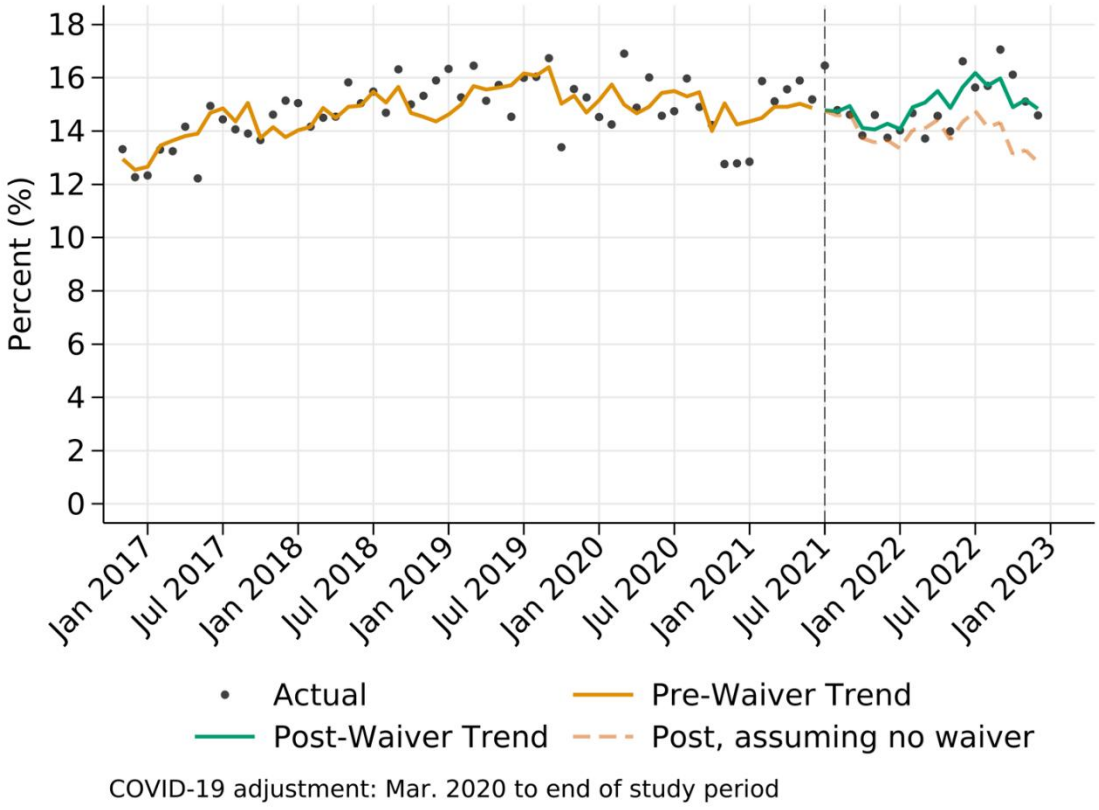


Table 0.51 Initiation and Engagement of Alcohol and Other Drug Abuse or Dependence Treatment (IET) – Initiation for Other Substances

	Baseline	SP Waiver Implementation	Difference
Average Predicted Outcome, July 2021	14.3139*	14.3507*	0.0368
	(13.5301, 15.0977)	(13.6753, 15.0261)	(-0.9906, 1.0641)
Slope	0.0636*	0.1793*	0.1157*
	(0.0422, 0.0850)	(0.0695, 0.2891)	(0.0080, 0.2234)
Average Predicted Outcome, Dec 2022	13.7516*	15.7554*	2.0039
	(11.6026, 15.9005)	(15.0729, 16.4379)	(-0.2415, 4.2492)
N	146,986		

*Notes: 95% confidence intervals in parentheses. SP = Standard Plan. *p < 0.05.*

Initiation and Engagement of Alcohol and Other Drug Abuse or Dependence Treatment (IET) – Engagement for Other Substances

Like some of the other measures in this particular metric family, we see a secular decrease in the rate of engagement for other substances with a small decrease occurring at July 2021, but a rather different slope in the post-implementation period. The difference in slopes is statistically significant, and the increasing slope reverses the effect from the implementation period, so that by December 2022, the projected rate is nearly a percentage point higher than the counterfactual estimate; however, this difference is not statistically significant.

Figure 0.60 Initiation and Engagement of Alcohol and Other Drug Abuse or Dependence Treatment (IET) – Engagement for Other Substances

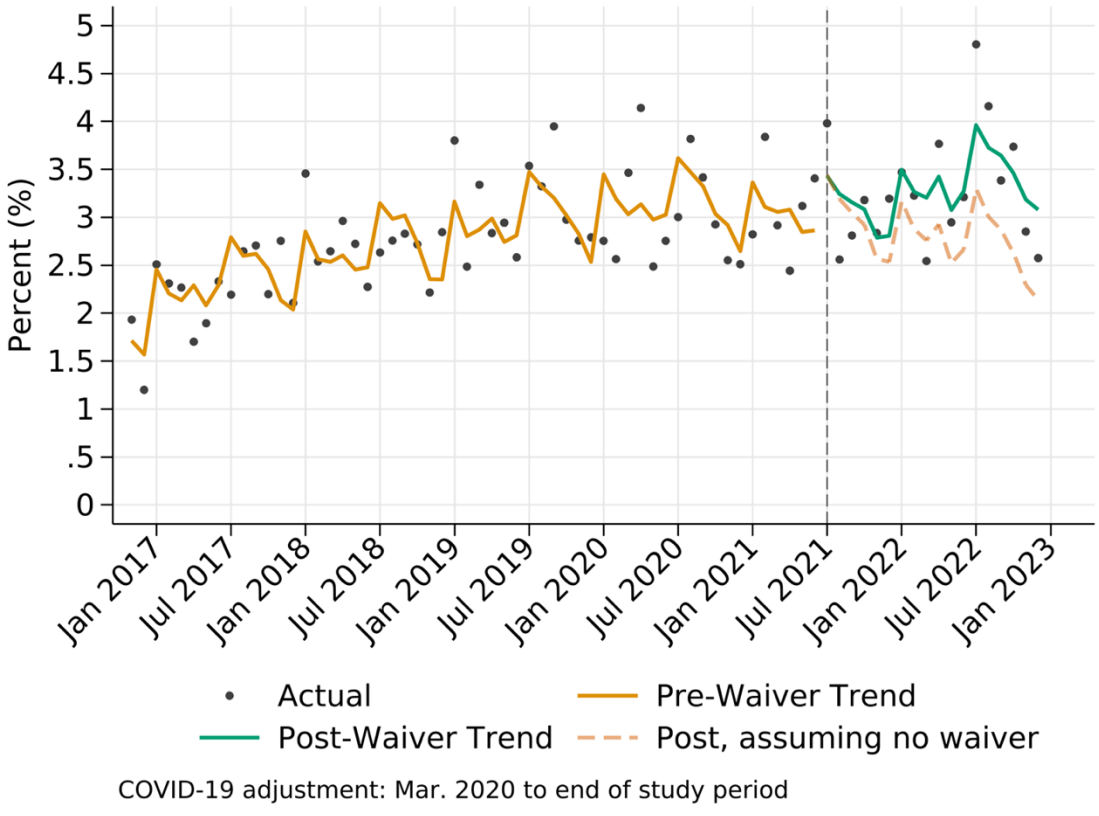


Table 0.52 Initiation and Engagement of Alcohol and Other Drug Abuse or Dependence Treatment (IET) – Engagement for Other Substances

	Baseline	SP Waiver Implementation	Difference
Average Predicted Outcome, July 2021	2.8841*	2.8789*	-0.0052
	(2.5006, 3.2675)	(2.5466, 3.2112)	(-0.5072, 0.4969)
Slope	0.0299*	0.0858*	0.0558*
	(0.0201, 0.0398)	(0.0317, 0.1399)	(0.0026, 0.1091)
Average Predicted Outcome, Dec 2022	2.4623*	3.4066*	0.9443
	(1.3984, 3.5262)	(3.0641, 3.7491)	(-0.1593, 2.0479)
N	146,986		

*Notes: 95% confidence intervals in parentheses. SP = Standard Plan. *p < 0.05.*

Initiation and Engagement of Alcohol and Other Drug Abuse or Dependence Treatment (IET) – Initiation for All Substances

Consistent with the trends for sub metrics for specific substances in this domain, we see a secular decrease in the immediate pre-implementation period. There is no evidence of an immediate effect in July 2021, but a higher trend after implementation leads to a growing difference between the post-implementation results and that which would be projected in the absence of a waiver. In this case, the post-implementation estimate is five percentage points higher, which corresponds to a nearly 20% increase in the rate from the from the counterfactual of 28.0 to the post-implementation estimate of 33.1. This is a statistically significant difference.

Figure 0.61 Initiation and Engagement of Alcohol and Other Drug Abuse or Dependence Treatment (IET) – Initiation for All Substances

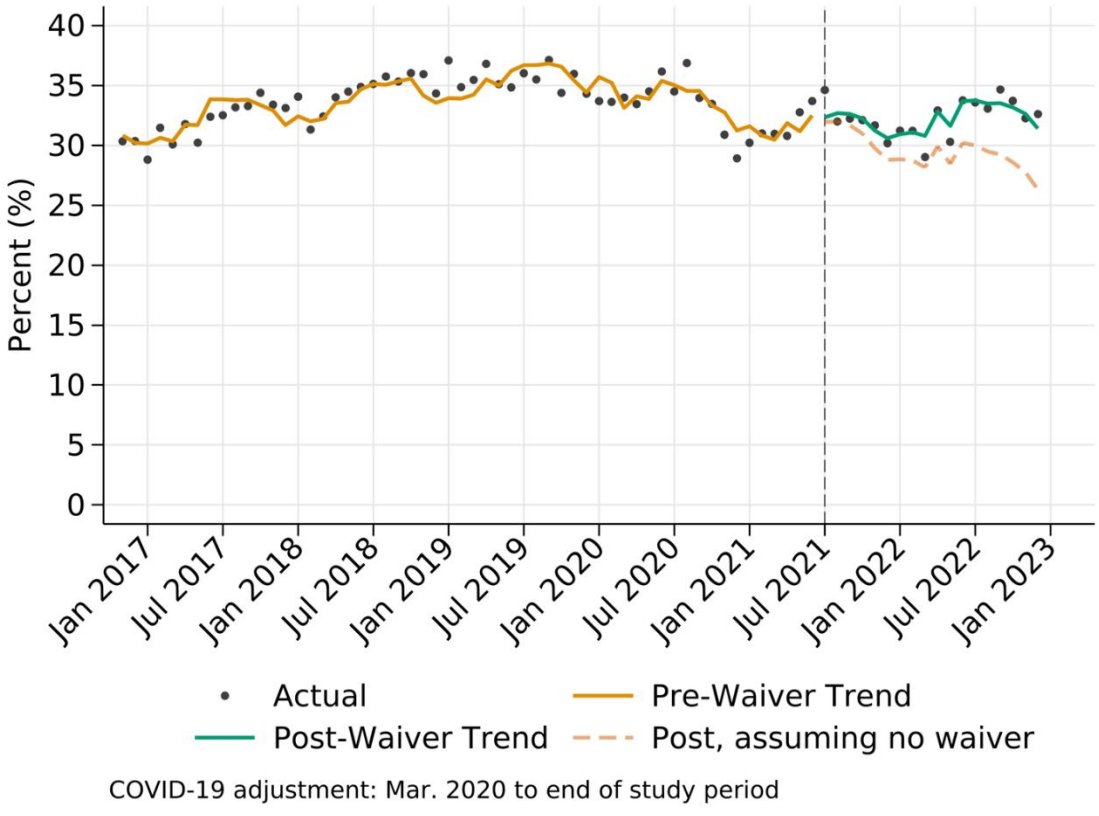


Table 0.53 Initiation and Engagement of Alcohol and Other Drug Abuse or Dependence Treatment (IET) – Initiation for All Substances

	Baseline	SP Waiver Implementation	Difference
Average Predicted Outcome, July 2021	31.1059*	31.5055*	0.3995
	(30.0742, 32.1377)	(30.6017, 32.4092)	(-0.9606, 1.7597)
Slope	0.1101*	0.3882*	0.2781*
	(0.0809, 0.1394)	(0.2439, 0.5326)	(0.1370, 0.4192)
Average Predicted Outcome, Dec 2022	28.0144*	33.1412*	5.1268*
	(25.1953, 30.8335)	(32.2409, 34.0414)	(2.1882, 8.0655)
N	146,986		

*Notes: 95% confidence intervals in parentheses. SP = Standard Plan. *p < 0.05.*

Initiation and Engagement of Alcohol and Other Drug Abuse or Dependence Treatment (IET) – Engagement for All Substances

Again, a nearly identical pattern to all the IET metrics: a secular decline through July 2021, followed by a reversal of the trend in the post-implementation period, leading to a clinically and statistically significant effect by the end of the study. In this case, the difference in December 2022 is estimated to be nearly six percentage points, more than doubling the rate projected based on the pre-July 2021 trend.

Figure 0.62 Initiation and Engagement of Alcohol and Other Drug Abuse or Dependence Treatment (IET) – Engagement for All Substances

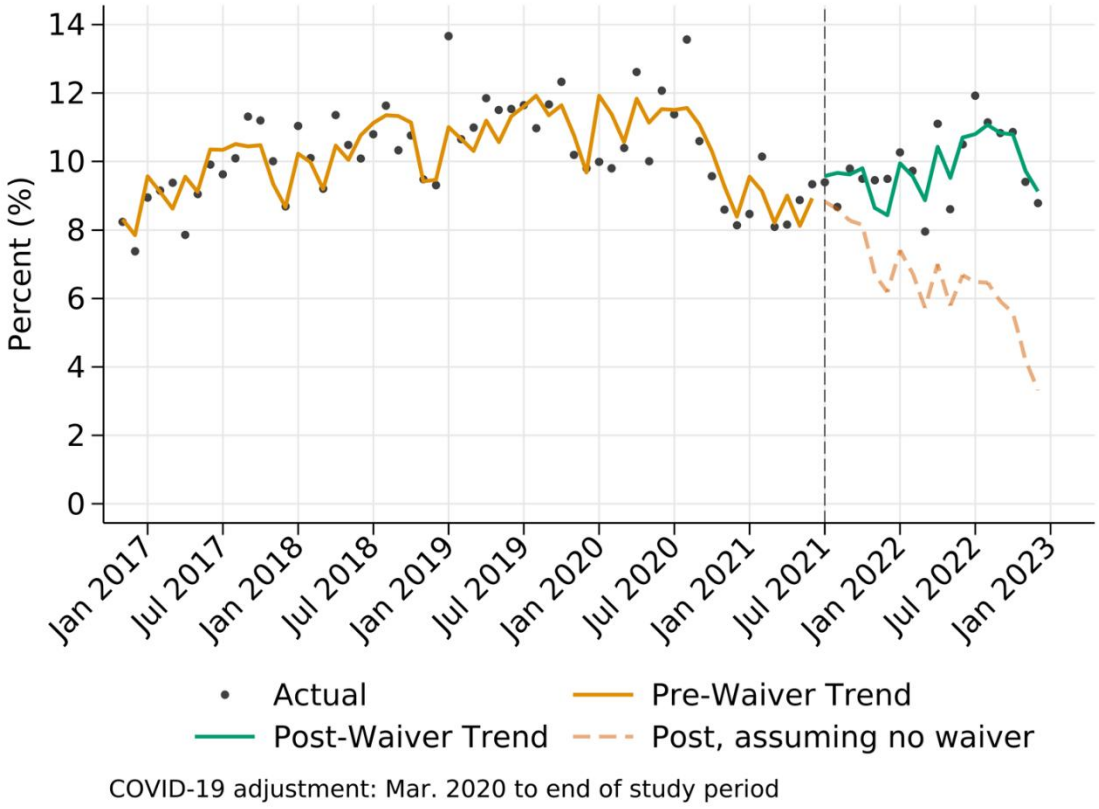


Table 0.54 Initiation and Engagement of Alcohol and Other Drug Abuse or Dependence Treatment (IET) – Engagement for All Substances

	Baseline	SP Waiver Implementation	Difference
Average Predicted Outcome, July 2021	8.0306*	8.7859*	0.7552
	(7.3955, 8.6657)	(8.2243, 9.3474)	(-0.0906, 1.6010)
Slope	0.0639*	0.3609*	0.297*
	(0.0455, 0.0822)	(0.2691, 0.4526)	(0.2073, 0.3866)
Average Predicted Outcome, Dec 2022	4.0421*	9.8461*	5.8039*
	(2.2643, 5.8200)	(9.2712, 10.4209)	(3.9497, 7.6581)
N	146,986		

*Notes: 95% confidence intervals in parentheses. SP = Standard Plan. *p < 0.05.*

Follow-up after Emergency Department Visit for Alcohol and Other Drug Abuse or Dependence (FUA) within 7 Days

Pre-implementation this measure was largely flat with a small but statistically positive trend. At the point of implementation in July 2021, the model identifies a decrease of approximately 3.5 percentage points in the measure. The pre-implementation slope, which was effectively zero, is replaced post-implementation with a positive but not statistically significant slope. Although statistically zero, the lower trend projects out to February 2023 having a difference in the measure of nearly 5 percentage points.

Figure 0.63 Follow-up after Emergency Department Visit for Alcohol and Other Drug Abuse or Dependence (7 Days)

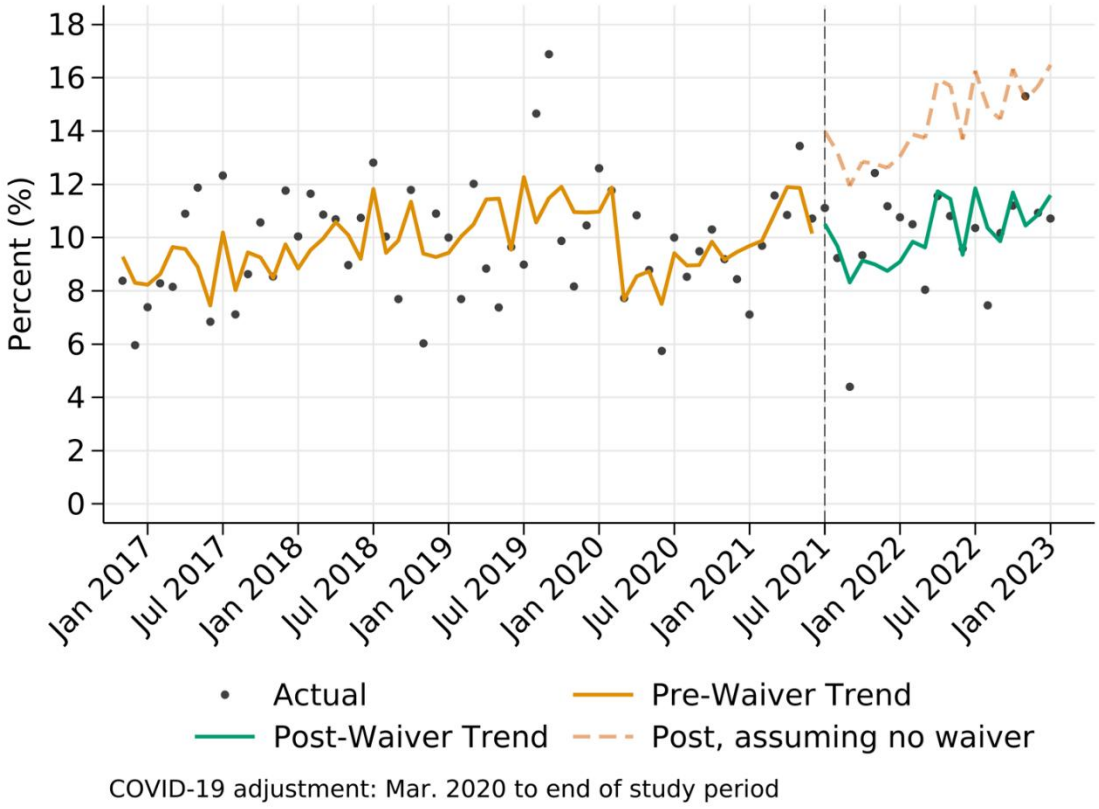


Table 0.55 Follow-up after Emergency Department Visit for Alcohol and Other Drug Abuse or Dependence (7 Days)

	Baseline	SP Waiver Implementation	Difference
Average Predicted Outcome, July 2021	11.7988*	8.3273*	-3.4716*
	(9.8484, 13.7493)	(6.5301, 10.1245)	(-6.1697, -0.7734)
Slope	0.0815*	0.0025	-0.079
	(0.0326, 0.1304)	(-0.2613, 0.2663)	(-0.3383, 0.1803)
Average Predicted Outcome, Jan 2023	16.6257*	11.7322*	-4.8935
	(11.2369, 22.0145)	(9.9072, 13.5572)	(-10.5513, 0.7642)
N	18,384		

*Notes: 95% confidence intervals in parentheses. SP = Standard Plan. *p < 0.05.*

Follow-up after Emergency Department Visit for Alcohol and Other Drug Abuse or Dependence (FUA) within 30 Days

Pre-implementation, this measure was largely flat with statistically zero trend. At the point of implementation in July 2021, the model identifies a statistically significant decrease of approximately 4.8 percentage points in the measure. The pre-implementation slope, which was a little greater than 0, is replaced post-implementation with a statistically zero slope. Despite a statistically zero trend, the lower trend projects out to February 2023 having a difference in the measure of approximately 6.6 percentage points, which is not quite statistically significant.

Figure 0.64 Follow-up after Emergency Department Visit for Alcohol and Other Drug Abuse or Dependence (30 Days)

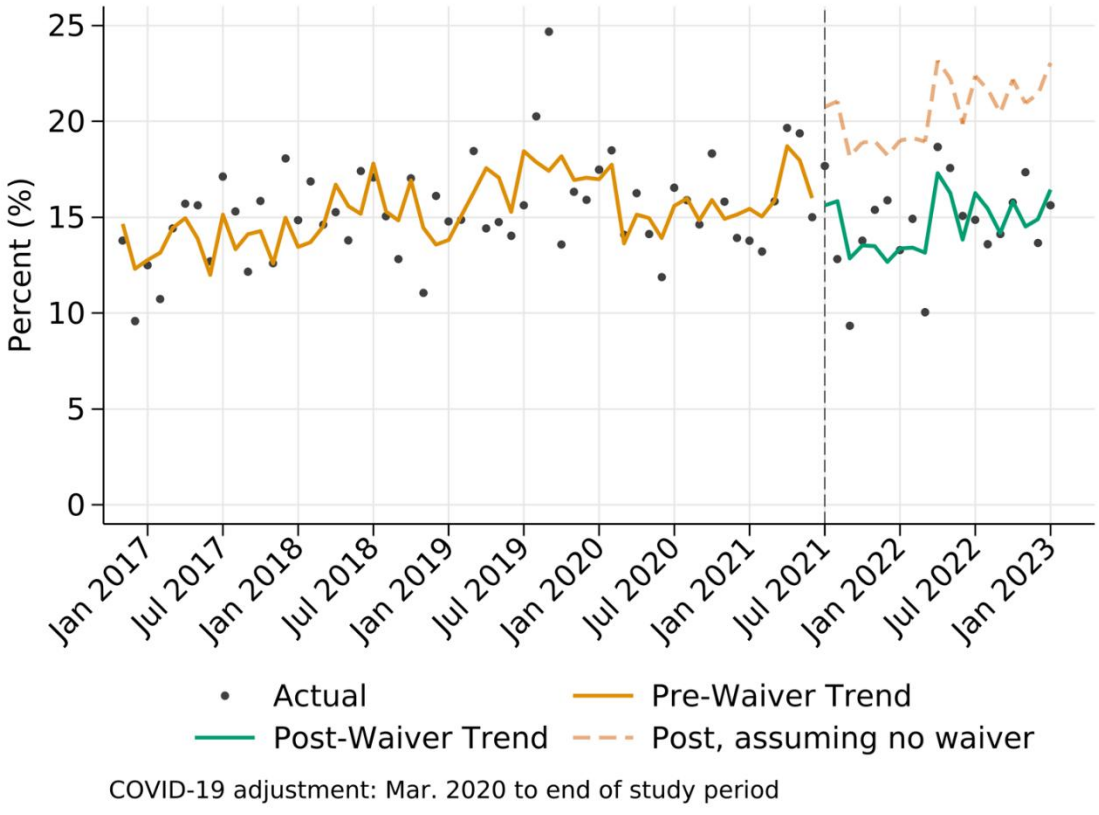


Table 0.56 Follow-up after Emergency Department Visit for Alcohol and Other Drug Abuse or Dependence (30 Days)

	Baseline	SP Waiver Implementation	Difference
Average Predicted Outcome, July 2021	18.0336*	12.894*	-5.1396*
	(15.7263, 20.3408)	(10.7910, 14.9970)	(-8.2929, -1.9863)
Slope	0.1314*	0.0498	-0.0816
	(0.0738, 0.1889)	(-0.2633, 0.3628)	(-0.3896, 0.2265)
Average Predicted Outcome, Jan 2023	23.1758*	16.5679*	-6.6079
	(16.7415, 29.6101)	(14.4664, 18.6695)	(-13.3464, 0.1306)
N	18,384		

*Notes: 95% confidence intervals in parentheses. SP = Standard Plan. *p < 0.05.*

Follow-up after Emergency Department Visit for Mental Illness (FUM) within 7 days

Pre-implementation this measure had a positive trend. At the point of implementation in July 2021, the model identifies a decrease of approximately 2.5 percentage points in the measure, but this is not statistically significant. The pre-implementation slope is .14 and post-implementation slope is statistically zero. Despite the slope in the pre-implementation period being statistically different from zero, the difference in the slope between the two periods is not statistically significant. The trend projects out to February 2023 having a not quite statistically significant difference in the measure of approximately 10 percentage points.

Figure 0.65 7-day Follow-up after Emergency Department Visit for Mental Illness

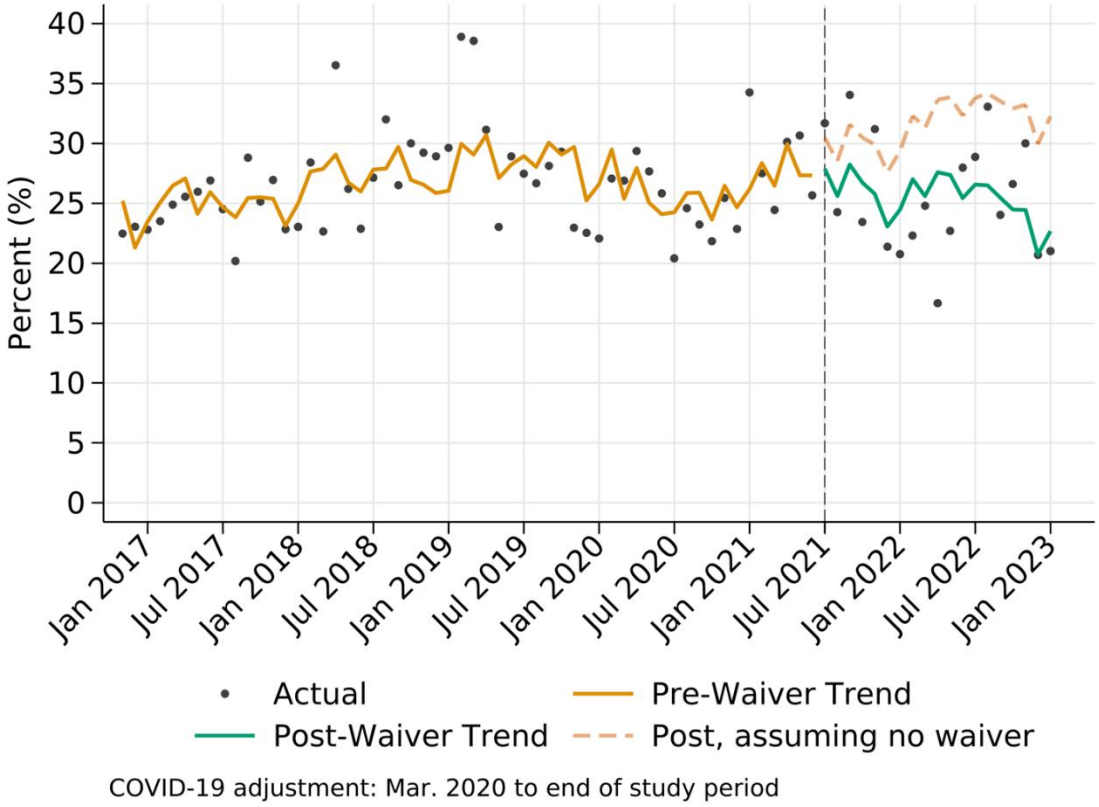


Table 0.57 7-day Follow-up after Emergency Department Visit for Mental Illness

	Baseline	SP Waiver Implementation	Difference
Average Predicted Outcome, July 2021	29.0847*	26.5042*	-2.5805
	(25.6630, 32.5063)	(23.2272, 29.7811)	(-7.3502, 2.1893)
Slope	0.1431*	-0.2461	-0.3892
	(0.0577, 0.2286)	(-0.7364, 0.2442)	(-0.8724, 0.0940)
Average Predicted Outcome, Jan 2023	34.4518*	24.8659*	-9.5859
	(24.6361, 44.2675)	(21.4820, 28.2497)	(-19.9192, 0.7474)
N	12,382		

*Notes: 95% confidence intervals in parentheses. SP = Standard Plan. *p < 0.05.*

Follow-up after Emergency Department Visit for Mental Illness (FUM) within 30 days

Pre-implementation, this measure was largely flat with a small and statistically positive trend. At the point of implementation in July 2021, the model identifies a statistically zero change in the measure values. The pre-implementation slope is 0.14 and post-implementation slope is -0.17. The model projects out to February 2023 to not have a statistically significant difference in measure values.

Figure 0.66 30-day Follow-up after Emergency Department Visit for Mental Illness

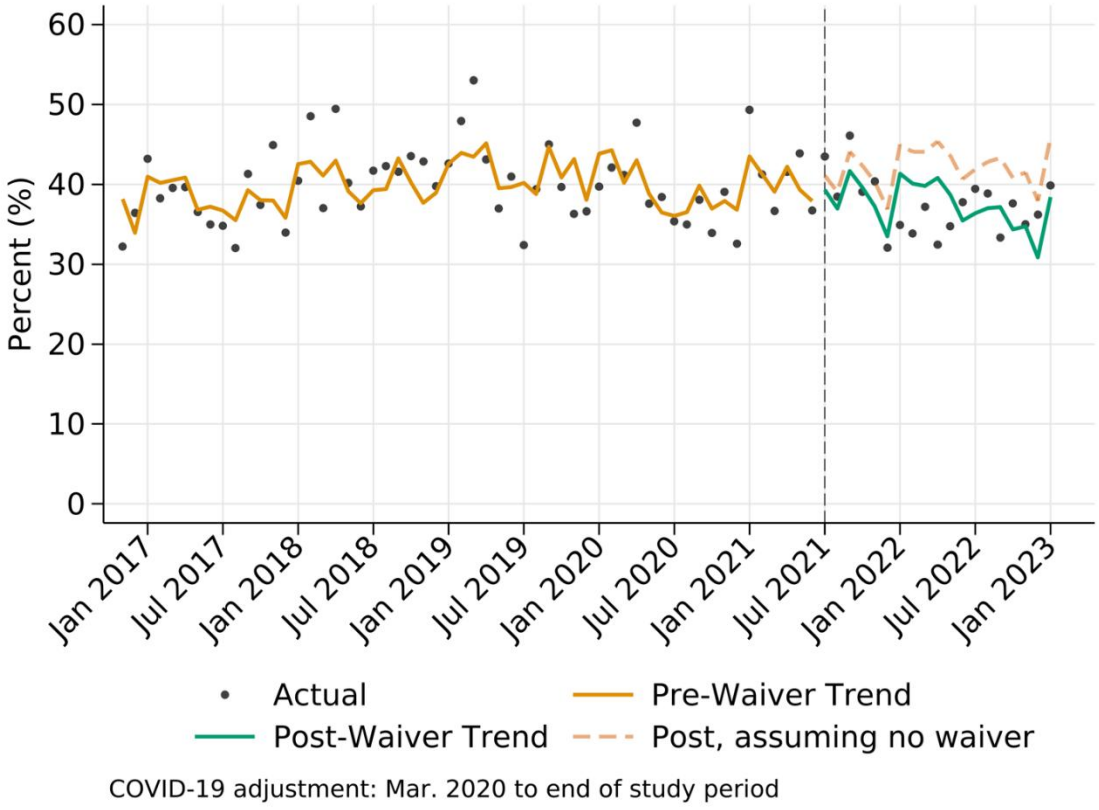


Table 0.58 30-day Follow-up after Emergency Department Visit for Mental Illness

	Baseline	SP Waiver Implementation	Difference
Average Predicted Outcome, July 2021	41.2296*	39.457*	-1.7726
	(37.5217, 44.9375)	(35.8902, 43.0238)	(-6.9570, 3.4119)
Slope	0.1403*	-0.171	-0.3113
	(0.0445, 0.2361)	(-0.7063, 0.3643)	(-0.8385, 0.2159)
Average Predicted Outcome, Jan 2023	44.7432*	37.3675*	-7.3757
	(34.0974, 55.3890)	(33.6310, 41.1039)	(-18.6336, 3.8821)
N	12,382		

*Notes: 95% confidence intervals in parentheses. SP = Standard Plan. *p < 0.05.*

Metabolic Monitoring for Children and Adolescents on Antipsychotics (APM): Composite (Glucose and Cholesterol test)

This sub measure is a composite of the other two in this family. Therefore, it is not surprising it exhibits similar temporal patterns to those. We see the rapid decline during the early pandemic, a recovery to pre pandemic levels coupled with a downward trend throughout 2021. These lead to a rather disparate estimate of post-implementation trend from the pre-implementation trend, leading to an ever-increasing gap between projected and realized post-implementation outcomes.

Figure 0.67 Metabolic Monitoring for Children and Adolescents on Antipsychotics (APM): Composite (Glucose and Cholesterol test)

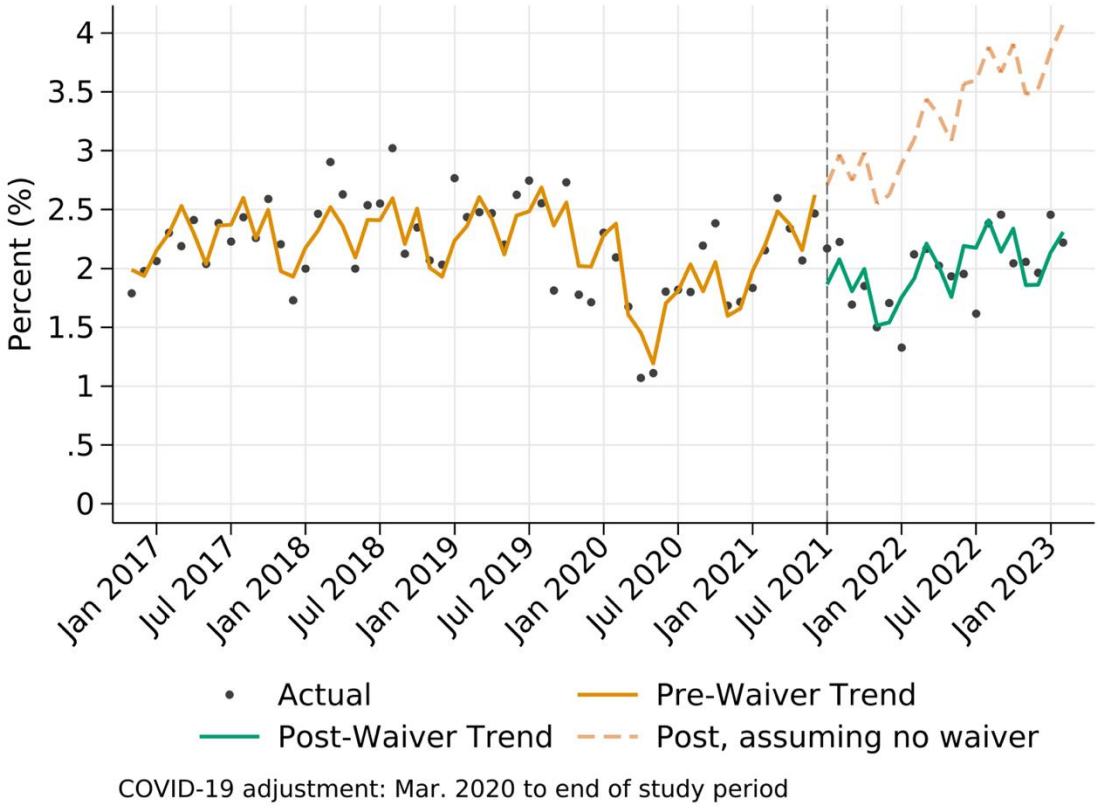


Table 0.59 Metabolic Monitoring for Children and Adolescents on Antipsychotics (APM): Composite (Glucose and Cholesterol test)

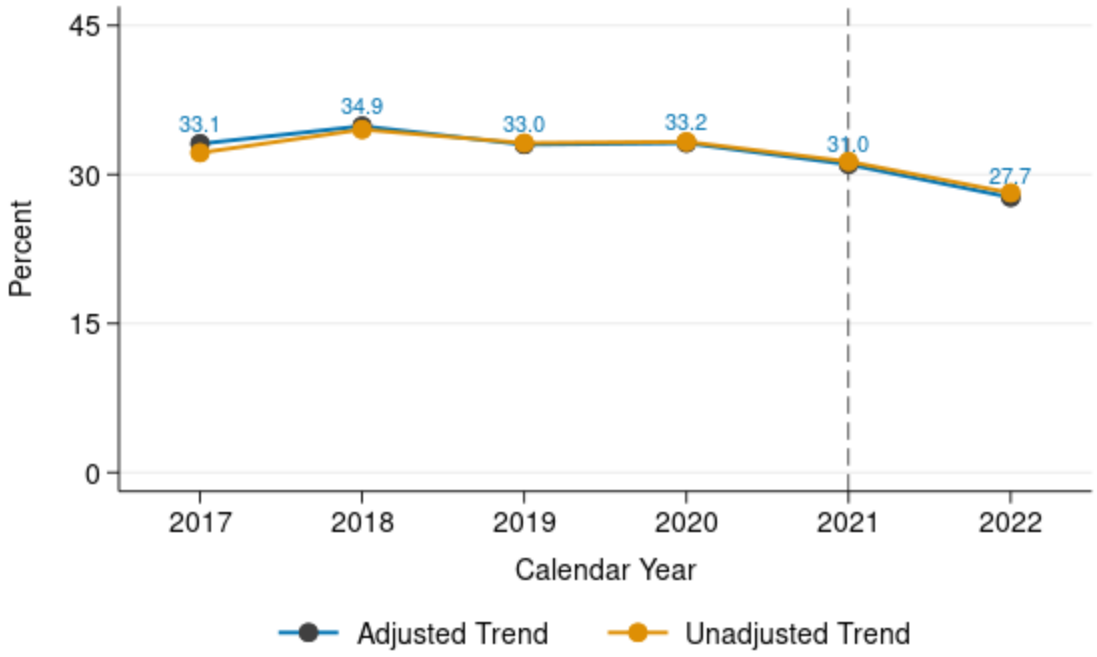
	Baseline	SP Waiver Implementation	Difference
Average Predicted Outcome, July 2021	2.5755*	1.7328*	-0.8427*
	(2.3696, 2.7814)	(1.5661, 1.8994)	(-1.0974, -0.5881)
Slope	0.002	-0.0464*	-0.0484*
	(-0.0034, 0.0075)	(-0.0710, -0.0218)	(-0.0725, -0.0244)
Average Predicted Outcome, Feb 2023	4.0134*	2.2504*	-1.763*
	(3.4581, 4.5687)	(2.0717, 2.4291)	(-2.3335, -1.1924)
N	387,570		

*Notes: 95% confidence intervals in parentheses. SP = Standard Plan. *p < 0.05.*

Continuation of Pharmacotherapy for OUD / Pharmacotherapy for OUD (POD)

The percentage of adults 18 years of age and older with pharmacotherapy for OUD who have at least 180 days of continuous treatment was relatively stable between 2017 and 2020. The highest percentage occurred in 2018 at 34.9%. The measure has declined since 2020, ending at 27.7% in 2022.

Figure 0.68 Trends in Continuation of Pharmacotherapy for OUD



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 (indicator flags).

Use of Behavioral Health Care for People With SMI/SUD/SED

This measure is the percent of beneficiaries with Severe Mental Illness, Substance Use Disorder, and/or Serious Emotional Disorder who receive behavioral healthcare in the month. Trends are positive in both the pre- and post- implementation periods, but a notable decrease at implementation of over four percentage points only slightly declines through February 2023 to 3.5 percentage points.

Figure 0.69 Use of Behavioral Health Care for People With SMI/SUD/SED

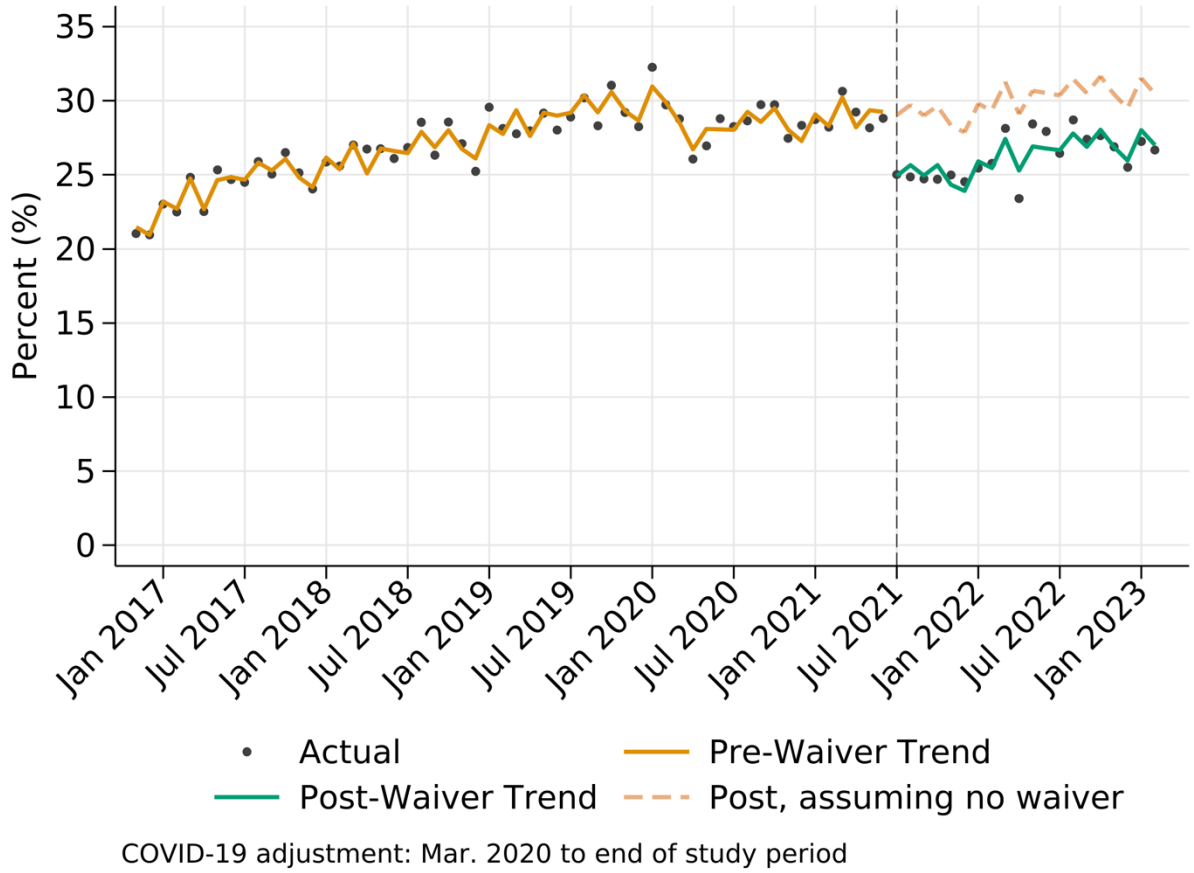


Table 0.60 Use of Behavioral Health Care for People With SMI/SUD/SED

	Baseline	SP Waiver Implementation	Difference
Average Predicted Outcome, July 2021	28.626*	24.521*	-4.105*
	(27.9311, 29.3209)	(23.9223, 25.1197)	(-4.8635, -3.3464)
Slope	0.1382*	0.1717*	0.0335
	(0.1173, 0.1590)	(0.0831, 0.2603)	(-0.0507, 0.1176)
Average Predicted Outcome, Feb 2023	30.585*	27.1162*	-3.4688*
	(28.7733, 32.3967)	(26.5166, 27.7159)	(-5.3612, -1.5764)
N	569,607		

*Notes: 95% confidence intervals in parentheses. SP = Standard Plan. *p < 0.05.*

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

The measure calculates the percent of beneficiaries with SUD who had at least one ambulatory (outpatient) visit that month. Pre-implementation, this measure has a slight upward trend of 0.08 percentage points per month which does not change significantly after intervention. At the point of implementation in July 2021, the model identifies a statistically significant decrease of approximately 2.3 percentage points in the measure. The pre implementation slope which was slightly positive, remains slightly positive. The small instantaneous decrease and lack of difference in slope means a small statistically significant decrease in projected value in January 2023 of 2.2 percentage points.

Figure 0.70 Access to Preventive/Ambulatory Health Services for Adult Medicaid Beneficiaries with SUD

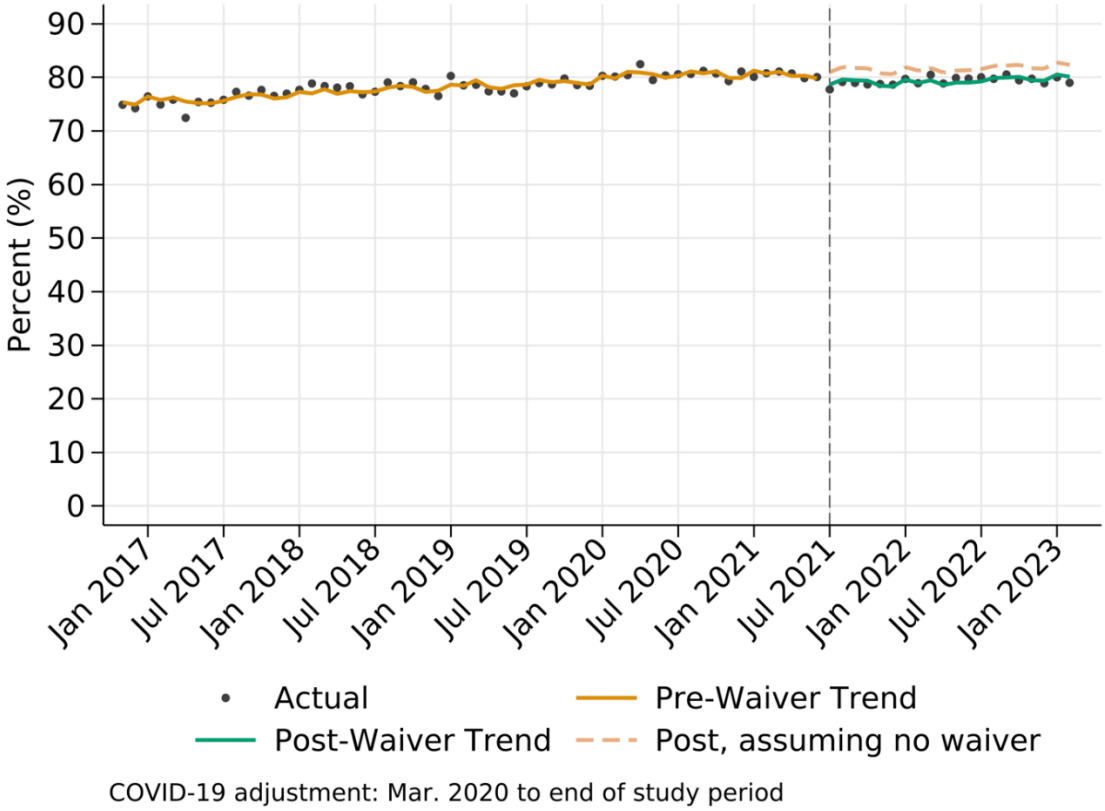


Table 0.61 Access to Preventive/Ambulatory Health Services for Adult Medicaid Beneficiaries with SUD

	Baseline	SP Waiver Implementation	Difference
Average Predicted Outcome, July 2021	80.4724*	78.1369*	-2.3355*
	(79.9757, 80.9691)	(77.6594, 78.6143)	(-2.9238, -1.7472)
Slope	0.0784*	0.0837*	0.0053
	(0.0607, 0.0961)	(0.0183, 0.1490)	(-0.0566, 0.0671)
Average Predicted Outcome, Feb 2023	81.2299*	78.9945*	-2.2354*
	(79.9125, 82.5473)	(78.5465, 79.4424)	(-3.6112, -0.8597)
N	713,665		

*Notes: 95% confidence intervals in parentheses. SP = Standard Plan. *p < 0.05.*

Qualitative Findings

The qualitative results support the mixed quantitative results, with perceptions of improved access to behavioral health services and barriers to accessing them. After the transition, many participating healthcare organizations and beneficiaries noted improvement in access to and quality of behavioral health services. However, this experience was not universal, as some participating beneficiaries shared concerns about the difficulty of finding a behavioral health provider for specialized services under managed care.

Before the launch of Medicaid managed care, we asked participants from healthcare provider organizations offering behavioral health services for their perceptions about the impact of the upcoming transition to managed care on behavioral health services. Participants shared varied assessments of the likely impact of managed care on access and quality of behavioral health services. Many participants saw the integration of behavioral and physical health as a cornerstone for better care coordination and quality of care. To that end, some participants described getting new electronic medical record systems or updating existing ones to ensure accurate health information exchange, which was described as a critical component for ensuring health information exchange. A few participants from primary care practices shared that they hired or planned to hire additional staff to provide behavioral health services and care management services to high-need behavioral health patients. An administrator at a pediatric practice described their approach as:

> We have been working with our behavioral health people as interim care management people for behavioral health issues. We've already implemented the impact model, where we have access to a consulting psychiatrist for patients with a PHQ9 of 10 or higher and patients identified as needing additional care management.

Several participants described challenges during the transition that could hamper access to behavioral health services. First, licensing and credentialing of behavioral health providers was described as a time-intensive effort during the transition to managed care, which could delay patient care. Even though credentialing and licensing requirements did not change under managed care, the ending of temporary emergency flexibilities established during the COVID-19 pandemic, such as a pause on re-credentialing and re-verification, could have contributed to this perception. Second, participants providing behavioral health services or planning to integrate them with primary care were concerned about the availability of behavioral health providers. At the same time, participants from smaller independent practices that did not provide behavioral health services lacked the resources to integrate behavioral health services.

Early results from 2023 show that participating healthcare organizations and beneficiaries noted improvements in providing behavioral health services under PHPs, such as "opening up some more services and more care for some of the clients," improving the quality of behavioral health services. [Administrator, BH Practice] Similarly, many participating adult beneficiaries and caregivers described finding a behavioral health provider or keeping their established providers under managed care and receiving the same or better care as they used to under the FFS model.

However, the availability of mental health providers who accepted Medicaid was still a major concern shared by several healthcare organizations and beneficiaries. Several adults and some caregivers of children with conditions like autism, ADHD, and other developmental disorders echoed these concerns. They described difficulty finding a therapist for their child or themselves and calling or emailing to figure this out, which took time and effort. Some caregivers could not find a therapist accepting Medicaid who provided specialized therapy like cognitive behavioral therapy, resulting in out-of-pocket expenses. A caregiver described multiple facets of challenges in finding and accessing behavioral health as follows:

> I wanted to get him specialized counseling for ADHD, coping skills, and other issues, but it appears that none of them are on the [provider] list. Oh, gosh, I've called so many….The ones on my list of recommendations aren't covered. They'll just say it's cash out of pocket, sometimes $300 an hour. The specific type of counseling I wanted to do is not covered. And then they're running into waitlists and stuff, so…

Many participants from healthcare organizations expressed confusion about administering Tailored Plans, such as billing, coverage, and service integration, and hence favored delaying the launch.

Overall, several participating beneficiaries and healthcare organizations found improvement in the availability of behavioral health services. However, some shared concerns about the complexity of finding a behavioral health provider under managed care and confusion about Tailored Plans, which can result in delays in finding the right care.

Hypothesis 1.3: The implementation of Medicaid managed care will increase the use of medications for opioid use disorder (MOUD) and other opioid treatment services and decrease the long-term use of opioids.

This hypothesis examines the use of MOUD and behavioral health services by SP enrollees and reductions in the use of opioids. Much of SUD treatment takes place in Medicaid Direct, currently, but some care is initiated under SPs. Opioid prescribing is also a potential concern in SPs to reduce the number of beneficiaries in the future who are exposed to potential harms from opioid medications. We have analyzed four metrics for this hypothesis. As reported under Hypothesis 1.2 (output is not repeated here), the initiation and engagement of opioid use treatment have both improved among beneficiaries in SPs since SP implementation. The rate of harmful opioid use in people without cancer has worsened and there was no difference in the rate of opioid prescriptions from multiple providers in beneficiaries without cancer, although rates are generally very low in the SP population.

Table 0.62 Summary of Metric Results for Hypothesis 1.

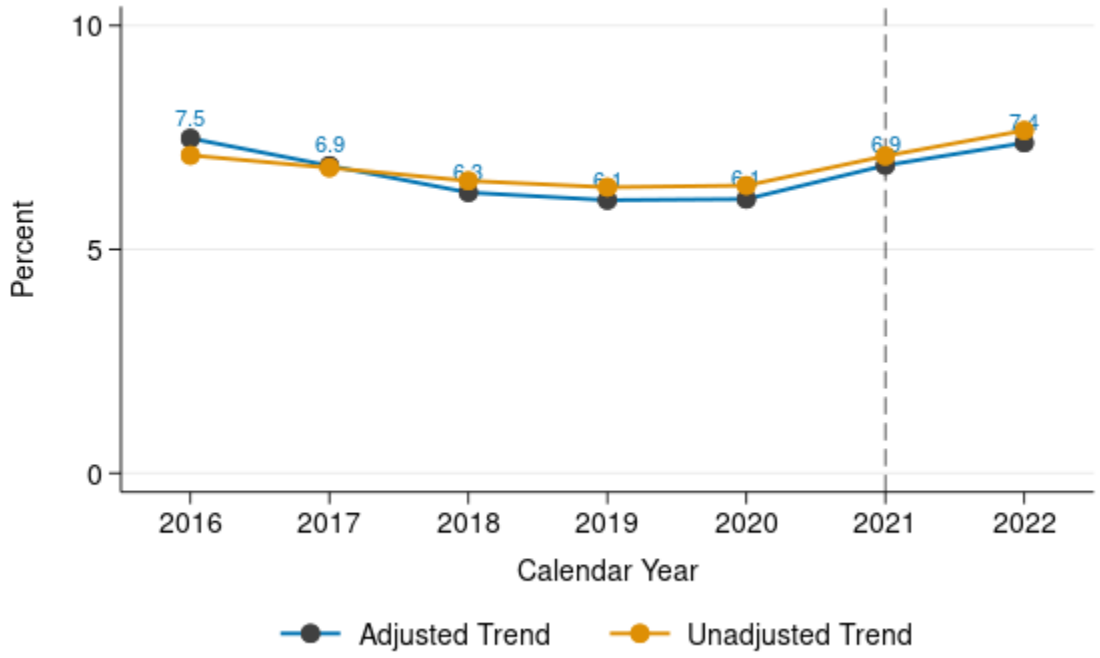
Measure (Metric abbreviation)	Adjusted waiver effects at endpoint	Improved / Worsened / No Difference
Initiation of Opioid Use Treatment (IET)	4.8% pts	Improved
Engagement in Opioid Use Treatment (IET)	4.8% pts	Improved
Use of Opioids at High Dosage in Persons without Cancer (OHD/HDO/SUD18)	--	Worsened
Use of Opioids from Multiple Providers in Persons Without Cancer (OMP/UOP/SUD19)	--	No Difference

Use of Opioids at High Dosage in Persons without Cancer (OHD/HDO)

The percentage of beneficiaries aged 18 and older without cancer who received prescriptions for opioids with an average daily dosage greater than or equal to 90 morphine milligram equivalents (MME) over a

period of 90 days or more decreased from 7.5% in 2016 to 6.1% in 2020. However, the measure has increased (i.e., worsened) since 2020. In 2022 the measure was 7.4%.

Figure 0.71 Trends in Use of Opioids at High Dosage in Persons without Cancer

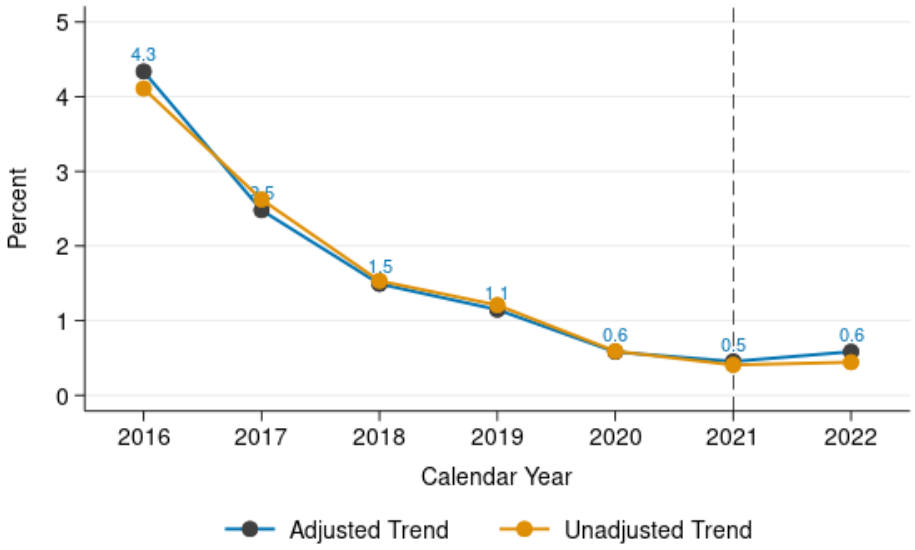


Notes: Adjusted model includes age (quadratic), urban location, race specific indicator variables and the Chronic Illness and Disability Payment System (CDPS + Rx) risk adjustment scores (indicator flags).

Use of Opioids from Multiple Providers in Persons Without Cancer (OMP/UOP)

The percentage of individuals ≥ 18 years of age who received prescriptions for opioids from ≥ 4 prescribers and ≥ 4 pharmacies within ≤ 180 days has declined dramatically in the past seven years. This could be both due to NC's lock-in program, which limits the number of prescribers and pharmacies for those with high levels of opioid prescriptions, and the greater use of the State's Controlled Substances Reporting System. The measure declined from 4.3% in 2016 to 0.6% in 2020. It has stayed level since then, ending at 0.6% in 2022.

Figure 0.72 Trends in Use of Opioids from Multiple Providers in Persons without Cancer



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 (indicator flags).

Hypothesis 1.4: The implementation of Advanced Medical Homes (AMHs) will increase the delivery of care management services and will improve quality of care and health outcomes.

This hypothesis tests whether specific outcome measures are different between Tier 3 Advanced Medical Homes (AMH3) and tiers 1-2 AMHs for Standard Plan beneficiaries. We test these hypotheses with multivariate models that control for differences in beneficiary characteristics such as comorbidities, demographic characteristics, as well as time-invariant practice-level characteristics at the provider (NPI) level using NPI-level fixed effects. All models were run on beneficiary-month data, where beneficiaries were linked to an AMH 1,2, or 3 based the AMH status of their attributed primary care provider. Beneficiary-months not attributed to an AMH practice are excluded. Models were run on data from September 2018, the earliest date that the AMH level is available in our data, through February 2023. We examine differences in outcomes that occurred after SP launch, as well as differences between AMH tiers that may have predated SP launch. We point out cases where the trends between AMH tiers were not similar before SP launch, which means that AMH1-2 practices may not be an ideal comparison group for AMH3s and results should be interpreted with caution. We present difference-in-differences (DiD) models that are fully adjusted for covariates and practice-fixed effects and use these results to drive the narrative. We also display but generally don't comment on models that omit practice fixed effects to facilitate comparisons about changes in results due to controlling for provider-level factors. The figures in this chapter represent predicted values adjusted for demographic characteristics (age, sex, race, Hispanic ethnicity, and urban residence), beneficiary comorbidities as well as provider taxonomy groups (primary care, OBGYN, mental health, and pediatrics).

We examined 26 outcome measures to determine whether tier 3 AMHs had different outcomes compared to tier 1-2 AMHs since the implementation of SPs. We found an impressive rate of growth in the number of practices designated as an AMH and the percent of the beneficiary population receiving care management services, we found lower levels of cervical cancer screening and lower levels of counseling for nutrition for children, and no differences in patterns of care for the remaining 24 measures. We do note that in some cases, beneficiaries in all types of AMHs had better outcomes after SP launch than before it, as noted in the results for hypotheses 1.1-1.3.

Table 0.63 Summary of Metric Results for Hypothesis 1.4

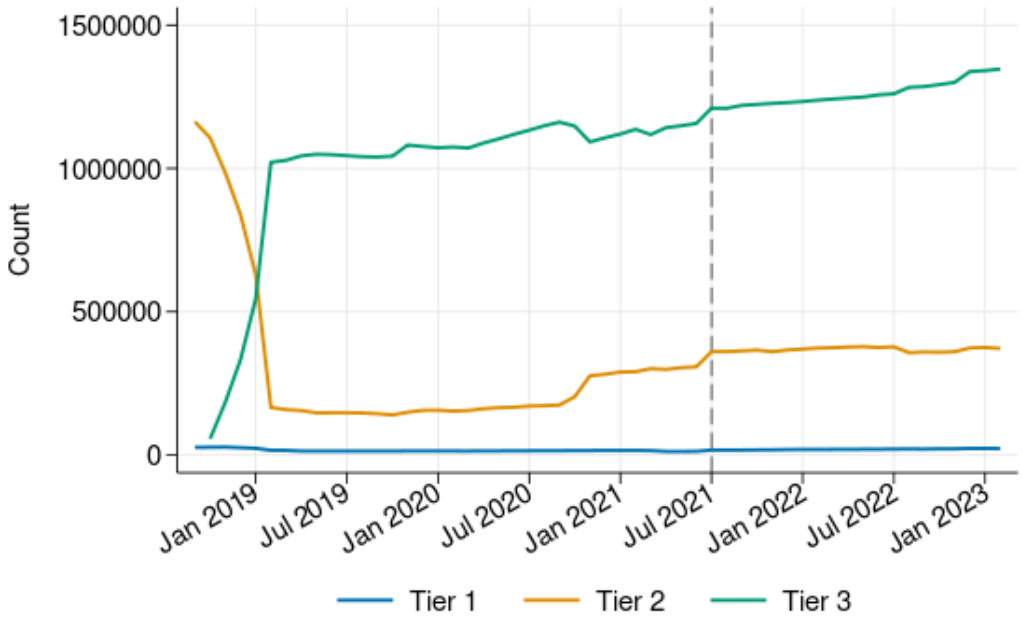
AMH Measure Set	Measure (Abbreviation)	Adjusted difference between AMH3 and AMH1-2	AMH3 vs. AMH1-2 (Higher/Lower/No difference)
	Number of Medicaid Beneficiaries Across AMH Tiers	--	NA
	Access to Care Management Services	1.98% pts	Higher
	Access to Preventative/Ambulatory Health Services (AAP)	0.24% pts (NS)	No Difference
Y	Child and Adolescent Well-Care Visits (WCV)	-0.07% pts (NS)	No Difference
Y	Well-child visits in first 30 months (W30)	-0.86% pts (NS)	No Difference
Y	Prenatal and Postpartum Care (PPC): Timely Prenatal Care	0.09% pts (NS)	No Difference
Y	Prenatal and Postpartum Care (PPC): Postpartum Care	1.25% pts (NS)	No Difference
Y	Chlamydia Screening in Women (CHL)	0.44% pts (NS)	No Difference
Y	Cervical Cancer Screening (CCS)	-1.19% pts	Lower
Y	Childhood Immunization Status (CIS) – Combination 10	-0.26% pts (NS)	No Difference
Y	Immunizations for Adolescents (IMA) – Combination 2	0.13% pts (NS)	No Difference
	Weight Assessment for Children/Adolescents (WCC)	-0.80% pts (NS)	No Difference
	Counseling for Nutrition for Children/Adolescents (WCC)	-1.66% pts	Lower
	Counseling for Physical Activity for Children/Adolescents (WCC)	0.30% pts (NS)	No Difference
Y	Plan All-Cause Readmissions (PCR): Observed	0.22% pts (NS)	No Difference
	Chronic Obstructive Pulmonary Disease or Asthma in Older Adults Admission Rate (PQI-05)	1.03 per 100,000 (NS)	No Difference
	Asthma in Younger Adults Admission Rate (PQI-15)	0.85 per 100,000 (NS)	No Difference
	Asthma Admission Rate (PDI-14)	0.23 per 100,000 (NS)	No Difference
	Antidepressant Medication Management (AMM): Acute Phase Retention	0.28% pts (NS)	No Difference
	Antidepressant Medication Management (AMM): Continuation Phase Retention	-0.68% pts (NS)	No Difference
	Follow-up After Hospitalization for Mental Illness (FUH): 7 days after discharge	-3.44% pts (NS)	No Difference
	Follow-up After Hospitalization for Mental Illness (FUH): 30 days after discharge	-1.82% pts (NS)	No Difference
	Diabetes Short-term Complications Admission Rate (PDI-15)	1.08 per 100,000 (NS)	No Difference
	Heart Failure Admissions Rate (PQI-08)	0.51 per 100,000 (NS)	No Difference
	Gastroenteritis Admission Rate (PDI-16)	-0.36% per 100,000 (NS)	No Difference
	Urinary Tract Infection Admission Rate (PDI 18)	-0.23% per 100,000 (NS)	No Difference
	Follow-up Care for Children Prescribed ADHD Medication (ADD): Initiation Phase	0.32% pts (NS)	No Difference
	Follow-up Care for Children Prescribed ADHD Medication (ADD): Continuation and Maintenance Phase	0.86% pts (NS)	No Difference

Notes: NS = Not statistically significant, indicating that there could potentially be no difference between AMH3 and AMH1-2.

Number of Medicaid Beneficiaries Across AMH Tiers

Figure 5.73 plots the number of beneficiaries attributed to AMHs tiers 1-3 each month as recognized by NC DHHS (that is, this variable does not necessarily reflect those contracting with one or more SPs). At the start of the study period, most beneficiaries were in Tier 2 practices because of the automatic conversion of CCNC practices into Tier 2. There was then a large uptick in Tier 3 AMH practices in the first few months of the study period fueled by conversions from Tier 2 to Tier 3 practices. Starting in late 2020, there was a modest increase in beneficiaries attributed to both Tier 2 and Tier 3 practices. Tier 1 AMHs are the least common type, with very few attributed beneficiaries; providers are no longer able to enroll as Tier 1 AMHs. In the analyses below, the comparisons between AMH3s and AMH1-2s compares outcome metrics during the months that each practice is recognized in each level based on the AMH linked to each beneficiary. That is, a practice that switches from AMH2 to AMH3 would be included separately in each category during only the months they were recognized at each tier. Difference-in-difference estimates with provider fixed effects therefore compare whether outcomes from AMH3s that occur after the implementation of Standard Plans, are different than post-launch outcomes from AMH1-2s, controlling for trends in outcomes prior to SP launch, practice-level time-invariant factors, and beneficiary characteristics.

Figure 0.73 Number of Beneficiaries Across AMH Tier Levels



Access to Care Management Services (CM)

Figure 5.74 displays the trends in the percent of beneficiaries receiving care management (CM) services by AMH status. After SP launch, beneficiaries in AMH3s received care management directly from their practice, while those in AMH1-2s received care management through their health plans. The percent of beneficiaries receiving CM was very similar between the types of AMH at about 1% of beneficiaries prior to SP launch. After the launch of SPs, there was a rapid increase in the percent of beneficiaries receiving CM across both AMH types. By the end of the study period, this rate has increased more than 5.5-fold. The difference-in-differences analysis estimates that there was a 0.9%-point increase in the receipt of CM by all SP beneficiaries attributed to an AMH model, and an additional 2.0%-point increase by beneficiaries in Tier 3 AMHs after SP launch.

Figure 0.74 Access to Care Management Services

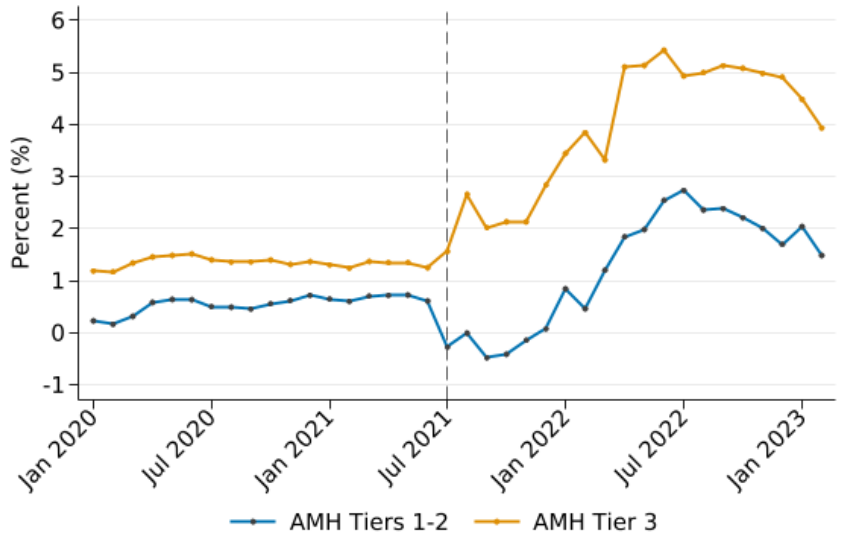


Table 0.64 Difference-in-differences (DiD) estimates for Access to Care Management Services (CM)

	Adjusted Model	
	NPI Fixed Effects	***No Fixed Effects***
Difference between post-SP launch and pre-launch	0.851 * (0.107,1.595)	1.311 * (0.228,2.394)
Difference between AMH3 and AMH1-2	0.777 (-0.292,1.846)	0.0595 (-0.208,0.327)
DiD estimate (post*AMH3)	1.983 * (0.858,3.107)	
N	57,023,504	

*Notes: 95% confidence intervals in parentheses. NPI = National Provider Identifier. * p<0.05*

Access to Ambulatory / Preventative Care (AAP)

The modified AAP metric gives the percentage of beneficiaries 20 years and older who had an ambulatory or preventive care visit during the calendar month. Analysis of trends in the pre-SP baseline period show that the trends in use are very similar by AMH type and were generally lower after SP launch. However, controlling for covariates, the difference-in-differences analysis finds that after SP launch, beneficiaries in both types of AMHs had 1.8%-point greater access to preventative care but that beneficiaries in AMH3s had slightly lower rates of access than those in AMH1-2s throughout the study period. We do not find evidence of a differential effect of SP launch on AAP rates by AMH level.

Figure 0.75 Access to Preventative/Ambulatory Health Services (AAP)

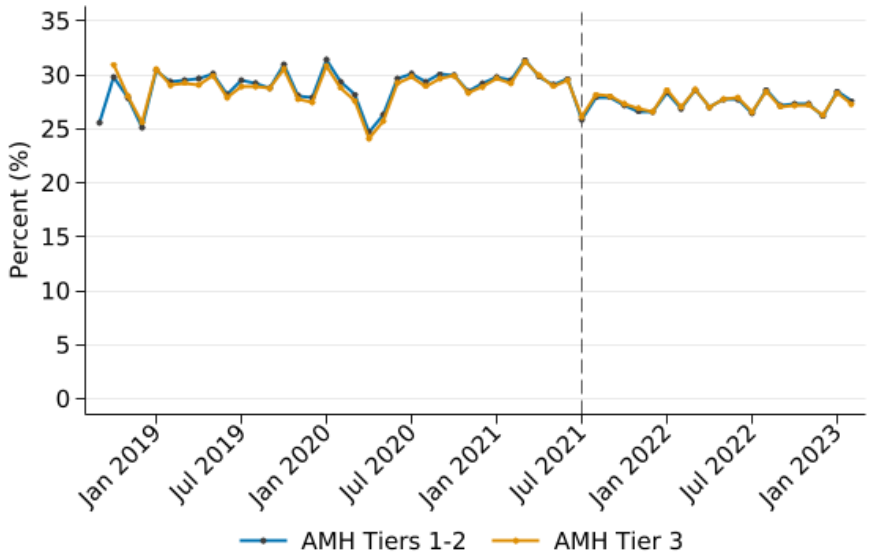


Table 0.65 DiD estimates for Access to Preventative/Ambulatory Health Services (AAP)

	Adjusted Model	
	NPI Fixed Effects	***No Fixed Effects***
Difference between post-SP launch and pre-launch	1.787 * (1.458,2.115)	1.772 * (1.356,2.188)
Difference between AMH3 and AMH1-2	-0.297 * (-0.529,-0.0658)	-0.270 (-0.598,0.0582)
DiD estimate (post*AMH3)	0.242 (-0.0254,0.510)	0.330 (-0.0151,0.676)
N	16,970,560	

*Notes: 95% confidence intervals in parentheses. NPI = National Provider Identifier. * p<0.05*

Child and Adolescent Well-care visits (WCV)

The modified WCV measure gives the percent of children age 3-21 years of age who received one or more well-care visit with a primary care practitioner or an OB/GYN practitioner during each month. It is a highly seasonal variable, which higher rates during the summer than the rest of the year, except during the

COVID-19 PHE. No differences were detected between the two types of AMHs either pre- or post-launch and rates were higher pre-SP than post by almost 2.0% points.

Figure 0.76 Child and Adolescent Well-Care Visits (WCV)

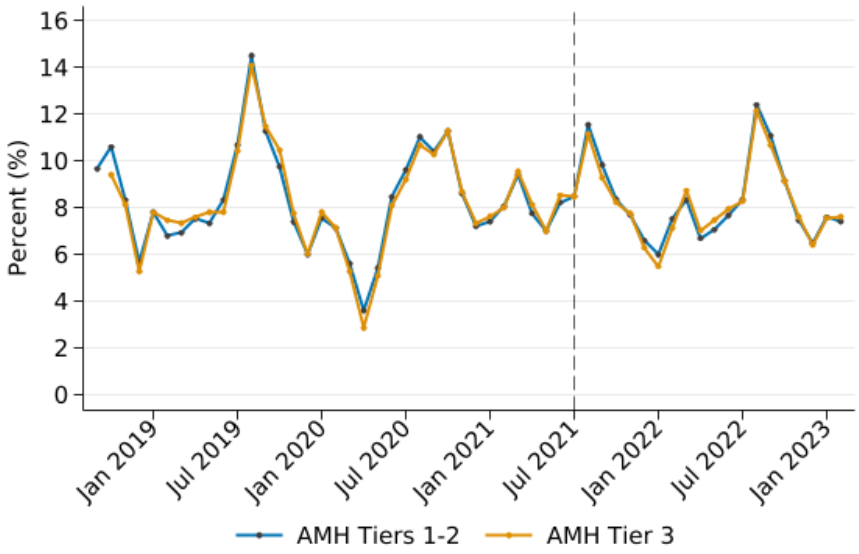


Table 0.66 DiD estimates for Child and Adolescent Well-Care Visits (WCV)

	Adjusted Model	
	NPI Fixed Effects	***No Fixed Effects***
Difference between post-SP launch and pre-launch	-1.980 * (-2.361,-1.599)	-2.665 * (-3.116,-2.214)
Difference between AMH3 and AMH1-2	-0.0562 (-0.226,0.114)	0.607 * (0.330,0.884)
DiD estimate (post*AMH3)	-0.0647 (-0.311,0.181)	0.0886 (-0.247,0.424)
N	52,612,444	

*Notes: 95% confidence intervals in parentheses. NPI = National Provider Identifier. * p<0.05*

Well Child Visits in the First 30 Months of Life (W30)

The well-child visit measure (W30) determines the percentage of beneficiaries who turned 30 months old each month and had at least six well-child visits with a primary care physician during their first 30 months of life. The rate was stable prior to SP implementation at 60-70% of children. The difference-in-differences analysis finds no differences in the well-child visit rate after SP implementation for AMH3 plans as

compared with AMH 1-2 plans, although controlling for covariates, the rates were higher for both types of AMH3 after SP implementation.

Figure 0.77 Well Child Visits in the First 30 Months of Life (W30)

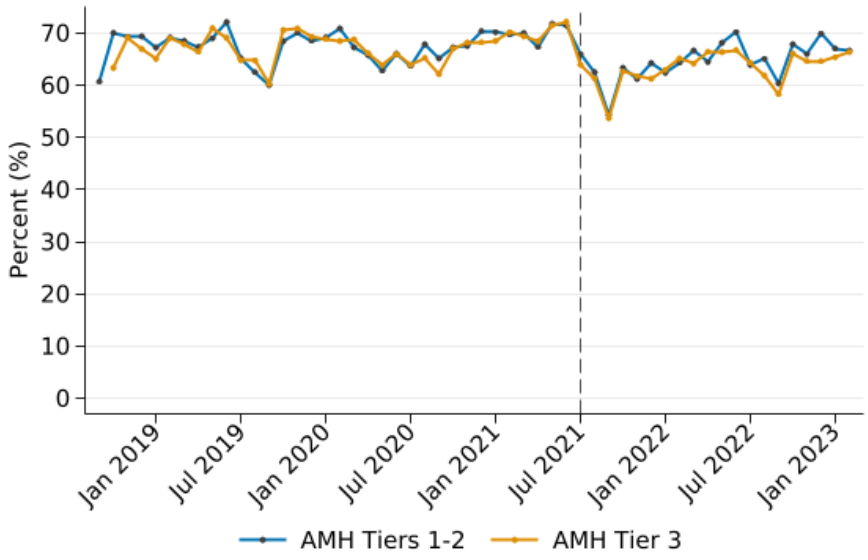


Table 0.67 DiD estimates for Well Child Visits in the First 30 Months of Life (W30)

	Adjusted Model	
	NPI Fixed Effects	***No Fixed Effects***
Difference between post-SP launch and pre-launch	6.597 * (4.266,8.928)	5.000 * (2.512,7.488)
Difference between AMH3 and AMH1-2	-0.513 (-1.526,0.500)	0.697 (-0.977,2.371)
DiD estimate (post*AMH3)	-0.856 (-2.334,0.621)	-0.971 (-2.698,0.757)
N	275,415	

*Notes: 95% confidence intervals in parentheses. NPI = National Provider Identifier. * p<0.05*

Prenatal and Postpartum Care (PPC): Timely Prenatal Care

PPC reflects the percentage of deliveries in the month where a woman had a prenatal care visit during the first trimester of pregnancy or within 42 days of enrolling in a health plan. We find no statistically significant differences between types of AMHs or from pre- to post-SP implementation. The rates are very stable at just under 80%.

Figure 0.78 Prenatal and Postpartum Care (PPC): Timely Prenatal Care

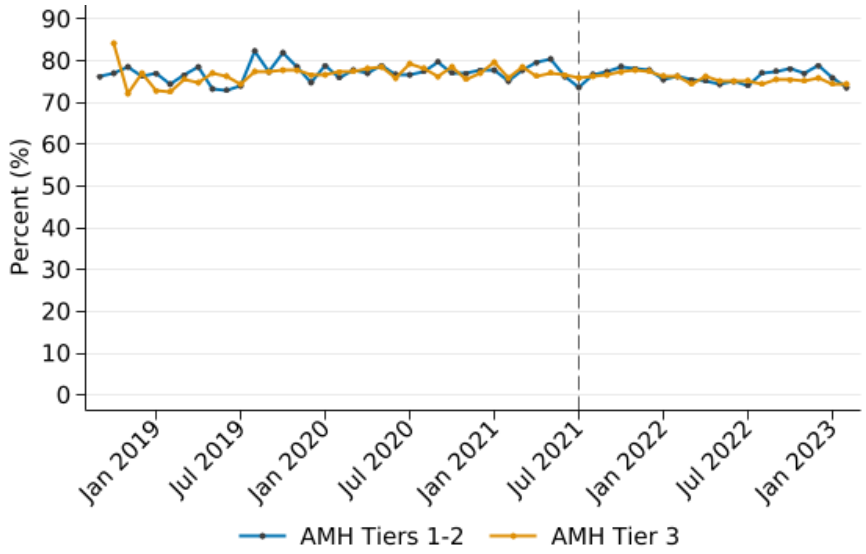


Table 0.68 DiD estimates for Prenatal and Postpartum Care (PPC): Timely Prenatal Care

	Adjusted Model	
	NPI Fixed Effects	***No Fixed Effects***
Difference between post-SP launch and pre-launch	-1.522 (-4.241,1.196)	-3.391 * (1.356,2.188)
Difference between AMH3 and AMH1-2	-0.643 (-1.898,0.613)	-1.100 * (-0.598,0.0582)
DiD estimate (post*AMH3)	0.0927 (-1.165,1.351)	1.371 * (0.00701,2.735)
N	120,369	

*Notes: 95% confidence intervals in parentheses. NPI = National Provider Identifier. * p<0.05*

Prenatal and Postpartum Care (PPC): Postpartum Care

This measure reflects the percentage of deliveries in which women had a postpartum visit on or between 7 and 84 days after delivery. The rates were declining over the study period, and we find even after adjusting for covariates that the rates dropped by an average of 7.8%-points between the pre and the post period across beneficiaries. We do not find evidence of a difference between types of AMHs either prior to or after SP implementation.

Figure 0.79 Prenatal and Postpartum Care (PPC): Postpartum Care

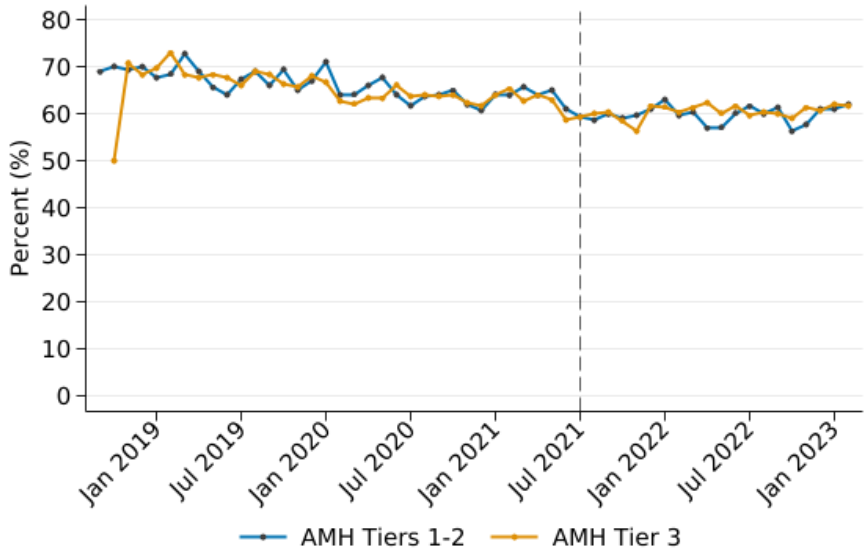


Table 0.69 DiD estimates for Prenatal and Postpartum Care (PPC): Postpartum Care

	Adjusted Model	
	NPI Fixed Effects	***No Fixed Effects***
Difference between post-SP launch and pre-launch	-7.793 * (-11.06,-4.529)	-7.977 * (-11.16,-4.795)
Difference between AMH3 and AMH1-2	-0.707 (-2.171,0.758)	-0.380 (-1.923,1.163)
DiD estimate (post*AMH3)	1.251 (-0.411,2.913)	1.262 (-0.376,2.901)
	120,369	

*Notes: 95% confidence intervals in parentheses. NPI = National Provider Identifier. * p<0.05*

Chlamydia Screening in Women (CHL)

The rate of Chlamydia screening in women (CHL) is an annual measure. It shows a decline over time from about 60% at the start of the study period to about 55% in 2022. The multivariate difference-in-differences results show that the rates overall were lower by about 1.6%-points after SP launch, but we find no statistically significant differences by AMH type either before or after the implementation of Standard Plans.

Figure 0.80 Chlamydia Screening in Women (CHL)

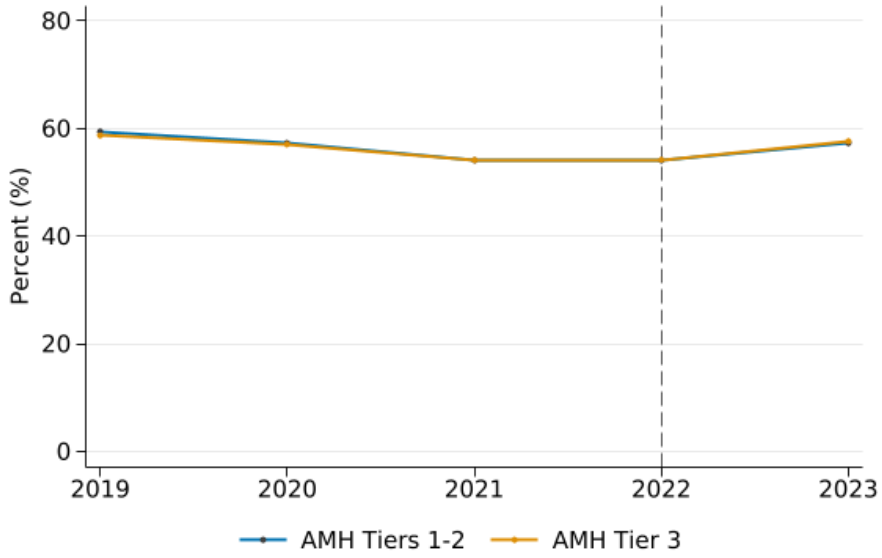


Table 0.70 DiD estimates for Chlamydia Screening in Women (CHL)

	Adjusted Model	
	NPI Fixed Effects	***No Fixed Effects***
Difference between post-SP launch and pre-launch	-1.598 * (-2.709,-0.488)	-1.614 * (-3.034,-0.195)
Difference between AMH3 and AMH1-2	-0.695 (-1.856,0.465)	2.605 * (1.455,3.754)
DiD estimate (post*AMH3)	0.438 (-0.953,1.829)	0.309 (-1.412,2.031)
N	413,191	

*Notes: 95% confidence intervals in parentheses. NPI = National Provider Identifier. * p<0.05*

Cervical Cancer Screening (CCS)

The annual rate of cervical cancer screening in Standard Plan eligible beneficiaries showed a slight decrease over the study period, from 55% in 2019 to just over 50% in 2022. The trends are virtually identical by AMH type prior to launch but start to separate over time. This is consistent with the findings after adjusting for covariates – we do not find evidence of a differential change in screening rates by AMH3 practices as compared to AMH1-2 practices in the pre- period. We find that both practice types decreased by about –

1.6%-points from before to after managed care launch but that AMH3s had a 1.2%-point greater decline after launch than did beneficiaries in AMH1-2s.

Figure 0.81 Cervical Cancer Screening (CCS)

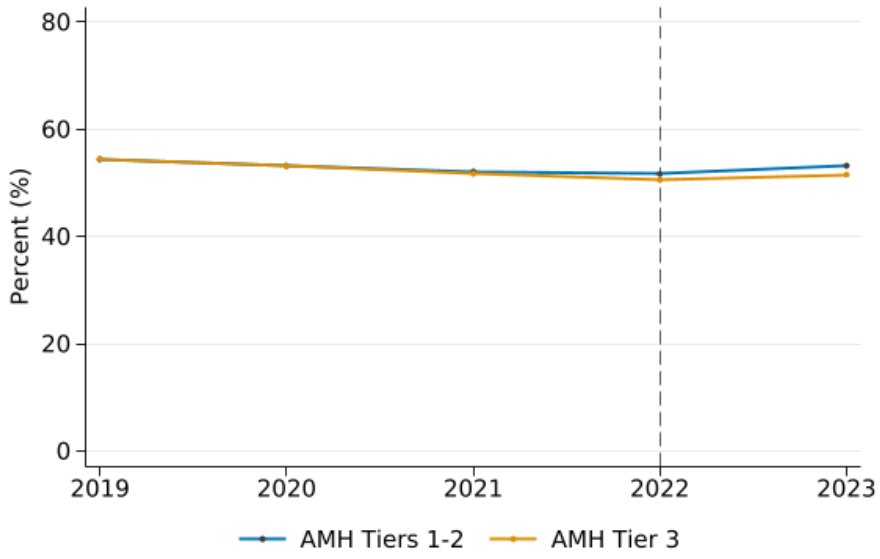


Table 0.71 DiD estimates for Cervical Cancer Screening (CCS)

	Adjusted Model	
	NPI Fixed Effects	***No Fixed Effects***
Difference between post-SP launch and pre-launch	-1.641 * (-2.392,-0.890)	-2.853 * (-3.881,-1.824)
Difference between AMH3 and AMH1-2	-0.146 (-0.893,0.602)	0.384 (-0.786,1.555)
DiD estimate (post*AMH3)	-1.190 * (-1.969,-0.410)	-1.042 * (-2.075,-0.00832)
N	971,428	

*Notes: 95% confidence intervals in parentheses. NPI = National Provider Identifier. * p<0.05*

Childhood Immunization Status (CIS) – Combination 10

This metric reflects the percentage of beneficiaries who had a four diphtheria, tetanus and acellular pertussis; three polio; one measles, mumps and rubella; three haemophilus influenza type B; three hepatitis B; one chicken pox; four pneumococcal conjugate; one hepatitis A; two or three rotavirus; and

two influenza (flu) vaccines by their second birthday. Figure 5.82 plots the annual rate of immunization by AMH status. Annual rates increased from 2019 to 2020, to 35%, then decline in 2021 and 2022 to 30%. The rates across AMH types are very similar. The multivariate difference-in-differences results (Table 5.73) similarly find no evidence of a difference in Combination 10 by AMH type during the post year (2022), controlling for levels and trends in the baseline period.

Figure 0.82 Childhood Immunization Status (CIS)

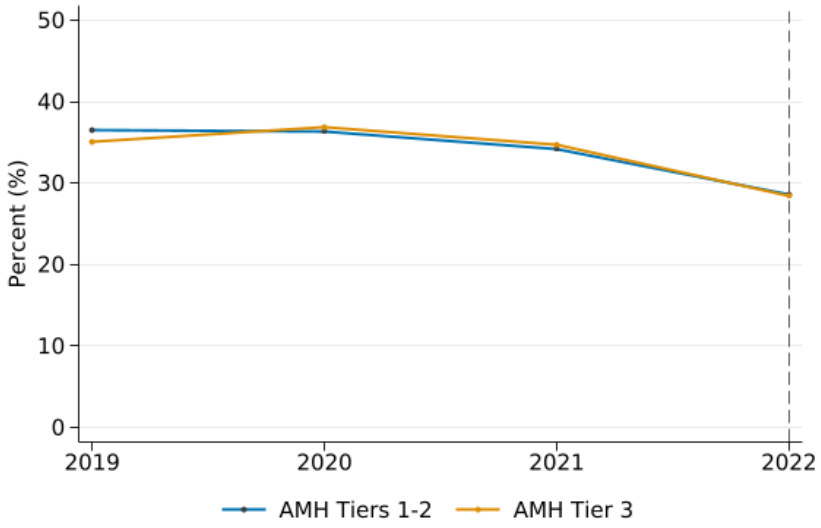


Table 0.72 DiD estimates for Childhood Immunization Status (CIS)

	Adjusted Model	
	NPI Fixed Effects	***No Fixed Effects***
Difference between post-SP launch and pre-launch	-6.346 * (-7.982,-4.711)	-5.619 * (-7.998,-3.240)
Difference between AMH3 and AMH1-2	0.288 (-1.010,1.586)	3.159 * (0.720,5.599)
DiD estimate (post*AMH3)	-0.259 (-2.026,1.508)	-0.873 (-3.421,1.675)
N	233,915	

*Notes: 95% confidence intervals in parentheses. NPI = National Provider Identifier. * p<0.05*

Immunization For Adolescents (IMA) – Combination 2

IMA reflects the percent of adolescent beneficiaries who had one dose of meningococcal vaccine, one Tdap vaccine and the complete human papillomavirus vaccine series by their 13th birthday. Figure 5.83 shows that the rate of vaccination for adolescents in AMH tiers 1-2 and level 3 practices were constant over time at just over 30%.

The difference-in-differences analysis comparing the immunization rate for beneficiaries in AMH3 practices to those in AMH1-2 practices finds no difference AMH tiers after SP implementation.

Figure 0.83 Immunization for Adolescents (IMA)

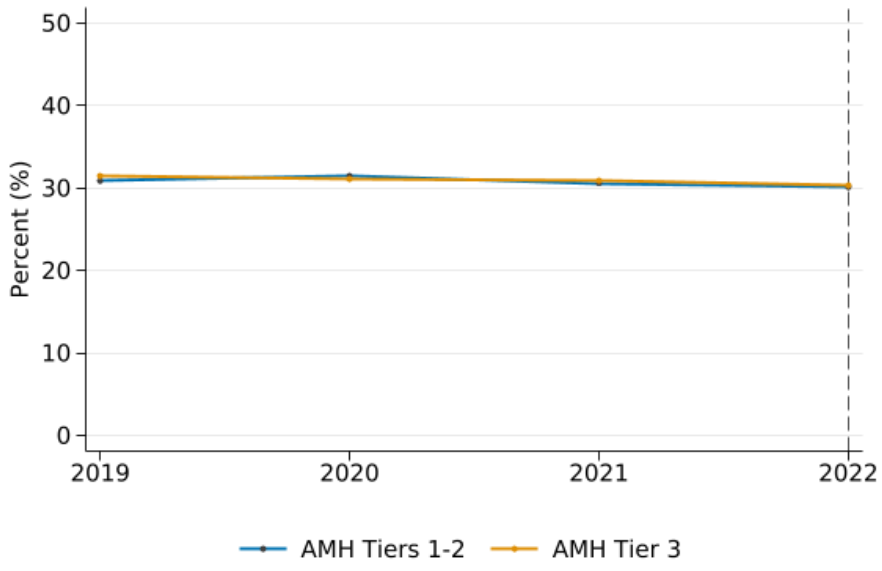


Table 0.73 DiD estimates for Immunization for Adolescents (IMA)

	Adjusted Model	
	NPI Fixed Effects	***No Fixed Effects***
Difference between post-SP launch and pre-launch	-1.176 (-2.869,0.517)	-0.042 (-6.447,-1.790)
Difference between AMH3 and AMH1-2	0.149 (-1.292,1.591)	7.382 * (4.774,9.991)
DiD estimate (post*AMH3)	0.132 (-1.742,2.007)	-0.993 (-3.589,1.604)
N	221,478	

*Notes: 95% confidence intervals in parentheses. NPI = National Provider Identifier. * p<0.05*

Weight Assessment and Counseling for Nutrition and Physical Activity for Children/Adolescents (WCC)

This metric reflects the percentage of Medicaid beneficiaries aged 3-17 who had an outpatient visit with a PCP or OB/GYN and who had evidence in claims or encounters of: (1) BMI percentile documentation; (2) counseling for nutrition; or (3) counseling for physical activity.

Figure 5.84 plots the trends in BMI percentile documentation by AMH level adjusted for covariates. There is seasonable variation in this variable, with a higher percent of BMI documentation during the summer, as expected. The rates by AMH levels are quite similar throughout the study period.

In the multivariate difference-in-differences models, we find no differences between AMH models after SP launch. However, AMH3s had been increasing BMI documentation at a higher rate than AMH1-2s prior to SP implementation; these dissimilar trends prior to SP launch mean that AMH1-2s may not be the ideal comparators for AMH3 so results should be interpreted with caution.

Figure 0.84 Weight Assessment and Counseling for Nutrition and Physical Activity for Children/Adolescents (WCC): BMI Percentile Documentation

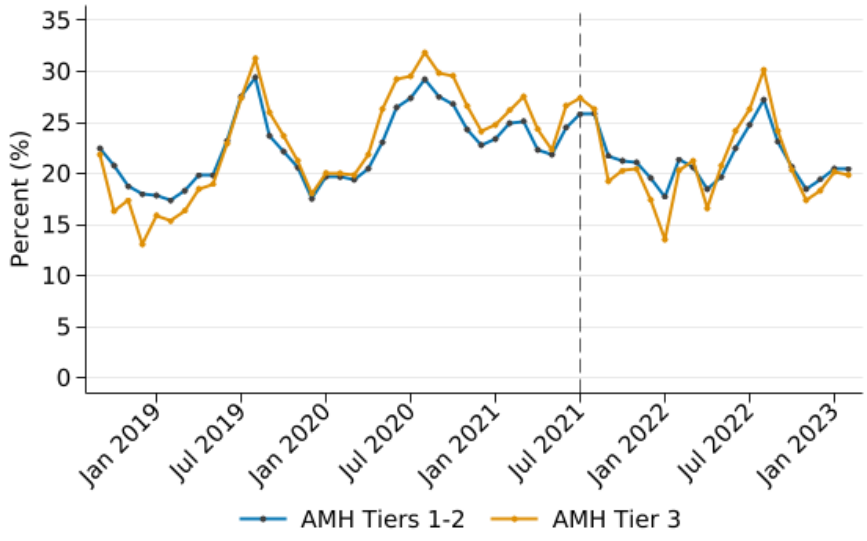


Table 0.74 DiD Estimates for Weight Assessment and Counseling for Nutrition and Physical Activity for Children/Adolescents (WCC): BMI Percentile Documentation

	Adjusted Model	
	NPI Fixed Effects	***No Fixed Effects***
Difference between post-SP launch and pre-launch	-1.848 (-3.815,0.119)	-8.131 * (-10.65,-5.616)
Difference between AMH3 and AMH1-2	0.0243 (-1.325,1.374)	6.880 * (4.372,9.389)
DiD estimate (post*AMH3)	-0.799 (-2.296,0.699)	-0.0965 (-2.331,2.138)
N	7,339,671	

*Notes: 95% confidence intervals in parentheses. NPI = National Provider Identifier. * p<0.05*

Figure 5.85 plots the trends in counseling for nutrition by AMH level, controlling for covariates. We find about a 1%-point higher rate by AMH3s than AMH1-2s throughout the study period, but a 1.7%-point lower rate of counseling for nutrition by AMH3s as compared with AMH1-2s after SP implementation. However, for this measure as well, the two groups' outcomes were not moving in parallel prior to SP launch and thus the findings may not be causal.

Figure 0.85 Weight Assessment and Counseling for Nutrition and Physical Activity for Children/Adolescents (WCC): Counseling for Nutrition

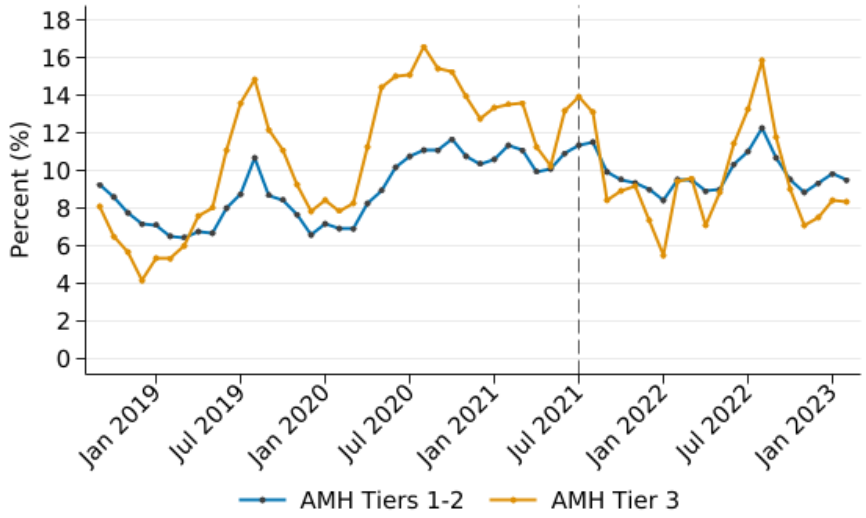


Table 0.75 DiD Estimates for Weight Assessment and Counseling for Nutrition and Physical Activity for Children/Adolescents (WCC): Counseling for Nutrition

	Adjusted Model	
	NPI Fixed Effects	***No Fixed Effects***
Difference between post-SP launch and pre-launch	-0.157 (-0.0995,2.581)	-4.546 * (-6.692,-2.400)
Difference between AMH3 and AMH1-2	1.015 * (0.0403,1.991)	5.777 * (4.014,7.541)
DiD estimate (post*AMH3)	-1.661 * (-3.267,-0.0562)	-0.682 (-2.814,1.449)
N	7,339,671	

*Notes: 95% confidence intervals in parentheses. NPI = National Provider Identifier. * p<0.05*

Finally, figure 5.86 plots the trends in counseling for physical activity by AMH level. The probability of receiving counseling for physical activity increased substantially during the pre-implementation period, from 0.5-2% to 3-7% by the end of the baseline period. After controlling for covariates, we find no evidence of a difference in the rate of providing counseling for physical activities between the two levels of AMHs in the post-SP implementation period. The rates of counseling for physical activities increased for both types of AMHs from the baseline to the SP implementation period, especially from early in the baseline period. However, the different trends in the baseline period mean that the comparison in the post-SP period is not ideal and results should be interpreted with caution.

Figure 0.86 Weight Assessment and Counseling for Nutrition and Physical Activity for Children/Adolescents (WCC): Counseling for Physical Activity

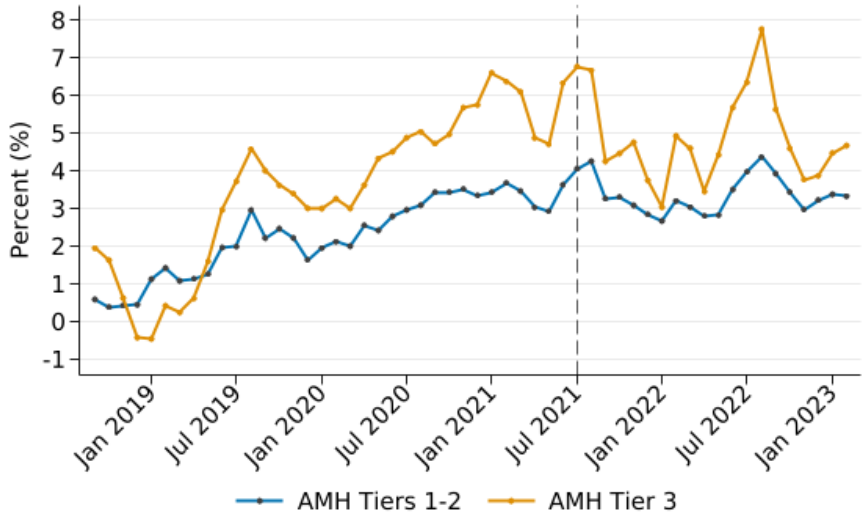


Table 0.76 DiD Estimates for Weight Assessment and Counseling for Nutrition and Physical Activity for Children/Adolescents (WCC): Counseling for Physical Activity

	Adjusted Model	
	NPI Fixed Effects	***No Fixed Effects***
Difference between post-SP launch and pre-launch	2.778 * (1.820,3.737)	1.846 * (0.823,2.869)
Difference between AMH3 and AMH1-2	0.968 * (0.152,1.785)	1.662 * (0.656,2.669)
DiD estimate (post*AMH3)	0.302 (-1.279,1.882)	0.910 (-0.593,2.414)
N	7,339,671	

*Notes: 95% confidence intervals in parentheses. NPI = National Provider Identifier. * p<0.05*

Plan All-cause Readmission Rate (PCR): Observed

This measure examines the percent of people discharged from the hospital each month that have a hospital readmission within 30 days. Lower is better for this metric. Figure 5.87 shows the adjusted trend for beneficiaries in AMH3s and AMH1-2, hovering around 15% prior to SP implementation, but dropping down closer to 12% after SP implementation. In the difference-in-differences model, after adjusting for beneficiary and practice characteristics, we find no evidence of a differential improvement from AMH3 practices as compared with AMH1-2s.

Figure 0.87 Plan All-cause Readmission Rate (PCR)

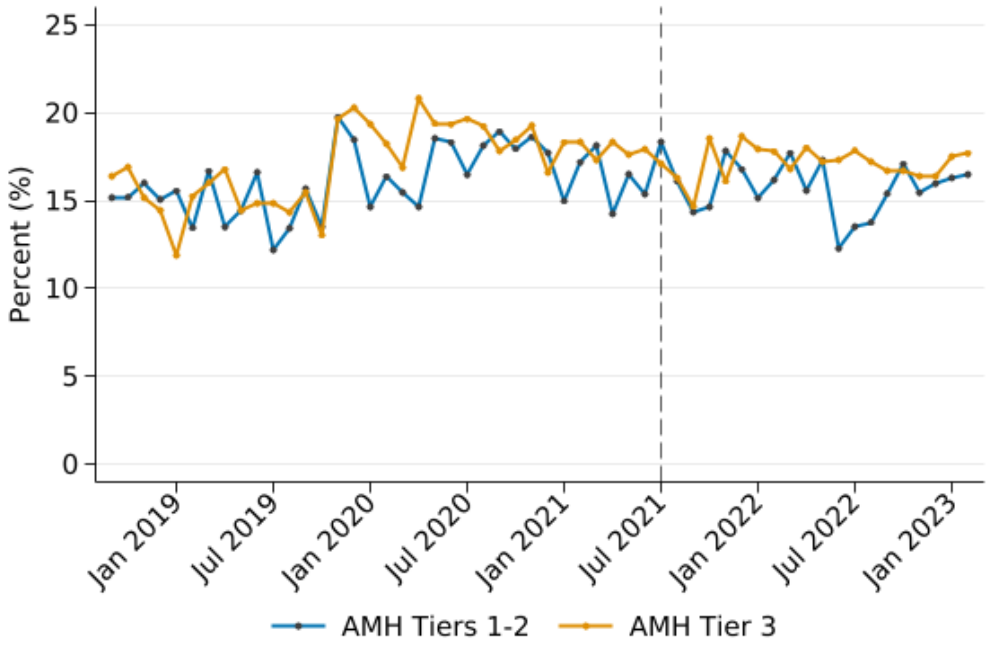


Table 0.77 DiD Estimates for Plan All-cause Readmission Rate (PCR)

	Adjusted Model	
	NPI Fixed Effects	***No Fixed Effects***
Difference between post-SP launch and pre-launch	1.179 (-1.044,3.402)	2.826 * (0.746,4.906)
Difference between AMH3 and AMH1-2	1.084* (0.0693,2.099)	-0.0852 (-0.936,0.766)
DiD estimate (post*AMH3)	0.215 (-0.916,1.347)	-0.0194 (-1.149,1.110)
N	152,631	

*Notes: 95% confidence intervals in parentheses. NPI = National Provider Identifier. * p<0.05*

Chronic Obstructive Pulmonary Disease or Asthma in Older Adults Admission Rate (PQI-05)

This metric quantifies the number of hospital admissions with a principal diagnosis of chronic obstructive pulmonary disease (COPD) or asthma per 100,000 beneficiaries aged 40 years and older. Fewer hospitalizations are better for this metric. Figure 5.88 plots the monthly admission rate by AMH status. There is a clear decline in this metric during the study period after the COVID PHE. The difference-in-differences model confirms the large decrease (36 fewer admissions per 100,000 beneficiaries/month after SP implementation). We find a larger number of COPD or Asthma admissions for AMH3s throughout the study period, after controlling for covariates, but find no evidence of differences in PQI 05 by AMH type after SP implementation (Table 5.79).

Figure 0.88 Chronic Obstructive Pulmonary Disease or Asthma in Older Adults Admission Rate (PQI-05)

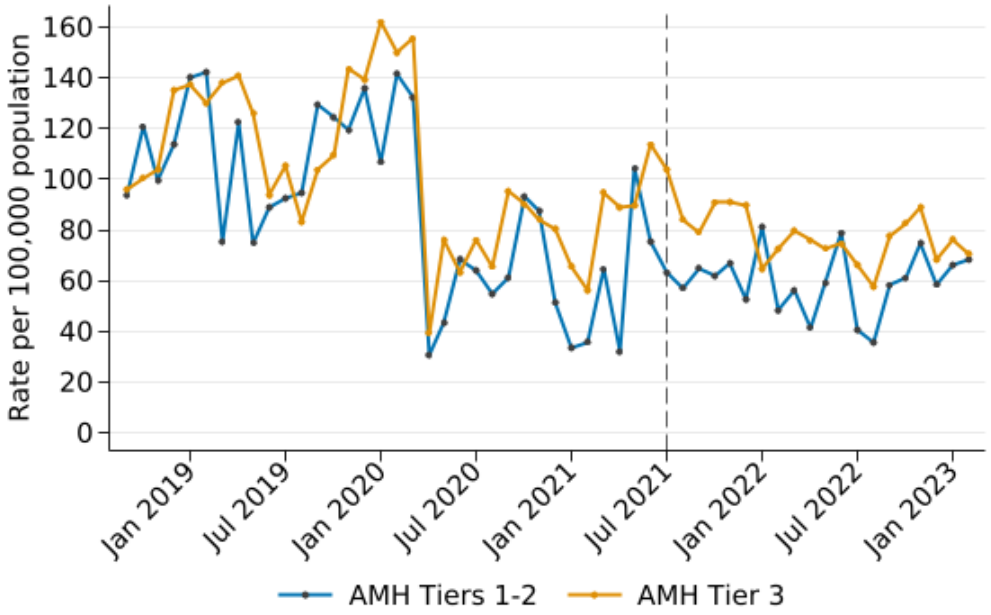


Table 0.78 DiD Estimates for Chronic Obstructive Pulmonary Disease or Asthma in Older Adults Admission Rate (PQI-05)

	Adjusted Model	
	NPI Fixed Effects	***No Fixed Effects***
Difference between post-SP launch and pre-launch	-35.77 * (-65.29,-6.256)	-27.27 (-54.65,0.112)
Difference between AMH3 and AMH1-2	16.38 * (2.085,30.67)	1.383 (-10.94,13.70)
DiD estimate (post*AMH3)	1.028 (-14.93,16.98)	2.030 (-12.59,16.65)
N	5,815,592	

*Notes: 95% confidence intervals in parentheses. NPI = National Provider Identifier. * p<0.05*

Asthma in Younger Adults Admission Rate (PQI-15)

This metric gives the rate of admissions for a principal diagnosis of asthma per 100,000 beneficiaries aged 18 to 39 years. A lower count is better for this metric. Figure 5.89 shows the trend over time by AMH type. There are notable peaks in this measure in 2019-2020. The multivariate difference-in-differences models that adjust for covariates finds no evidence of differences by AMH status.

Figure 0.89 Asthma in Younger Adults Admission Rate (PQI-15)

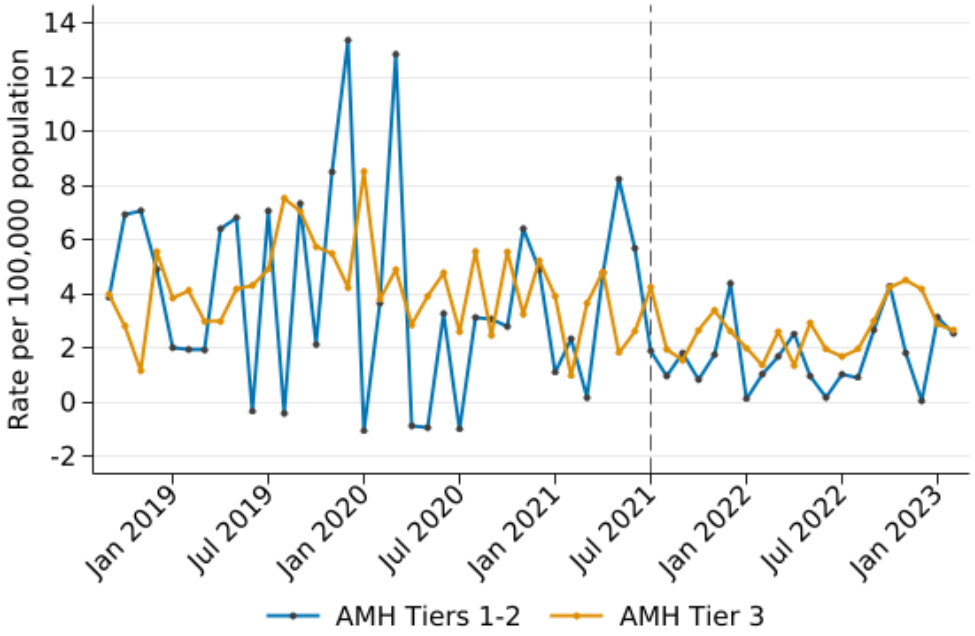


Table 0.79 DiD Estimates for Asthma in Younger Adults Admission Rate (PQI-15)

	Adjusted Model	
	NPI Fixed Effects	***No Fixed Effects***
Difference between post-SP launch and pre-launch	-2.154 (-5.297,0.990)	-2.100 (-5.058,0.858)
Difference between AMH3 and AMH1-2	0.316 (-1.277,1.910)	0.149 (-1.131,1.430)
DiD estimate (post*AMH3)	0.845 (-0.738,2.427)	0.890 (-0.495,2.275)
N	16,595,287	

*Notes: 95% confidence intervals in parentheses. NPI = National Provider Identifier. * p<0.05*

Asthma Admission Rate (PDI-14)

This measure examines hospital admissions with a principal diagnosis of asthma among Medicaid beneficiaries ages 2 through 17 per 100,000. It excludes beneficiaries with cystic fibrosis, anomalies of the respiratory system, obstetric admissions, and transfers from other institutions. As with other PQI and PDI measures, lower counts are better for this metric.

Figure 5.90 shows the trends in the rates over time. The rates are lower post-SP launch than before launch, controlling for covariates. We find no difference in rates by AMH type, either before or after SP launch.

Figure 0.90 Asthma Admission Rate (PDI-14)

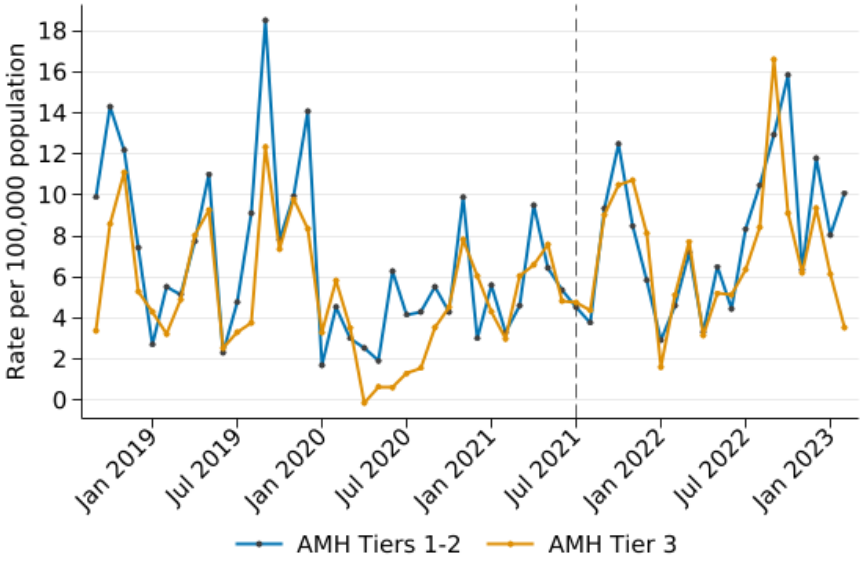


Table 0.80 DiD Estimates for Asthma Admission Rate (PDI-14)

	Adjusted Model	
	NPI Fixed Effects	***No Fixed Effects***
Difference between post-SP launch and pre-launch	-4.420 * (-7.727,-1.114)	-5.626 * (-9.250,-2.003)
Difference between AMH3 and AMH1-2	-1.033 (-2.338,0.272)	-0.216 (-1.325,0.893)
DiD estimate (post*AMH3)	0.225 (-1.202,1.653)	0.433 (-1.080,1.946)
N	45,819,726	

*Notes: 95% confidence intervals in parentheses. NPI = National Provider Identifier. * p<0.05*

Antidepressant Medication Management (AMM): Acute Phase Retention

This metric tracks the percentage of adult beneficiaries (18+ years) eligible or enrolled in Standard Plans who had a diagnosis for major depressive disorder, filled a prescription for an antidepressant medication and remained on an antidepressant medication treatment for at least 84 days during the Acute Phase of treatment or at least six months during the Continuation Phase of treatment, separately.

The percent of adult beneficiaries with major depression remaining on an antidepressant during the Acute Phase of treatment increased from 40-50% to 55-60% during the pre-implementation period, from October 2018 to June 2021, across AMH models, as seen in Figure 5.91. The rates are relatively similar between AMH tiers over time. In multivariate analyses, adjusting for comorbidities and practice-level effects, we do not find any evidence that there was a difference in the percent of beneficiaries with greater acute phase retention in treatment (Table 5.82) by AMH type. However, as seen in the Figure, both types of AMHs improved markedly from the baseline to the post-implementation period, by over 11% points.

Figure 0.91 Antidepressant Medication Management (AMM): Acute Phase Retention

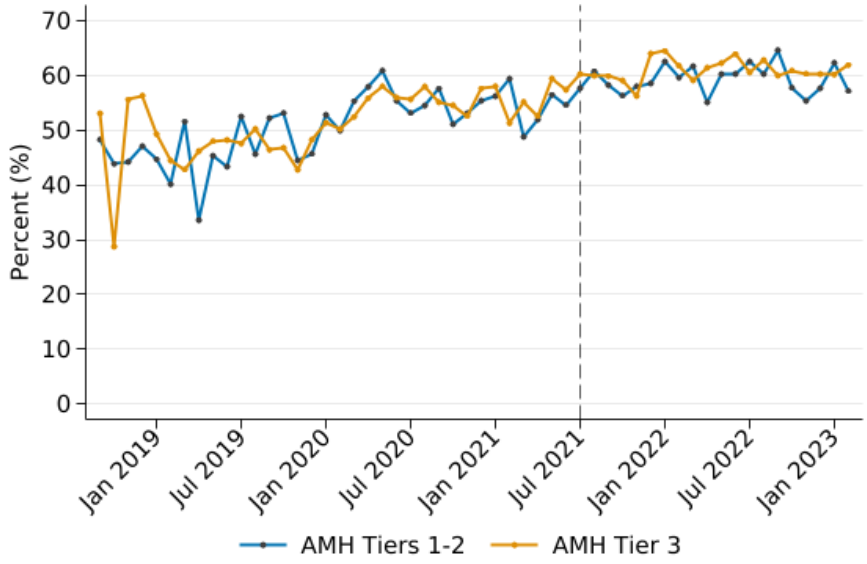


Table 0.81 DiD Estimates for Antidepressant Medication Management (AMM): Acute Phase Retention

	Adjusted Model	
	NPI Fixed Effects	***No Fixed Effects***
Difference between post-SP launch and pre-launch	11.22 * (6.242,16.21)	12.60 * (7.908,17.30)
Difference between AMH3 and AMH1-2	1.184 (-0.660,3.027)	1.241 (-0.135,2.616)
DiD estimate (post*AMH3)	0.284 (-1.774,2.343)	-0.877 (-2.786,1.033)
N	59,974	

*Notes: 95% confidence intervals in parentheses. NPI = National Provider Identifier. * p<0.05*

Antidepressant Medication Management (AMM): Continuation Phase Retention

The percent of adult beneficiaries with major depression remaining on an antidepressant during the continuation Phase of treatment similarly increased substantially over the study period, from 30-35% at the start of the baseline period to 35-40% just prior to SP implementation (Figure 5.92).

In multivariate analyses, adjusting for comorbidities and practice-level effects, we again find no differences across beneficiaries between AMH types (Table 5.83). Beneficiaries with major depressive disorder had substantially higher (14% pts) rates of retention in medication treatment from the baseline to the post-implementation period.

Figure 0.92 Antidepressant Medication Management (AMM): Continuation Phase Retention

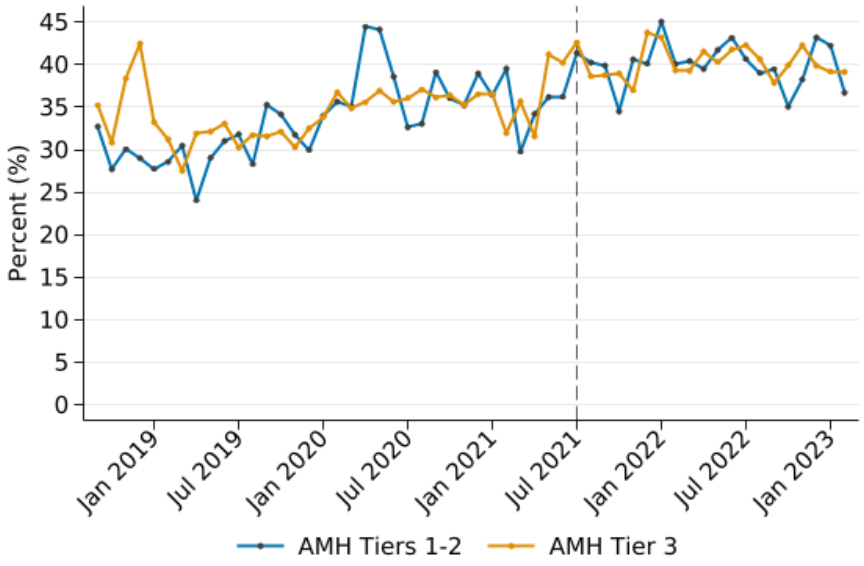


Table 0.82 DiD Estimates for Antidepressant Medication Management (AMM): Continuation Phase Retention

	Adjusted Model	
	NPI Fixed Effects	***No Fixed Effects***
Difference between post-SP launch and pre-launch	5.390 * (0.557,10.22)	6.192 * (1.765,10.62)
Difference between AMH3 and AMH1-2	1.028 (-0.795,2.852)	1.261 (-0.0367,2.558)
DiD estimate (post*AMH3)	-0.680 (-2.690,1.329)	-1.942 * (-3.799,-0.0857)
N	59,974	

*Notes: 95% confidence intervals in parentheses. NPI = National Provider Identifier. * p<0.05*

Follow-up After Hospitalization for Mental Illness (FUH): 7 Days After Discharge

We analyzed two indicators of follow up care after hospitalization for mental illness within 7 days or 30 days as separate measures. These measures were created on a monthly basis and track discharges in each calendar month to see whether follow up occurred in the specified window. We examine follow up with any provider type (behavioral health specialist, primary care, or enhanced behavioral health services). Higher is better for this metric.

Figure 5.93 plots the trends in follow-up with any provider type within 7 days after hospitalization for mental illness. The rates are similar by AMH type, ranging mostly between 30-50%, but there is fair amount of fluctuation. However, after adjusting for comorbidities and practice characteristics (Table 5.84), we find no difference in rates of follow up within 7 days after hospital discharge for mental illness between beneficiaries in different AMH levels or from pre-to post. We estimated that this measure had different pre-period trends by AMH status, so the comparison is not ideal for the post period.

Figure 0.93 Follow-up After Hospitalization for Mental Illness (FUH): 7 Days After Discharge

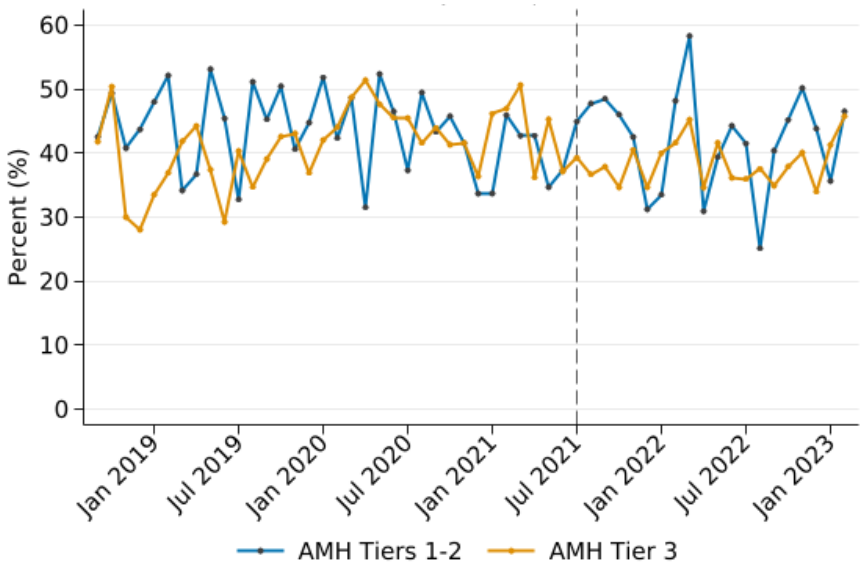


Table 0.83 DiD Estimates for Follow-up After Hospitalization for Mental Illness (FUH): 7 Days After Discharge

	Adjusted Model	
	NPI Fixed Effects	***No Fixed Effects***
Difference between post-SP launch and pre-launch	6.876 (-4.152,17.90)	4.584 (-5.406,14.57)
Difference between AMH3 and AMH1-2	-0.750 (-4.387,2.888)	1.870 (-0.537,4.277)
DiD estimate (post*AMH3)	-3.441 (-7.834,0.951)	-3.156 (-6.827,0.515)
N	18,306	

*Notes: 95% confidence intervals in parentheses. NPI = National Provider Identifier. * p<0.05*

Follow-up After Hospitalization for Mental Illness (FUH): 30 Days After Discharge

The rates of follow up within 30 days of hospital discharge with any provider type after hospitalization for mental illness are naturally higher than the 7-day follow up rates, generally between 50-80%. After adjusting for comorbidities and practice characteristics, we do see higher rates in the post period than the pre-period, but again find no difference in rates of follow up within 30 days after hospital discharge for mental illness between beneficiaries attributed to an AMH3 as compared with those attributed to an AMH1-2 practice (Table 5.85); again the baseline trends were also different by AMH type, which means AMH1-2s may not be an adequate control group for AMH3s.

Figure 0.94 Follow-up After Hospitalization for Mental Illness (FUH): 30 Days After Discharge

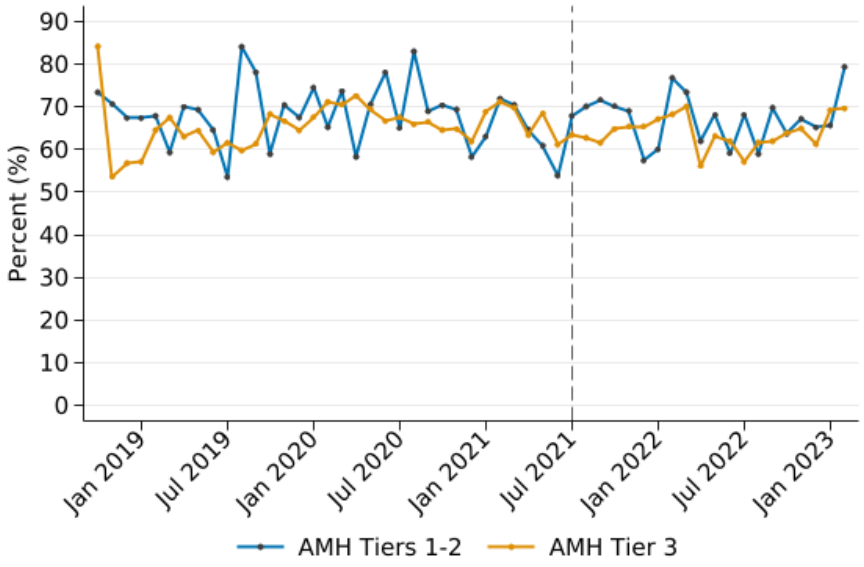


Table 0.84 DiD Estimates for Follow-up After Hospitalization for Mental Illness (FUH): 30 days After Discharge

	Adjusted Model	
	NPI Fixed Effects	***No Fixed Effects***
Difference between post-SP launch and pre-launch	13.26 * (2.718,23.80)	11.93 * (2.310,21.55)
Difference between AMH3 and AMH1-2	-1.883 (-5.339,1.574)	0.261 (-1.876,2.398)
DiD estimate (post*AMH3)	-1.820 (-5.734,2.095)	-2.361 (-5.604,0.882)
N	18,306	

*Notes: 95% confidence intervals in parentheses. NPI = National Provider Identifier. * p<0.05*

Diabetes Short-term Complications Admission Rate (PDI-15)

This metric examines non-maternal discharges among beneficiaries aged 6-17 with diagnosis codes for short-term complications from diabetes including ketoacidosis, hyperosmolarity, and coma. This is a relatively rare outcome and the rates are low. The measure was more variable among AMH1-2 than AMH3 during the pre-implementation period but both decreased and stabilized after SP implementation. However, after controlling for covariates, we find no difference in diabetes short-term complications admission rate between AMH3 and AMH1-2 after SP implementation.

Figure 0.95 Diabetes Short-term Complications Admission Rate (PDI-15)

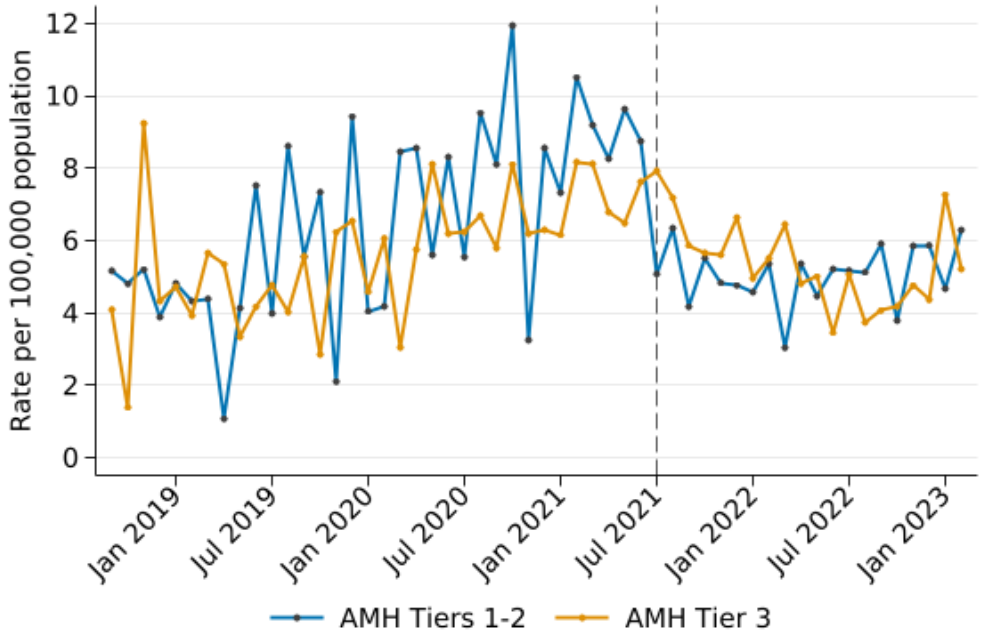


Table 0.85 DiD Estimates for Diabetes Short-term Complications Admission Rate (PDI-15)

	Adjusted Model	
	NPI Fixed Effects	***No Fixed Effects***
Difference between post-SP launch and pre-launch	-0.0162 (-2.926,2.893)	-0.266 (-2.875,2.342)
Difference between AMH3 and AMH1-2	-0.794 (-2.207,0.619)	-0.643 (-1.843,0.556)
DiD estimate (post*AMH3)	1.082 (-0.673,2.836)	1.042 (-0.497,2.580)

N	32,866,956

*Notes: 95% confidence intervals in parentheses. NPI = National Provider Identifier. * p<0.05*

Heart Failure Admission Rate (PQI-08)

This metric captures the number of hospital admissions with a principal diagnosis of heart failure per 100,000 beneficiaries aged 18 years and older. A lower rate is better with this metric. Figure 5.96 plots the trends by AMH status over time. The unadjusted trends were relatively similar by AMH type, with much higher rates prior to SP launch than afterwards across AMH tier. The multivariate difference-in-differences analysis finds no evidence of a difference between AMH3 and AMH1-2 after SP implementation.

Figure 0.96 Heart Failure Admission Rate (PQI-08)

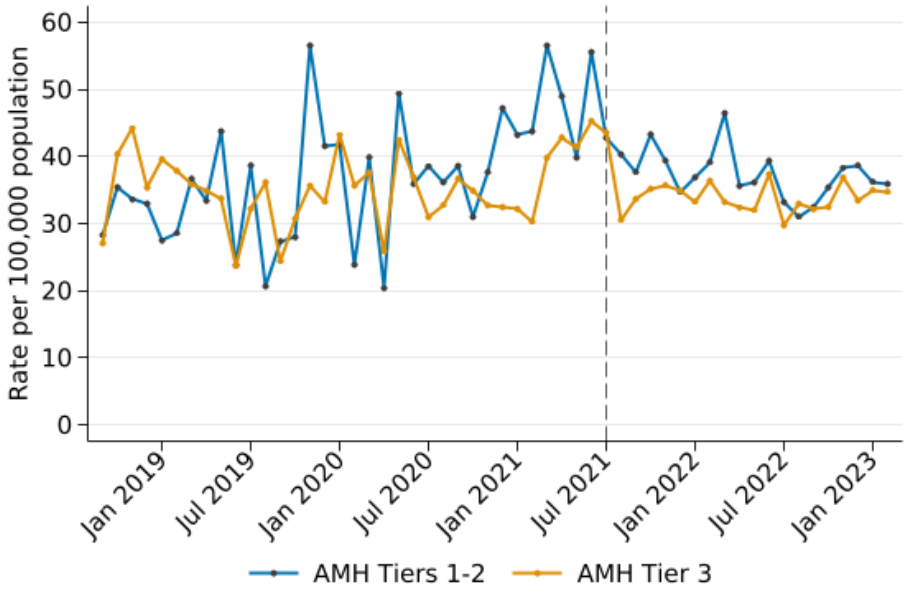


Table 0.86 DiD Estimates for Heart Failure Admission Rate (PQI-08)

	Adjusted Model	
	NPI Fixed Effects	***No Fixed Effects***
Difference between post-SP launch and pre-launch	7.534 (-1.203,16.27)	9.445 * (1.435,17.46)
Difference between AMH3 and AMH1-2	-1.591 (-6.771,3.589)	-4.229 (-9.278,0.819)
DiD estimate (post*AMH3)	0.507 (-5.910,6.924)	-0.374 (-6.122,5.374)
N	22,410,879	

*Notes: 95% confidence intervals in parentheses. NPI = National Provider Identifier. * p<0.05*

Gastroenteritis Admission Rate (PDI-16)

This pediatric quality measure quantifies admissions of gastroenteritis, or dehydration with gastroenteritis per 100,000 for beneficiaries ages 3 months to 17 years. This is also a very rare event, and we see some variability across months. However, after controlling for covariates, we find no difference in gastroenteritis admission rate between AMH3 and AMH1-2 (Table 5.88), nor do we find any differences in the average rates between pre- and post-SP implementation.

Figure 0.97 Gastroenteritis Admission Rate (PDI-16)

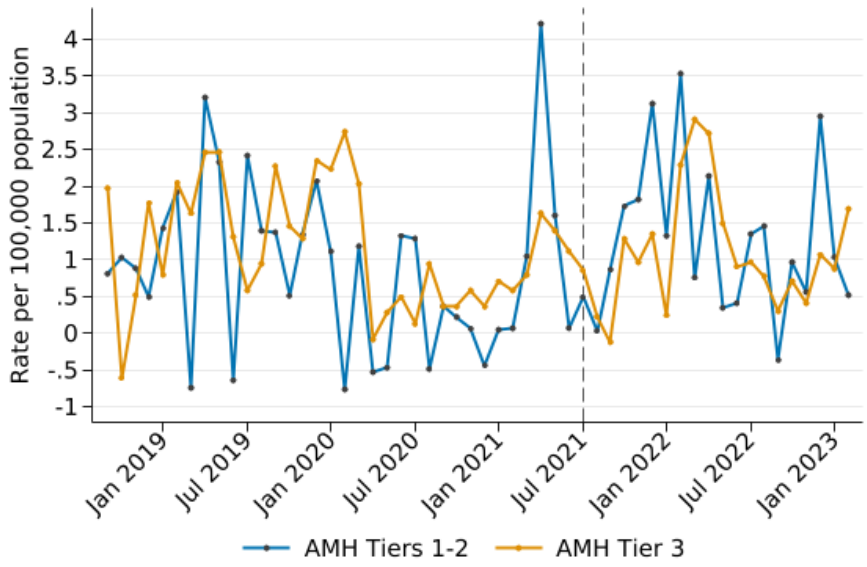


Table 0.87 DiD Estimates for Gastroenteritis Admission Rate (PDI-16)

	Adjusted Model	
	NPI Fixed Effects	***No Fixed Effects***
Difference between post-SP launch and pre-launch	0.763 (-0.846,2.371)	0.445 (-1.023,1.913)
Difference between AMH3 and AMH1-2	0.225 (-0.533,0.982)	0.353 (-0.142,0.847)
DiD estimate (post*AMH3)	-0.361 (-1.150,0.427)	-0.160 (-0.863,0.544)
N	53,695,192	

*Notes: 95% confidence intervals in parentheses. NPI = National Provider Identifier. * p<0.05*

Urinary Tract Infection Admission Rate (PDI-18)

This metric reports the number of admissions with a principal diagnosis of urinary tract infection per 100,000 beneficiaries ages 3 months to 17 years. Lower rates are better for this metric. Figure 5.98 reports the unadjusted rates of PDI 18, which are generally very low, trending between 0-3 admissions per 100,000 child beneficiaries. Table 5.89 reports the results of multivariate difference-in-differences analysis. While we find an overall decrease in the rate of pediatric urinary tract admissions from before to after SP launch (-1.8 per 100,000), we do not find evidence of a differential improvement between AMH3 and AMH1-2 practices.

Figure 0.98 Urinary Tract Infection Admission Rate (PDI-18)

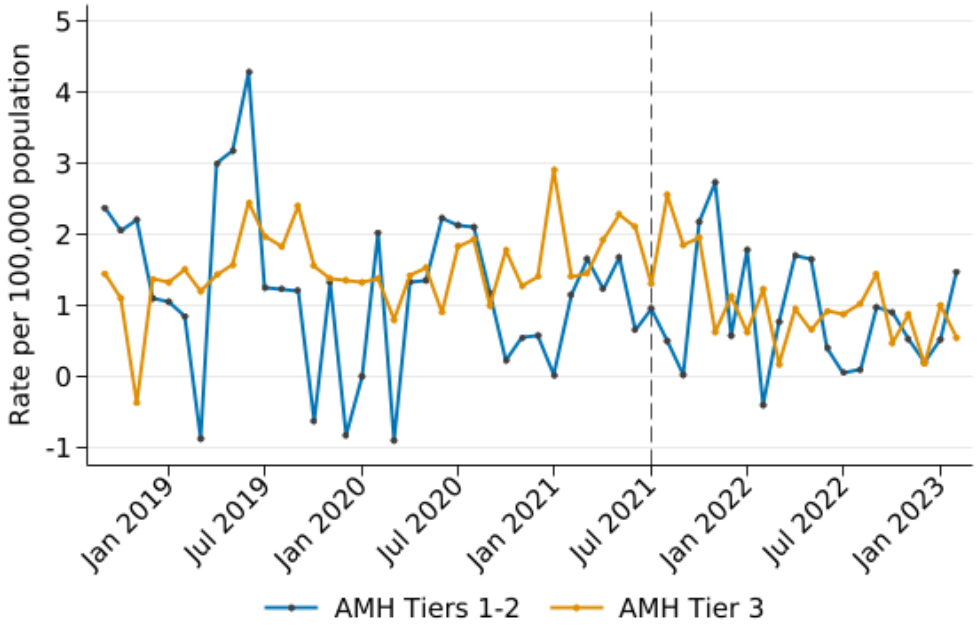


Table 0.88 DiD Estimates for Urinary Tract Infection Admission Rate (PDI-18)

	Adjusted Model	
	NPI Fixed Effects	***No Fixed Effects***
Difference between post-SP launch and pre-launch	-1.766 * (-3.126,-0.405)	-1.986 * (-3.270,-0.703)
Difference between AMH3 and AMH1-2	0.370 (-0.266,1.007)	0.385 (-0.0605,0.831)
DiD estimate (post*AMH3)	-0.230 (-0.836,0.376)	-0.0535 (-0.618,0.511)
N	53,695,192	

*Notes: 95% confidence intervals in parentheses. NPI = National Provider Identifier. * p<0.05*

Follow-up Care for Children Prescribed ADHD Medication (ADD): Initiation Phase

ADD Initiation Phase measures the percent of children between 6 and 12 years of age who were diagnosed with ADHD and had a follow up visit within 30 days after an initial ADHD medication prescription. This measure reflects the percent of children who had at least one follow-up visit with a practitioner with prescribing authority from their first prescription of ADHD medication. Higher is better for this metric.

Figure 5.99 plots the trends in ADD by AMH status (AMH3 vs AMH1-2). The percent of beneficiaries with follow up care appears to be trending slightly downward and shows similar patterns by AMH type. The multivariate difference-in-differences model (Table 5.90) does not find any difference by AMH type in the rate of follow up care for children prescribed ADHD medication.

Figure 0.99 Follow-up Care for Children Prescribed ADHD Medication (ADD): Initiation Phase

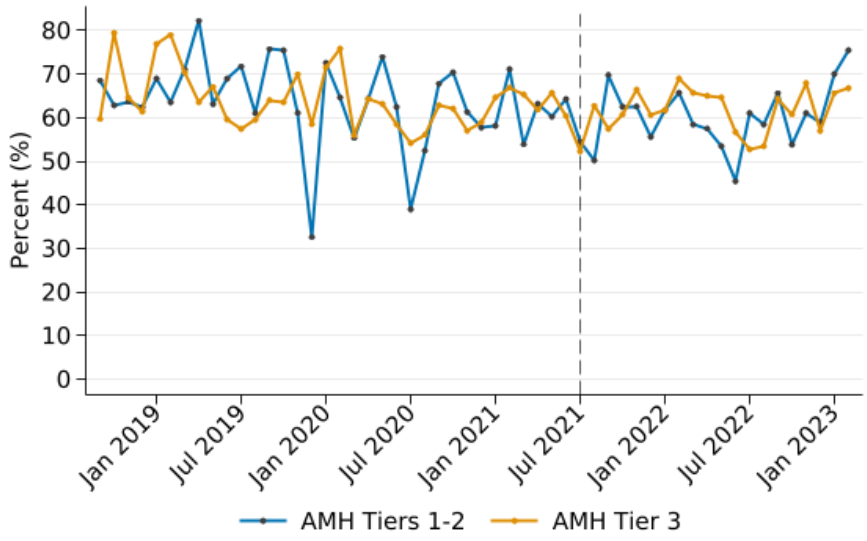


Table 0.89 DiD Estimates for Follow-up Care for Children Prescribed ADHD Medication (ADD): Initiation Phase

	Adjusted Model	
	NPI Fixed Effects	***No Fixed Effects***
D Difference between post-SP launch and pre-launch	-0.643 (-9.374,8.087)	-4.354 (-12.00,3.295)
Difference between AMH3 and AMH1-2	0.803 (-3.171,4.777)	2.075 (-0.924,5.073)
DiD estimate (post*AMH3)	0.322 (-5.701,6.344)	1.680 (-3.014,6.374)
N	17,073	

*Notes: 95% confidence intervals in parentheses. NPI = National Provider Identifier. * p<0.05*

Follow-up Care for Children Prescribed ADHD Medication (ADD): Continuation and Maintenance Phase

The ADD Continuation and Maintenance Phase measures the percent of children between 6 and 12 years of age who were diagnosed with ADHD, filled a prescription for ADHD medication and remained on the medication for at least 210 days, and had at least two follow-up visits with a practitioner in the 9 months after the Initiation Phase. Higher is again better for this metric.

Figure 5.100 plots the trends in ADD by AMH status (AMH3 vs AMH1-2). The percent of beneficiaries who meet the continuation and maintenance phase criteria appear to be trending slightly downward. We again see similar patterns by AMH type. The multivariate difference-in-differences model (Table 5.91) does not find any difference by AMH type in the rate of continuation and maintenance phase criteria for children prescribed ADHD medication.

Figure 0.100 Follow-up Care for Children Prescribed ADHD Medication (ADD): Continuation and Maintenance Phase

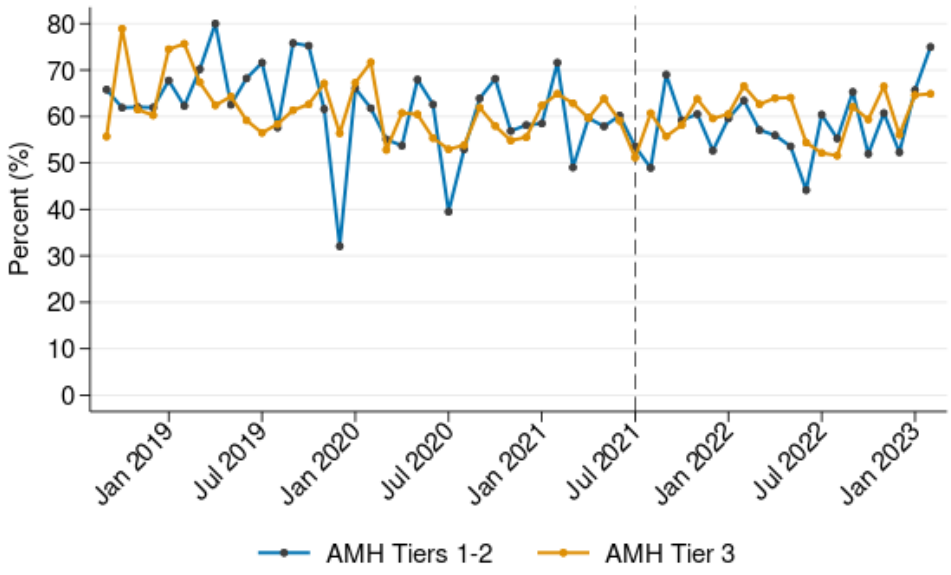


Table 0.90 DiD Estimates for Follow-up Care for Children Prescribed ADHD Medication (ADD): Continuation and Maintenance Phase

	Adjusted Model	
	NPI Fixed Effects	***No Fixed Effects***
Difference between post-SP launch and pre-launch	0.482 (-8.522,9.486)	-2.491 (-10.42,5.437)
Difference between AMH3 and AMH1-2	0.230 (-3.717,4.176)	1.364 (-1.553,4.281)
DiD estimate (post*AMH3)	0.856 (-5.121,6.833)	1.727 (-2.935,6.389)
N	17,073	

*Notes: 95% confidence intervals in parentheses. NPI = National Provider Identifier. * p<0.05*

Qualitative Findings

From 2022 to 2023, qualitative findings from healthcare organizations suggest they valued the role of care management for their patients under the AMH program. Some participating health systems and larger practices worked on building or strengthening their care management infrastructure, while smaller practices contracted with care management entities for data and staffing support. Some less-resourced,

smaller practices and a few health systems chose to contract at a lower-tier level. The major barriers reported were low reimbursement rates, staffing instability for care management services, and attribution issues impacting performance metrics. Preliminary results from 2023 beneficiary data show that PCPs played a primary role in coordinating patient care. We also found variability in awareness and utilization of community-based resources among participating beneficiaries. Table 5.92 shows the AMH tier status of participating healthcare organizations.

Table 0.91 Advanced Medical Home Status of Participating Organizations

Advanced medical home (AMH) Status	2022 (N=26)	2023 (N=36)
Not an AMH	1	3
Tier 2	3	3[#]
Tier 3	18	25
Tier 3 Plus	0	1
Unsure	4	4
AMH services*		
In-house	4	7
Contracted with external agencies	18	17
Unsure	1	8

[#]One participating healthcare organization had AMH Tier 3 status with 2 PHPs and Tier 2 status with 3 PHPs.
* Some health systems that were clinically integrated networks themselves are not included in this category.

a. Facilitators for implementing the AMH program

Our findings from the first two years of the transition to managed care (July 2021 to May 2023) showed several facilitators that motivated participating healthcare organizations to implement the AMH program. The main facilitators described by the participants continued to be the partnerships or support from external agencies, such as CCNC, and perceptions of better patient care through care coordination and meeting health-related social needs. Partnerships with external care management entities predominantly benefited FQHCs and small independent practices. A senior administrator at a local health department described how they collaborated with a care management entity as follows:

> One neat thing that they [care management agency] did for us is they created this portal, where all claims' data from all the PHPs is funneled through to generate scorecards and reports on all those clients that are under all those PHPs so that we can know how we are doing in terms of

> administering treatment and services. It has also created criteria with quality measures. We have about 9 to 13 quality measures that score us on this basis. It's not perfect, so it's like a math lag, but it tells us what the clients need and what they're overdue for.

The care management entities provided data infrastructure, staffing, and technical assistance, which enabled healthcare organizations to track quality metrics and provide advanced care management services to their patients.

b. Barriers to implementing the AMH program

During the first year of implementation (2021 to 2022), the main challenges included workforce instability and low reimbursement rate (aka per member per month [pmpm]) for care management services. Hiring new or training existing staff to provide care management services was the main challenge across healthcare organizations (e.g., health systems, independent practices, FQHCs). Participants described the demand for care management staff and the financial implications for them. A senior leader at a health system explained this situation as follows:

> We invested $120 million in adjusting compensation for our workforce because of the instability of the workforce. And from our population health, the workforce is even more unstable because they're in high demand, and some work can now be done remotely. So, they're in hugely high demand. So, we have this workforce instability. Um, we're trying to address that. Compensation is one. And now we have a static revenue stream to support increasingly expensive work. So, that's not necessarily sustainable for the long term.

A related challenge was the low PMPM for care management services, which did not cover the expenses of administering the AMH tier 3 program. These challenges were shared mainly by healthcare organizations that invested in building or expanding care management services or had the capability of attesting as tier 3 but chose to attest as tier 2, such as health systems and large independent practices.

Early findings from the second year of implementation (2022-2023) show that operational challenges, including meeting performance metrics for care management, were more pronounced as compared to the first year of the transition (2021-2022). Participants from healthcare organizations explained that attribution errors have improved over time, in general, but continue to be an issue with some PHPs. Several participants described challenges with obtaining a list of attribution from some PHPs and frustration with the quality of attribution data they received, making it difficult to reconcile attribution errors, which in turn impacts quality metrics. Furthermore, not meeting the quality metrics could have

financial consequences for healthcare organizations, as described by a senior leader at an independent primary care group.

> We've been having to report control of hypertension, control of diabetes, uh, preventative measures, smoking cessation, weight management…We're used to the pay-for-performance space, but if we're being beholden to or accountable for patients' wellness and disease management who are not our patients, it potentially impacts us financially due to not being able to avail ourselves of that upside bonus. And then, at some point down the line, it could be a risk to us because a penalty is paid if you don't achieve certain measures.

Despite these barriers, participating healthcare organizations continued to provide care management services either themselves or through collaboration with care management entities. However, the concerns about meeting quality metrics with some PHPs remained.

c. Beneficiary experiences of care management services

Early findings from beneficiary data in 2023 revealed that PCPs were critical in coordinating care between specialists, primary care, pharmacy, and PHP for referrals and medication approvals. Some participants described having assigned case managers for themselves or their children. However, a few participants shared some dissatisfaction with communicating with their case managers. For example, a caregiver of two children diagnosed with autism expressed her frustration as follows:

> It said they were supposed to have a managed care worker who would contact you, which has been very frustrating. But I have not had any contact with them whatsoever, and this was supposed to be someone who was specifically for them; that's been frustrating.

Within our sample of participants, we found variability in awareness and utilization of community-based resources. Some participants reported using transportation, food, and housing support. Those who reported using a transportation service indicated that the service was easy to use.

Overall, participants from healthcare organizations shared the importance of care management services for patients and continued to work towards improving staffing, data sharing, and care management infrastructure to deliver better care management services and achieve quality metrics.

Hypothesis 1.5: The implementation of Medicaid managed care will reduce disparities (increase equity) in the quality of care received across rurality, age, race/ethnicity and disability status.

Health disparities exist across a variety of populations, for various reasons. We hypothesized that Standard Plan Implementation would affect population groups of interest differentially. For each of the monthly metrics, we conducted stratified analyses, comparing populations across multiple population characteristics:

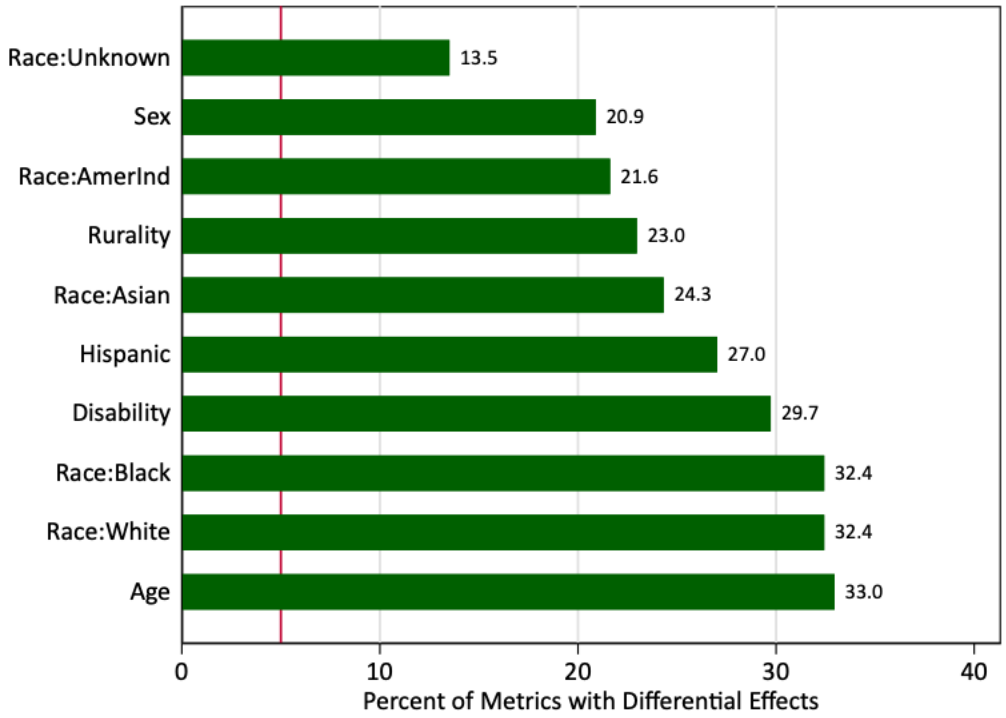
- Age: 0-18, 19-64, 65 or more
- Rurality: NCHS 2013 Urbanization Metro vs. Non-Metro
- Ethnicity: Hispanic vs Not
- Sex: Female vs. Male
- Disability: yes or no
- Race: for each self-reported race category, assessed those who indicated this race versus those who did not (e.g. White vs Not White; Black vs Not Black, Asian / Pacific Islander vs Not Asian / Pacific Islander).

Some metrics did not lend themselves to stratification analyses. For example, pediatric measures are not appropriate for those over the age of 18 and thus no comparison was available. Thus, across all the metrics, there were approximately 800 models testing whether there was heterogeneity of treatment effect. For this report, we took a broad view and looked for evidence of differential effects; subsequent analyses will investigate these issues in more detail. It is important to understand that with 800 models, there will be many that are deemed statistically significant when in fact there is no true effect; analysts must be careful in the context of this *multiplicity* – even with no true effect, there will be plenty that are statistically significant. Based on the 95 percent confidence interval, we would expect at least 5 percent of models to return statistically significant results; to conclude there is heterogeneity, we would be looking for considerably more than 5 percent of models to return statistically significant results.

The figure below shows, by stratification category, the percentage of metrics for which there is evidence of differential effects at the final month of the study period. The vertical red line denotes 5 percent, the percent we expect if there was no true effect.

For three stratification variables – age, White race, and Black Race – nearly one third of the models have evidence of differential effects of SP implementation. All have substantially more cases with differential effects than the 5 percent expected level. More than a quarter of metrics identified differential effects for Hispanic ethnicity and disability status. There is good evidence of differential effects across these populations. Note that the two of the three stratification variables less likely to have differential effects have small populations. Interestingly, other than "Race Unknown vs Not Unknown", Sex (Male vs. Female) is the stratification least likely to identify differential effects (but still has many).

Figure 0.101 Percent of Metrics with Differential Effects



The metrics tending to be most likely to have differential effects are those with the broadest inclusion criteria – for example, expenditures and metrics for whom a large number of beneficiaries are eligible (e.g. dental visits). Statistically, this makes sense; the larger sample size strengthens the precision of the model.

Finally, our lens here is *statistical*, rather than *clinical* – just because there is statistical evidence of heterogeneity, does not mean that the effect is of a meaningful size. Many of these statistically significant results are of inconsequential magnitude.

Hypothesis 2.1: The implementation of Medicaid managed care will decrease the use of emergency departments for non-urgent use and hospital admissions for ambulatory sensitive conditions.

This hypothesis examines whether improved access and quality of care through SPs decreased reactive services such as emergency department (ED) or hospital admissions. We analyzed three metrics for this hypothesis. One demonstrated substantial progress after SP implementation (ED visits per capita); one worsened (avoidable ED visits) and one demonstrated no difference from what is estimated to occur in the absence of the waiver (hospital admissions). We did identify an adequate measure of hospital admissions for ambulatory sensitive conditions that was inclusive of behavioral health admissions.

Table 0.92 Summary of Metric Results for Hypothesis 2.1

Measure (Metric abbreviation)	Adjusted waiver effects at endpoint	Improved / Worsened / No difference)
Emergency Department Visits per Member-Month	-5.5% pts	Improved
Avoidable or Preventable Emergency Department Visits	28.6 per 1000	Worsened
Number of Hospital Admissions	-0.08 per 1000 (NS)	No difference

Emergency Department Use

As is well-known, emergency department use fell dramatically during the onset of the pandemic and has slowly recovered since then. There's a small but statistically significant immediate increase in ED use at the time of implementation. A lower time trend in the post-implementation period is evident. For the last month of data in January 2023, the use rate post-implementation is 5.5 visits per 10,000 lower than projected in the absence of the waiver (40.3/10,000). This is a fourteen percent decrease.

(Expressed as per 10,000 member-months)

Figure 0.102 Emergency Department Use

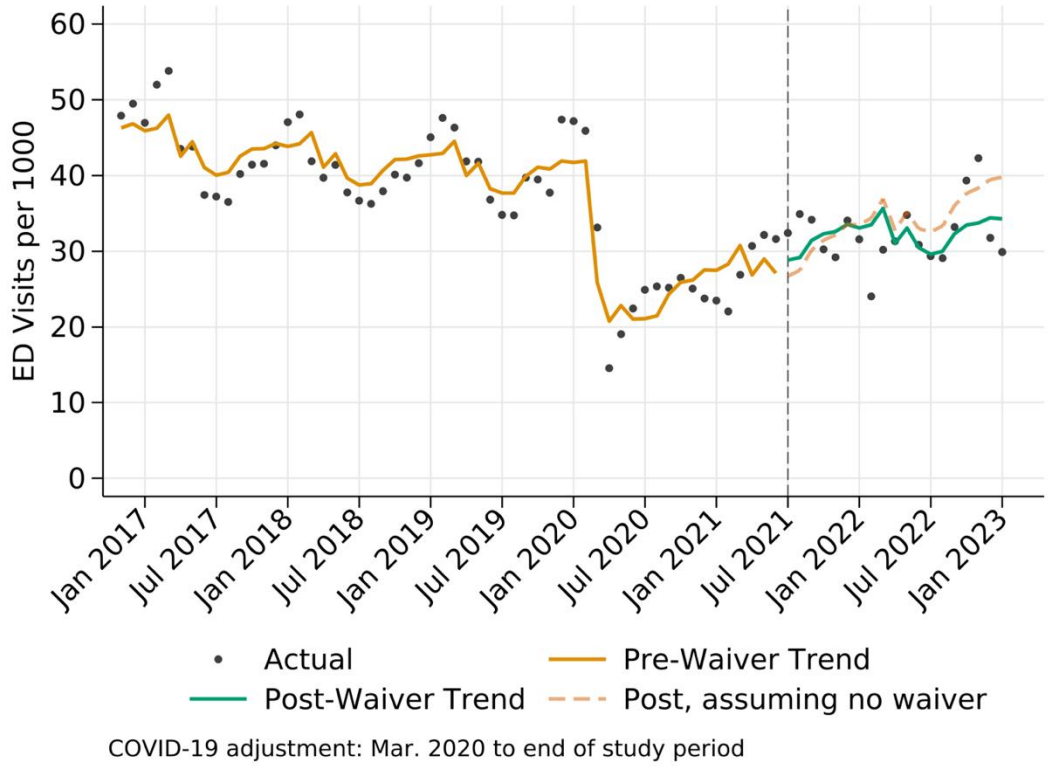


Table 0.93 Emergency Department Use

	Baseline	SP Waiver Implementation	Difference
Average Predicted Outcome, July 2021	30.3895*	32.4948*	2.1052*
	(30.0375, 30.7416)	(32.1851, 32.8044)	(1.6633, 2.5472)
Slope	-0.1097*	-0.5296*	-0.42*
	(-0.1216, -0.0977)	(-0.5755, -0.4838)	(-0.4643, -0.3757)
Average Predicted Outcome, Jan 2023	40.3122*	34.8577*	-5.4545*
	(39.3702, 41.2543)	(34.5505, 35.1649)	(-6.4306, -4.4785)
N	24,074,924		

*Notes: 95% confidence intervals in parentheses. SP = Standard Plan. *p < 0.05. This analysis uses a 20 percent random sample of members.*

Potentially Avoidable ED Visits

This measure is the rate of potentially avoidable emergency department visits in a month. Lower values are better. The rate falls in April 2020 and holds relatively steady until right before implementation, where it begins a slow increase through the post-implementation period. In February 2023, the rate is 28.6 per 1000 higher than projected in the absence of the transformation.

Figure 0.103 Potentially Avoidable ED Visits

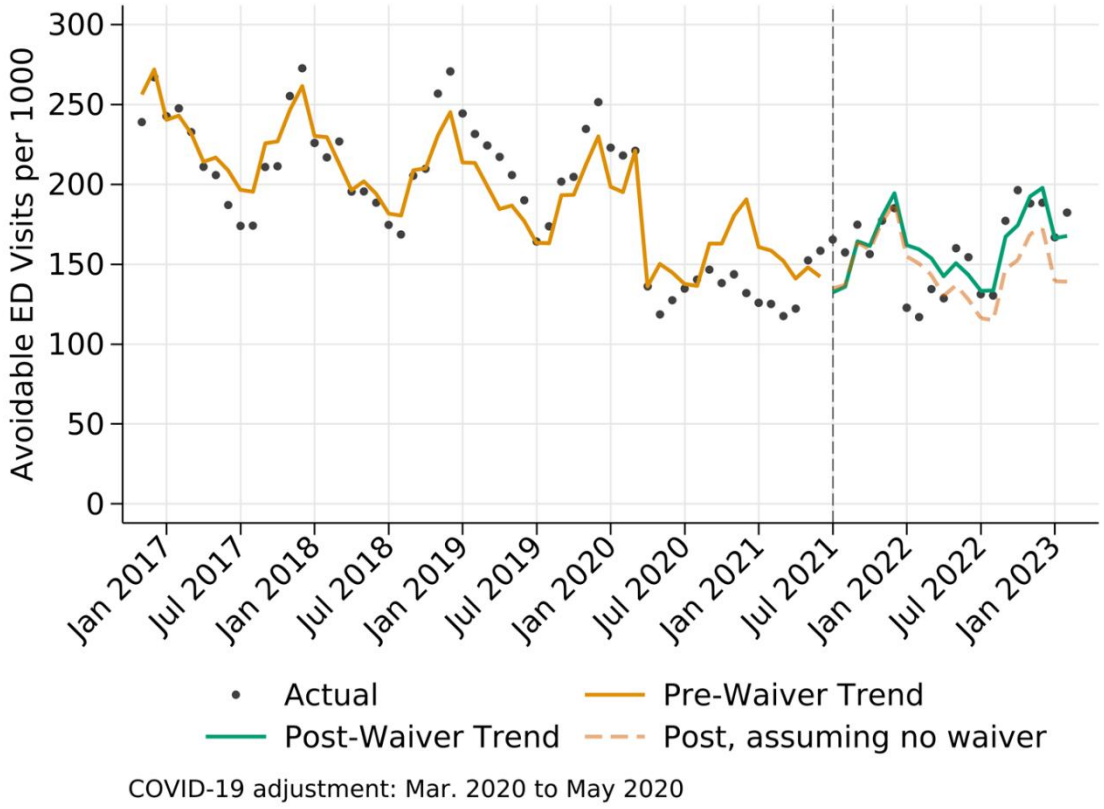


Table 0.94 Potentially Avoidable Preventable ED Visits

	Baseline	SP Waiver Implementation	Difference
Average Predicted Outcome, July 2021	160.0261*	157.3463*	-2.6798*
	(159.0295, 161.0226)	(155.9502, 158.7424)	(-4.3727, -0.9869)
Slope	-1.3845*	0.2622*	1.6467*
	(-1.4133, -1.3557)	(0.1387, 0.3857)	(1.5196, 1.7738)
Average Predicted Outcome, Feb 2023	133.7209*	162.3286*	28.6076*
	(132.2246, 135.2173)	(160.9762, 163.6809)	(26.5941, 30.6212)
N	3,972,510		

Notes: 95% confidence intervals in parentheses. SP = Standard Plan. $^{*}p < 0.05$.

Inpatient Admission Rate

Inpatient admission rates fall throughout the study period, with the expected sizable decrease in April 2020, the first full month of the global pandemic, and a rather quick return to baseline trend, continuing the slow and steady secular decrease in the admission rate. At the time of implementation, there is little evidence of an immediate effect on inpatient use rates; statistically identical time trends lead to no projected difference between inpatient admission rates in the absence of the waiver and what we saw post-implementation. The estimated difference is roughly .8 admissions per 1000 lives, compared to a baseline estimate of 10.5 in the absence of the waiver.

(Expressed as per 1000 covered lives)

Figure 0.104 Inpatient Admission Rate

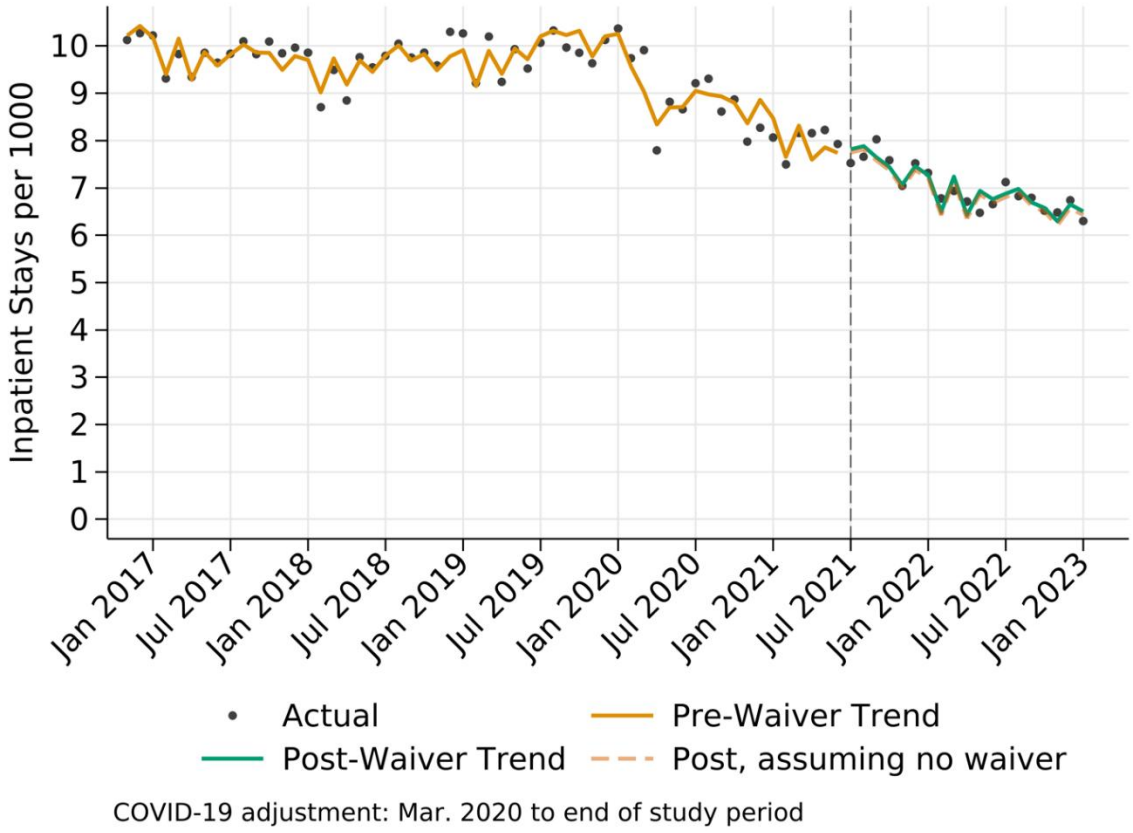


Table 0.95 Inpatient Admission Rate

	Baseline	SP Waiver Implementation	Difference
Average Predicted Outcome, July 2021	8.4331*	8.5013*	0.0682
	(8.2624, 8.6038)	(8.3701, 8.6325)	(-0.1497, 0.2861)
Slope	-0.0012	-0.0005	0.0006
	(-0.0061, 0.0038)	(-0.0221, 0.0211)	(-0.0205, 0.0218)
Average Predicted Outcome, Jan 2023	9.4168*	9.4966*	0.0798
	(8.9363, 9.8973)	(9.3729, 9.6203)	(-0.4115, 0.5712)
N	24,074,924		

*Notes: 95% confidence intervals in parentheses. SP = Standard Plan. *p < 0.05.*

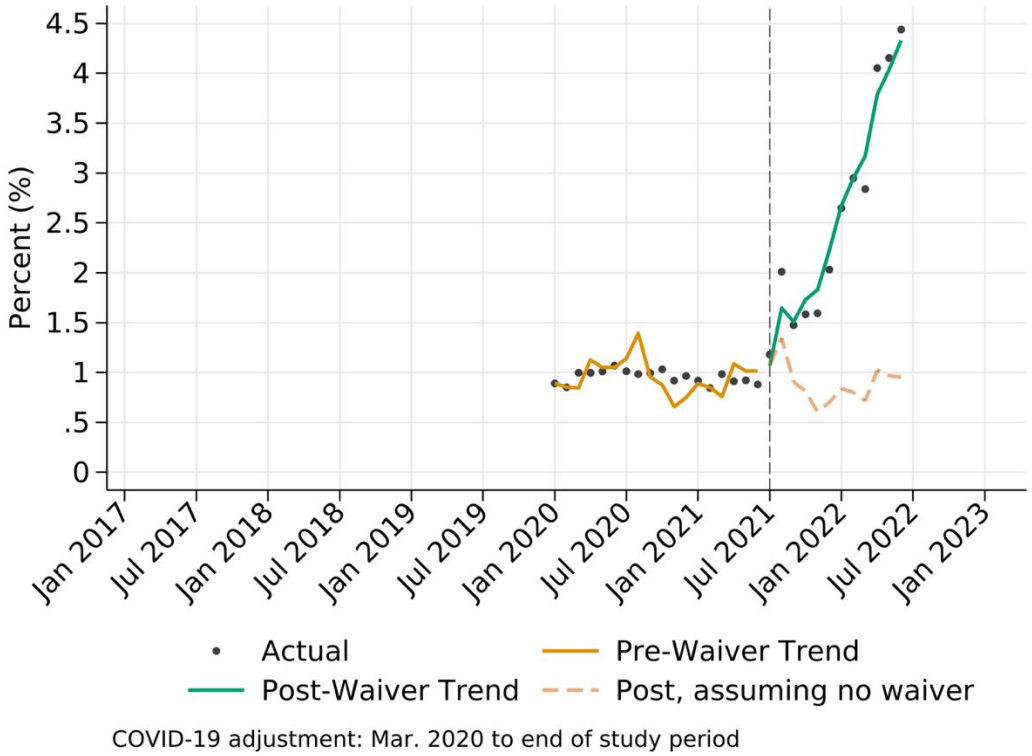
Hypothesis 2.2: The implementation of Medicaid managed care will increase the number of enrollees receiving care management, overall and during transitions in care.

We examined two measures for this hypothesis. One measure reflected the percent of beneficiaries in the SP population who received care management services. This increased appreciably after SP implementation. The second metric reflecting patient engagement in post-discharge care worsened, indicating a large reduction in care by adult beneficiaries after an acute or non-acute inpatient stay.

Table 0.96 Summary of Metric Results for Hypothesis 2.2

Measure (Metric abbreviation)	Adjusted waiver effects at endpoint	Improved / Worsened / No Difference
Receipt of care management	3.4% pts	Improved
Transitions in Care (TRC): engagement in post-discharge care	-6.5% pts	Worsened

Figure 0.105 Care Management Contact Rate



This measure captures the percent of beneficiaries who received at least one care management contact during the month. During the pre-implementation period, the trend was flat, and began to rise quickly after implementation. By June 2022, the post-implementation rate was nearly 3.4 percentage points higher than the projected rate in the absence of the waiver. The metric begins January 2020 since care management values before that are unreliable.

Table 0.97 Care Management Rate

	Baseline	SP Waiver Implementation	Difference
Average Predicted Outcome, July 2021	0.9315*	0.921*	-0.0105
	(0.9026, 0.9603)	(0.8834, 0.9586)	(-0.0596, 0.0387)
Slope	-0.0004	0.3075*	0.3078*
	(-0.0486, 0.0478)	(0.2583, 0.3567)	(0.3006, 0.3151)
Average Predicted Outcome, Jun 2022	0.9216*	4.2974*	3.3758*
	(0.8641, 0.9791)	(4.2439, 4.3508)	(3.3004, 3.4512)
N		10,018,304	

Notes: 95% confidence intervals in parentheses. SP = Standard Plan $*p < 0.05$.

Transitions of Care (TRC): Patient Engagement in post-discharge care

This measure examines the percentage of discharges for adult beneficiaries who had engagement after inpatient discharge through an office visit, a visit to the home, or via telehealth provided within 30 days after discharge. A separate measure examines the documentation of medication reconciliation on the date of discharge through 30 days after discharge. Pre-implementation, the engagement measure was largely flat with statistically zero trend. In July 2021, there exists a 2.5 percentage point decrease in patient engagement in post-discharge care. The post-implementation trend was negative and statistically significant. At the end of the reporting period (February 2023), there was an approximate 7% difference in patient engagement, with lower engagement arising from Waiver implementation.

Figure 0.106 Transitions of Care (TRC): Patient Engagement in post-discharge care

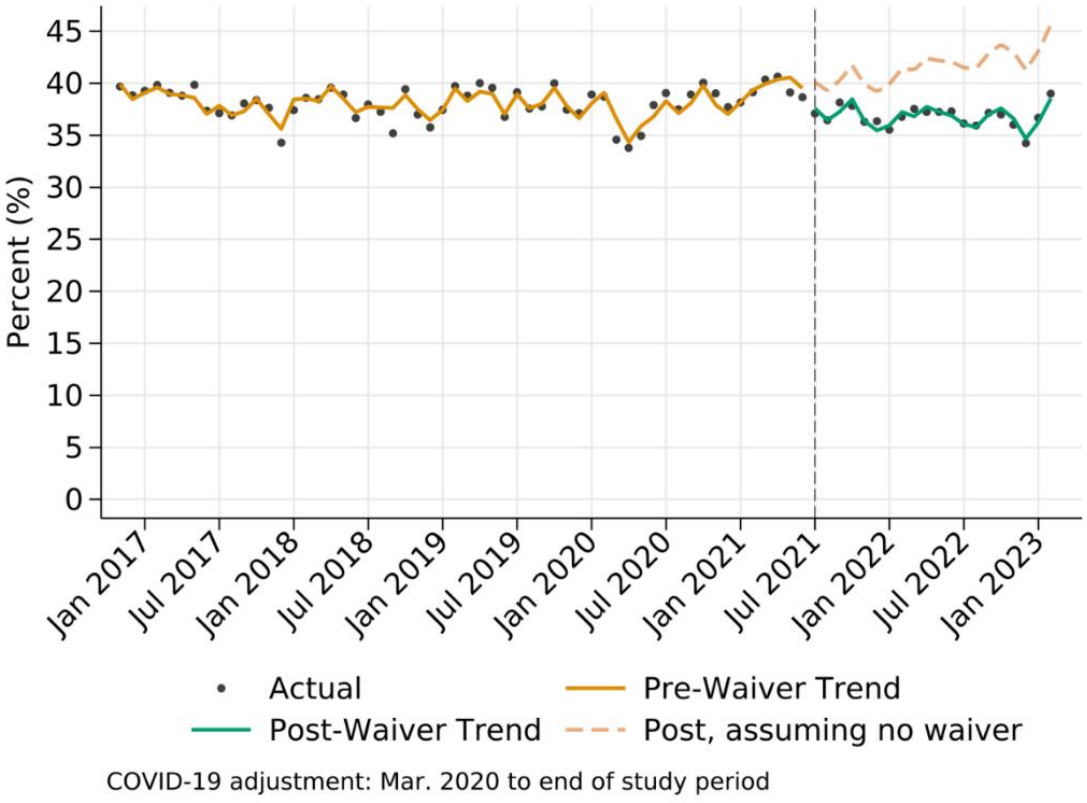


Table 0.98 Transitions of Care (TRC): Patient Engagement in post-discharge care

	Baseline	SP Waiver Implementation	Difference
Average Predicted Outcome, July 2021	39.7359*	37.1946*	-2.5413*
	(39.1623, 40.3095)	(36.7100, 37.6792)	(-3.2971, -1.7855)
Slope	-0.0104	-0.2491*	-0.2387*
	(-0.0247, 0.0040)	(-0.3233, -0.1749)	(-0.3116, -0.1659)
Average Predicted Outcome, Feb 2023	43.1252*	36.0478*	-7.0774*
	(41.4736, 44.7768)	(35.5479, 36.5476)	(-8.7918, -5.3631)
N	463,987		

*Notes: 95% confidence intervals in parentheses. SP = Standard Plan. *p < 0.05.*

Hypothesis 2.3: The implementation of Medicaid managed care will reduce Medicaid program expenditures.

While the budget neutrality and formal cost analysis is not conducted by the evaluation team, we did examine trends in per-member per-month expenditures by Medicaid and the Standard Plans for components of expenditures. We found that per capita spending in many areas was lower after SP implementation than what was projected in the absence of the waiver, although we notably found increases in spending on emergency department services. No changes were observed for behavioral health or prescription medication spending per capita.

Table 0.99 Summary of Metric Results for Hypothesis 2.3

Measure (Metric abbreviation)	Adjusted waiver effects at endpoint	Higher / Lower / No Difference
Total Expenditures by Medicaid and Standard Plans on:		
ER expenditures (not resulted in inpatient)	$2.68	Higher
Outpatient E&M services	-$10.32	Lower
Outpatient services excluding E&M codes	-$33.00	Lower
Dental Services	-$3.32	Lower
Prescription Drugs	-$2.55 (NS)	No Difference
Behavioral health services	-$1.46 (NS)	No Difference

Expenditures: Emergency Department (not admitted)

The average PMPM amount for emergency department use fell during the initial phase of the pandemic and increased at the time of the implementation by about $4.21 per member per month. There was a slight downward trend in this amount during the post-implementation period, so the difference at January 2023 was $2.68 PMPM.

Figure 0.107 Expenditures: Emergency Department (not admitted)

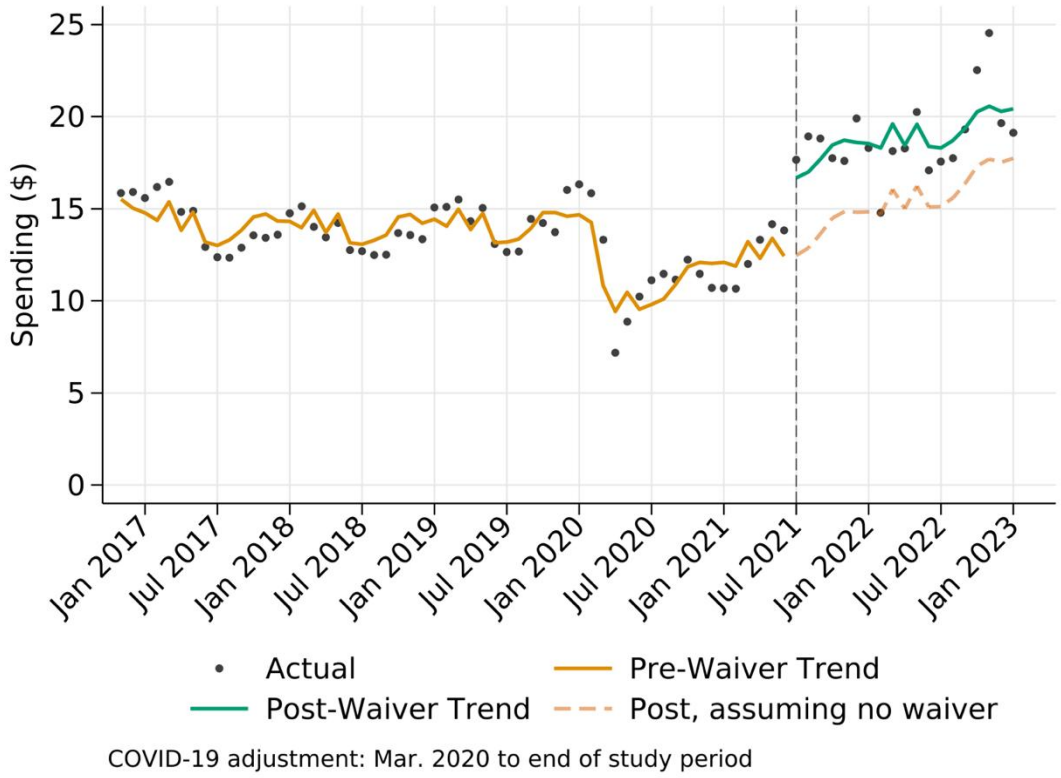


Table 0.100 Expenditures: Emergency Department (not admitted)

	Baseline	SP Waiver Implementation	Difference
Average Predicted Outcome, July 2021	13.5608*	17.7728*	4.212*
	(13.3263, 13.7953)	(17.5125, 18.0331)	(3.8707, 4.5534)
Slope	0.0071*	-0.0781*	-0.0852*
	(0.0010, 0.0133)	(-0.1119, -0.0443)	(-0.1184, -0.0519)
Average Predicted Outcome, Jan 2023	17.8875*	20.5661*	2.6786*
	(17.2498, 18.5251)	(20.3084, 20.8238)	(1.9993, 3.3579)
N		24,127,823	

*Notes: 95% confidence intervals in parentheses. SP = Standard Plan. *p < 0.05.*

Expenditures: Outpatient E&M

The steady increase in average PMPM for E&M (Evaluation and Management) codes pre-implementation was reversed with a steady decrease post-implementation. What was a statistically zero difference at implementation grew to a 10.32 savings by January 2023.

Figure 0.108 Expenditures: Outpatient E&M

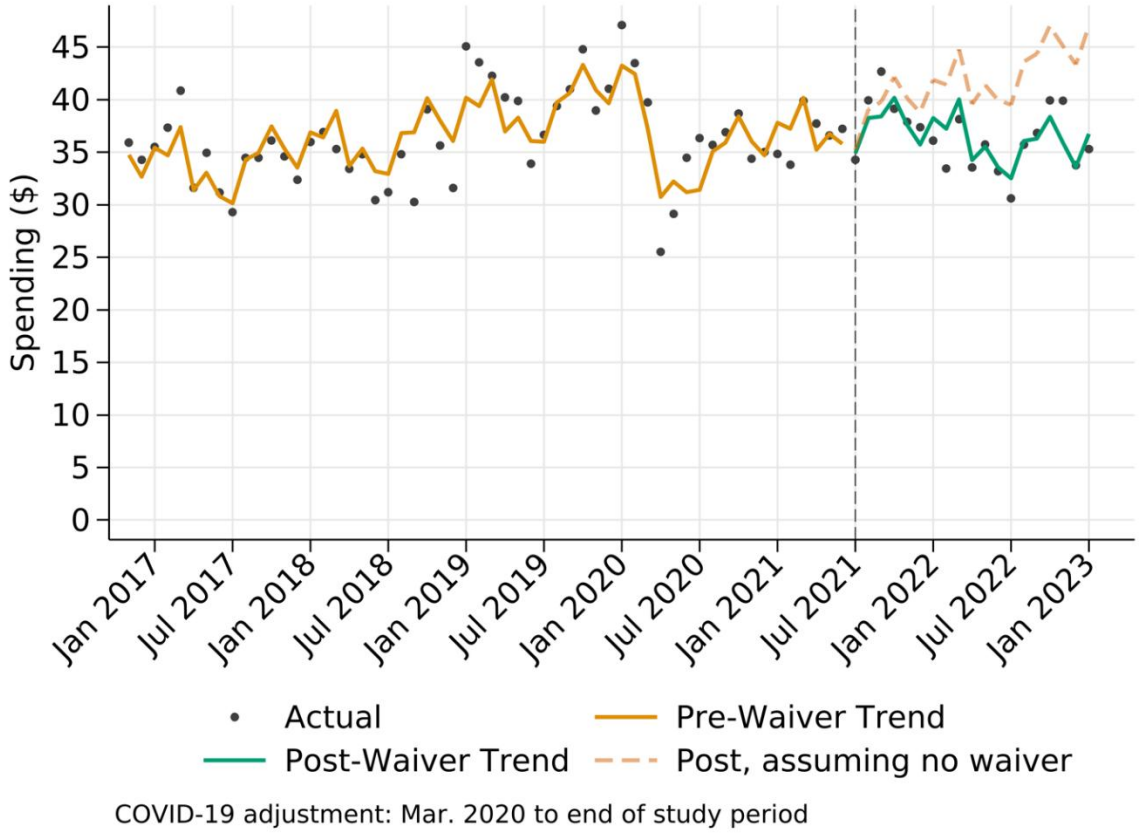


Table 0.101 Expenditures: Outpatient E&M

	Baseline	SP Waiver Implementation	Difference
Average Predicted Outcome, July 2021	40.0727*	39.7962*	-0.2765
	(39.5786, 40.5669)	(39.4006, 40.1919)	(-0.8512, 0.2982)
Slope	0.1979*	-0.3602*	-0.558*
	(0.1857, 0.2100)	(-0.4270, -0.2934)	(-0.6228, -0.4933)
Average Predicted Outcome, Jan 2023	50.0575*	39.7363*	-10.3211*
	(48.6665, 51.4484)	(39.3941, 40.0786)	(-11.7638, -8.8785)
N	24,159,624		

*Notes: 95% confidence intervals in parentheses. SP = Standard Plan. *p < 0.05.*

Expenditures: Outpatient non-E&M

Like the costs for E&M outpatient service, pre-implementation saw an increase until a reversal post-implementation. What was a roughly nine dollar difference at implementation grew to over $33 in savings by January 2023. That being said, the post-implementation counterfactual trend may be driven more by pandemic effects; regardless, the costs post-implementation were below those immediately pre-implementation.

Figure 0.109 Expenditures: Outpatient non-E&M

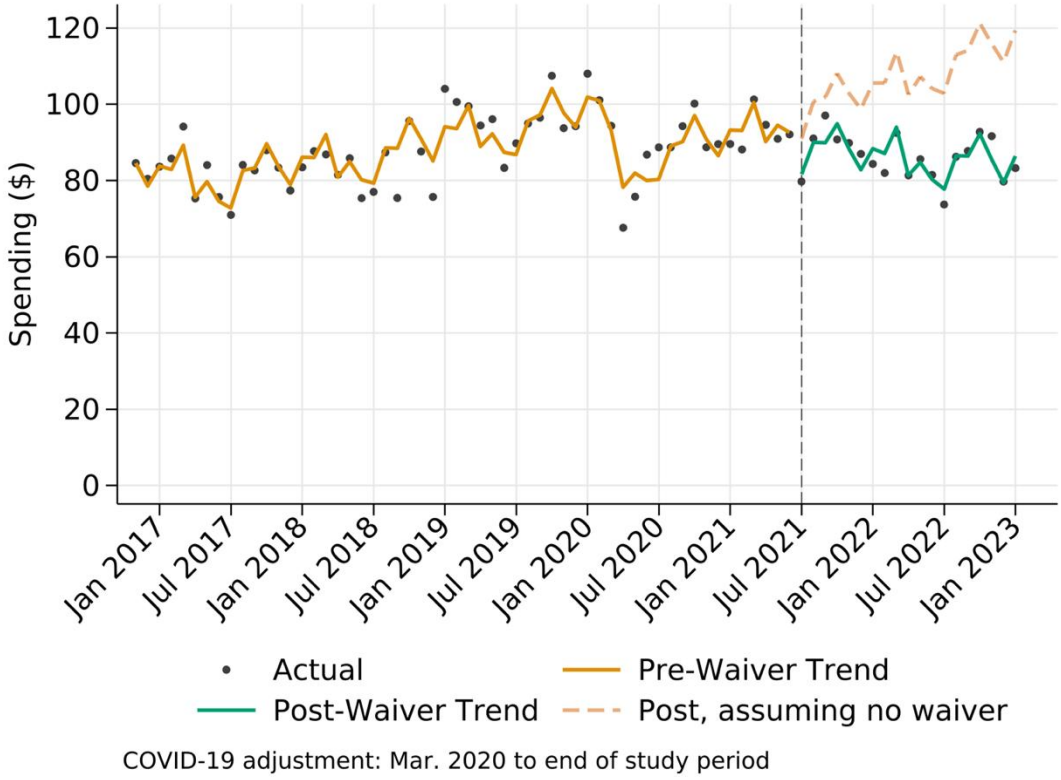


Table 0.102 Expenditures: Outpatient non-E&M

	Baseline	SP Waiver Implementation	Difference
Average Predicted Outcome, July 2021	101.2697*	91.914*	-9.3557*
	(99.9174, 102.6221)	(90.6793, 93.1487)	(-10.5726, -8.1388)
Slope	0.4678*	-0.8459*	-1.3138*
	(0.4314, 0.5043)	(-1.0011, -0.6908)	(-1.4603, -1.1672)
Average Predicted Outcome, Jan 2023	125.2037*	92.1998*	-33.0038*
	(122.1764, 128.2309)	(90.9316, 93.4681)	(-36.0765, -29.9312)
N	24,159,624		

*Notes: 95% confidence intervals in parentheses. SP = Standard Plan. *p < 0.05.*

Expenditures: Prescription Medications

Prescription spending saw a steady increase throughout the study period and is one of the few measures with no discernible effect from the pandemic onset. The slopes were identical, and the predicted expenditures were similar at implementation and January 2023. Prescription spending seems largely unassociated with transformation.

Figure 0.110 Expenditures: Prescription Medications

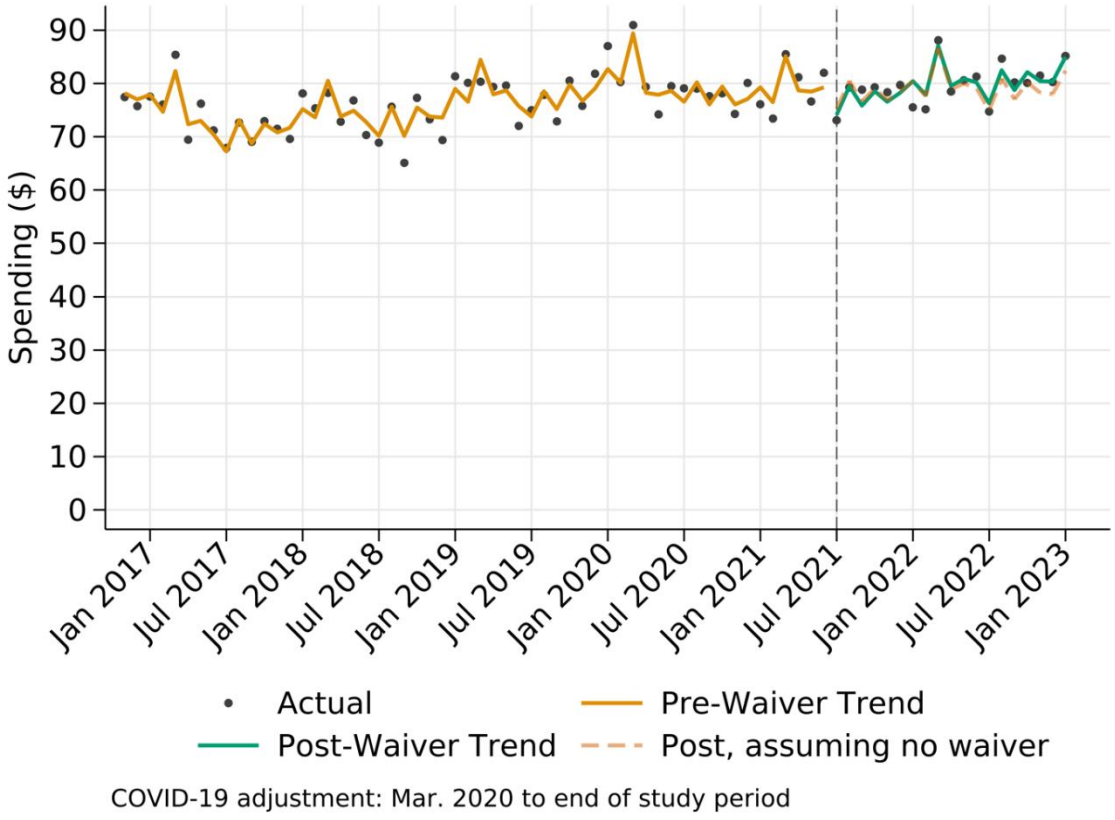


Table 0.103 Expenditures: Prescription Medications

	Baseline	SP Waiver Implementation	Difference
Average Predicted Outcome, July 2021	81.0493*	79.8544*	-1.1949
	(78.1707, 83.9280)	(77.0178, 82.6911)	(-3.2509, 0.8611)
Slope	0.1851*	0.3931*	0.208
	(0.1100, 0.2602)	(0.0754, 0.7108)	(-0.0878, 0.5038)
Average Predicted Outcome, Jan 2023	84.0587*	86.6076*	2.5489
	(78.2056, 89.9118)	(83.3286, 89.8866)	(-3.4202, 8.5179)
N	24,049,755		

*Notes: 95% confidence intervals in parentheses. SP = Standard Plan. *p < 0.05.*

Expenditures: Dental

The figure is dominated by a remarkable decline in dental expenditures in early 2020. Spending on dental care was slightly lower at implementation, with a larger difference of $3.32 PMPM in January 2023.

Figure 0.111 Expenditures: Dental

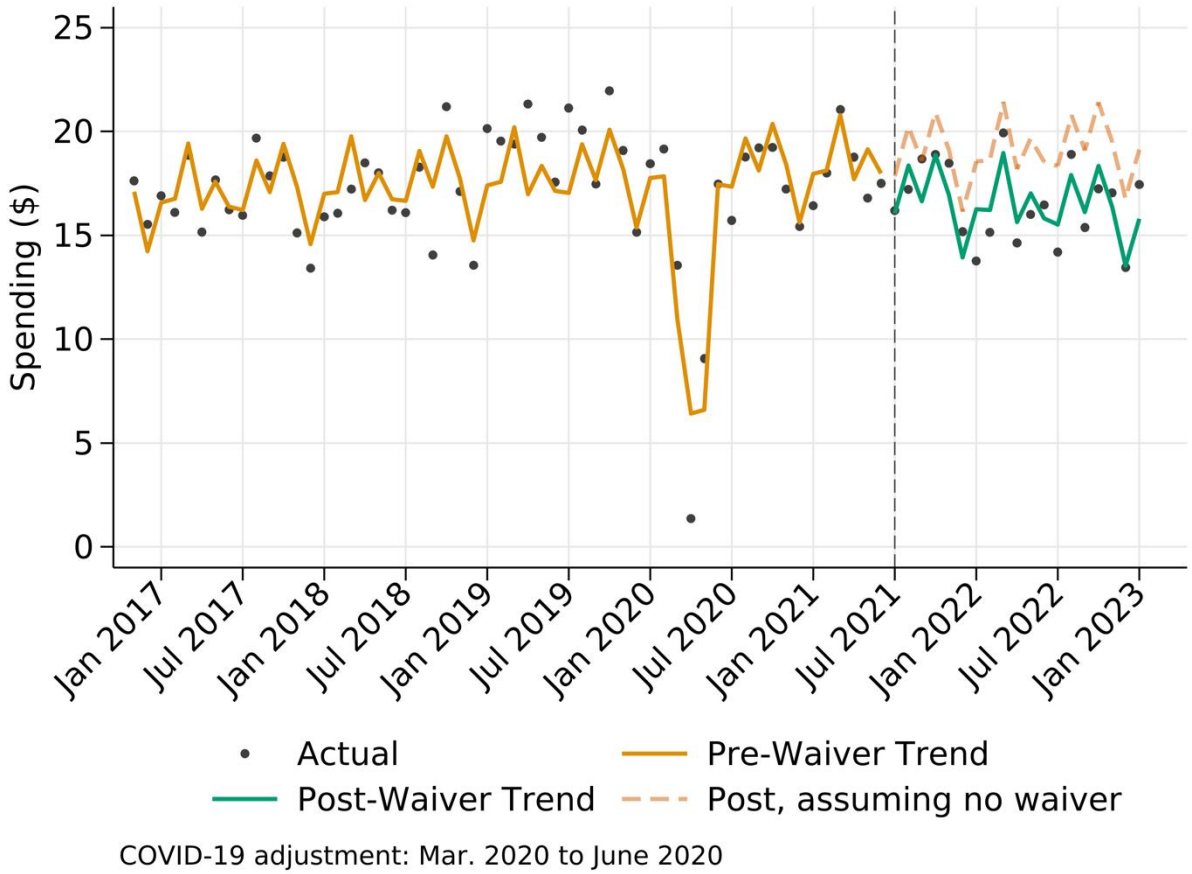


Table 0.104 Expenditures: Dental

	Baseline	SP Waiver Implementation	Difference
Average Predicted Outcome, July 2021	18.6689*	16.8772*	-1.7917*
	(18.1898, 19.1480)	(16.1887, 17.5657)	(-2.6309, -0.9525)
Slope	0.03*	-0.055	-0.085*
	(0.0164, 0.0437)	(-0.1191, 0.0091)	(-0.1505, -0.0195)
Average Predicted Outcome, Jan 2023	19.2098*	15.8875*	-3.3223*
	(18.5041, 19.9154)	(15.2303, 16.5446)	(-4.2851, -2.3595)
N		1,202,508	

*Notes: 95% confidence intervals in parentheses. SP = Standard Plan. *p < 0.05.*

Expenditures: Behavioral Health Providers

A slight upward trend pre-implementation was reversed at implementation and began declining. A sizable jump at implementation was negated by January 2023 for similar spending amounts at that time.

Figure 0.112 Expenditures: Behavioral Health Providers

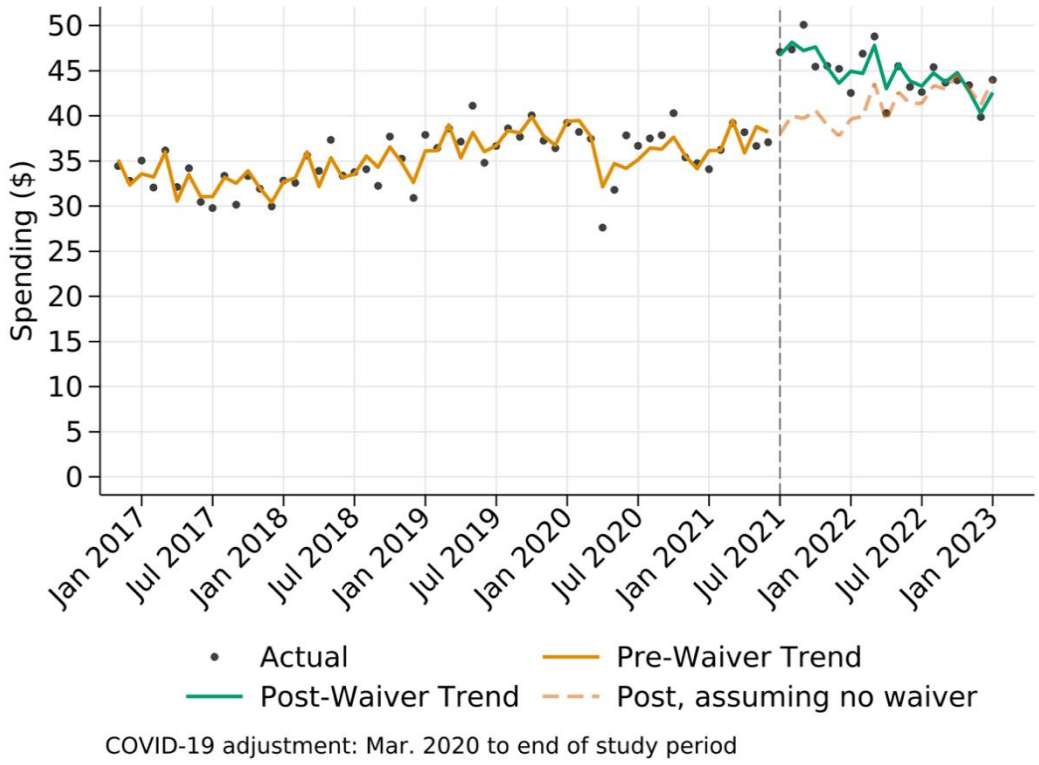


Table 0.105 Expenditures: Behavioral Health Providers

	Baseline	SP Waiver Implementation	Difference
Average Predicted Outcome, July 2021	39.7044*	48.4013*	8.6969*
	(38.6098, 40.7989)	(46.9871, 49.8154)	(7.0569, 10.3369)
Slope	0.1758*	-0.3883*	-0.5641*
	(0.1395, 0.2121)	(-0.5743, -0.2024)	(-0.7408, -0.3874)
Average Predicted Outcome, Jan 2023	47.6875*	46.2303*	-1.4572
	(44.5734, 50.8015)	(44.8455, 47.6150)	(-4.8445, 1.9301)
N		24,159,624	

*Notes: 95% confidence intervals in parentheses. SP = Standard Plan. *p < 0.05.*

Qualitative Findings

Qualitative findings from 2021 PHP interviews provide insight into the strategies PHPs consider in containing or reducing costs/healthcare expenditures. The most common strategy for short-term cost containment was utilization management to ensure "people receive the right care at the right time" [Chief Medical Officer, PHP 1] and "more effective handoffs to the right settings by people who have the right set of skills to meet each need." [Chief Medical Officer, PHP 2] The most common strategy for long-term cost containment was investing in addressing social determinants of health. PHPs offered value-added benefits like housing support, doulas, and early childhood interventions to address cost drivers. In addition, PHPs are required to transition to value-based payment models to achieve further cost reduction. The participants from PHPs described several strategies to enhance the transition to value-based contracting to reduce costs and improve the quality of care. They shared that more work was needed to transition smaller practices to value-based contracts. One PHP described how they planned to help provider practices build infrastructure towards a value-based payment model:

> I think part of our intent and approach is to work with all comers to meet practices where they are and help practices develop capabilities in terms of having a pay-for-performance program that focuses on preventive care aspects, but also it starts to help providers focus on some of those utilization-based measures that will help them to develop the skills and practice patterns to be

> successful, moving towards more sophisticated, um, alternative payment models in the future. So, we have a primary care incentive program that's applicable to all providers.

Several PHP participants described other strategies to build provider relationships and assist provider practices in transitioning to VBP models. One PHP provided a detailed example of how they are supporting small, medium, and large organizations during and beyond the transition:

> We have a tiered structure in the provider relationship and quality department: For the smaller practices, we have a provider representative; the middle to larger practices will have both a provider rep and a quality rep; and then the large clinically integrated networks will have a provider rep, quality rep, and performance advisor to help see the projected savings, pull reports, etc.

The participants from PHPs emphasized the importance of partnerships with the state, providers, and community-based organizations to realize higher provider and beneficiary satisfaction and higher quality of care at lower healthcare expenditure.

Hypothesis 2.4: The Implementation of Medicaid managed care will increase provider satisfaction and participation in the Medicaid Program.

The Provider Participation measure is the percent of providers who hold a contract with Medicaid and bill Medicaid in the month. The measure had a steady increase throughout the pre-implementation period, with a similar but slightly lower increase during the post-implementation period. An increase at the time of implementation dissipated to a 2.3 percentage point lower participation by December 2022.

Figure 0.113 Provider Participation

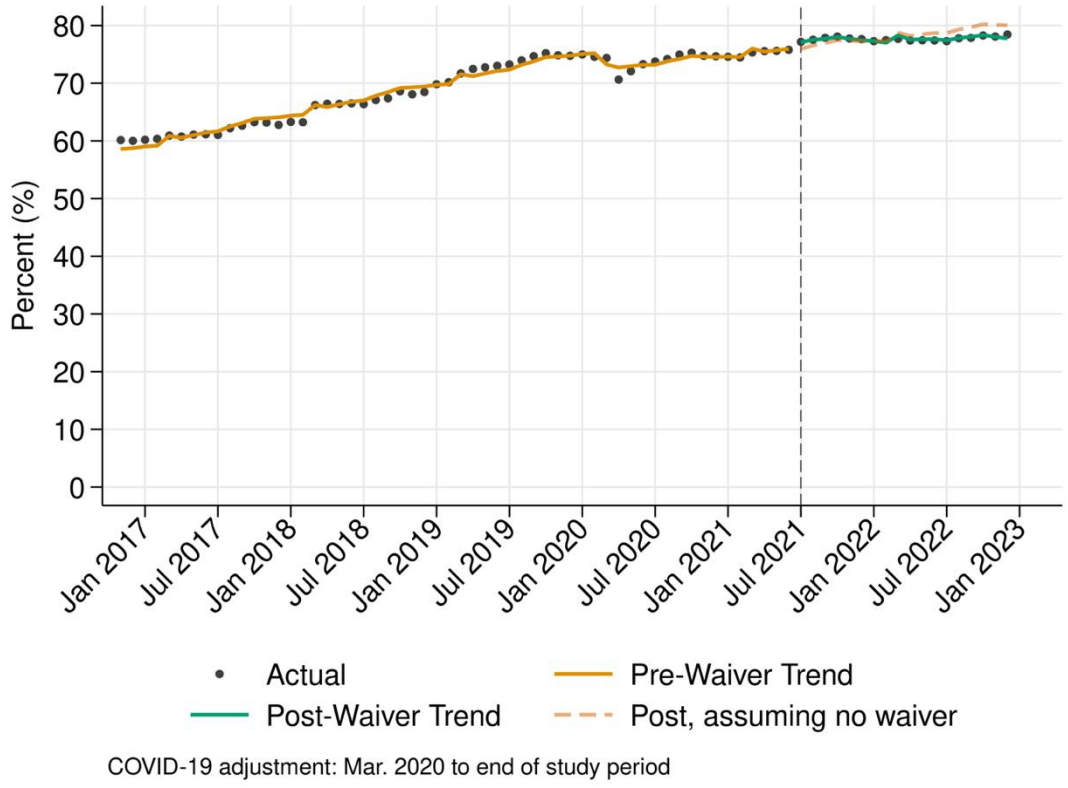


Table 0.106 Provider Participation

	Baseline	SP Waiver Implementation	Difference
Average Predicted Outcome, July 2021	76.2653*	77.4289*	1.1636*
	(75.9493, 76.5813)	(77.1287, 77.7292)	(0.9837, 1.3435)
Slope	0.4452*	0.2426*	-0.2025*
	(0.4357, 0.4547)	(0.2202, 0.2650)	(-0.2226, -0.1825)
Average Predicted Outcome, Dec 2022	80.1697*	77.89*	-2.2797*
	(79.7134, 80.6259)	(77.5962, 78.1839)	(-2.6825, -1.8768)
N		5,321,567	

*Notes: 95% confidence intervals in parentheses. SP = Standard Plan. *p < 0.05.*

Qualitative Findings

Qualitative findings reveal variation in provider satisfaction, with half being satisfied with Medicaid managed care and others being neither dissatisfied nor satisfied. The results also indicate that most participating healthcare organizations chose to maintain contracts with all PHPs operating in their region to enable patient access. Some participating healthcare organizations considered terminating a PHP contract due to the administrative burden from unresolved issues of denials and attribution. The detailed results are reported below.

a. Provider Satisfaction

Preliminary findings from 2023 interviews with healthcare organizations revealed mixed provider satisfaction with Medicaid managed care (Table 5.108). Most participants were satisfied with the transition to managed care. Common reasons for satisfaction included some Standard Plans being perceived as easy payers compared to other insurance carriers, and improvements in the operations of some Standard Plans from 2021 to 2023. Participants who were neither satisfied nor dissatisfied reported unresolved issues with some plans, such as high rates of denials, attribution errors, or problems with prior authorization.

Table 0.107 Overall satisfaction of participants from healthcare organizations with Medicaid managed care in 2023.

Level of Satisfaction		Representative Quote
Satisfied	17	Um, I would say I'm pretty satisfied with it. I think out of all of our payers, we've had the least problems with Medicaid. I think Medicaid, we've been really, really satisfied. (Administrator, Independent Behavioral Health Practice) From what I put together and what I allowed, I'm satisfied because they worked out a lot of the issues. (Practice Administrator, Independent Adult Primary Care Practice)
Neither satisfied nor dissatisfied or dissatisfied	18	It is improving, let's put it that way and has it got a long way to go. Yes. But it is improving, and there is the desire for it to improve. Um, but they need to be listening to the realities of the situation in order for it to improve." (Administrator, Independent Family Practice) If you'd asked me a month ago, I probably would've been a six but now, I'm a four because I think there's been even more changes in the process. Like, I had a patient yesterday that I've been trying to get their supplies for their ventilator for, like, forever. And it's, like their insurance company has just made it super challenging. (Administrator and Provider, Health-system Affiliated Practice)

b. Provider Participation

In our sample, over three years, fifty participating organizations contracted with all five PHPs, 18 with four, and 24 with three or fewer PHPs. Table 5.109 summarizes the number of PHP contracts and future contracting plans by year of data collection.

Table 0.108 Number of PHP contracts and future contracting decisions (2021 to 2023

Number of PHP contracts	2021 (n=41)	2022 (n=26)	2023 (=36)
5	10 (24.4%)	14 (53.8%)	26 (63.9%)
4	6 (14.6%)	7 (26.9%)	5 (13.8%)
3	6 (14.6%)	3 (11.5%)	4 (11.1%)
2	5 (12.2%)	1 (3.8%)	1 (2.7%)
1	3 (7.3%)	1 (3.8%)	0
Unsure	11 (26.8%)	0	0
Plan to add or terminate PHP contracts in the future*			
No	-	10 (38.5%)	24 (66.7%)
Yes - eliminate	-	6 (23.1%)	6 (16.7%)
Yes- add	-	1(3.8%)	1 (2.7%)
Unsure	-	9 (34.6%)	5 (13.9%)

*Does not apply to data collected before the transition to Medicaid managed care

Qualitative findings highlight factors influencing provider decisions regarding contracting with PHPs, which include the contracting process, patient access to care, and increased administrative burden.

MCO contracting process and negotiation

Most participating healthcare organizations considered the ease of contracting with PHPs an essential factor. Participating small independent healthcare organizations relied on clinically integrated networks, accountable care organizations, or other intermediary agencies to negotiate contracts with PHPs. This support enabled smaller healthcare organizations to contract with all PHPs. Participating health systems and larger independent healthcare organizations negotiated with PHPs directly. For them, ease of contracting and negotiating reimbursement rates were often sticking points for contracting with PHPs. Participants shared that contracting was "*easier with some PHPs than others*" (Leader, Health System). For example, PHPs which had assigned representatives for healthcare organizations were easier to contract with. On the contrary, the variations in contract terms made negotiations time-intensive, influencing the contracting decisions. A senior leader at a health-system-affiliated practice described:

> It's an organizational-level decision….What we hear from the conversations about why we haven't contracted and why we're still in discussion is that there's no transparency about the reimbursement and payment structure.

Participants from healthcare organizations suggested these unsuccessful negotiations led to contracting with fewer PHPs.

Patient Access

Maintaining or improving patient access to care was cited as a primary motivating factor for contracting with all PHPs initially (2021 interviews) and maintaining contracts in the future (2022 and 2023 interviews). This was particularly true for organizations serving a high share of Medicaid beneficiaries, most of whom expressed concern for patients' access to care. Interviewees perceived a lack of awareness among their Medicaid patients about the change to Medicaid managed care. They believed offering all PHPs was a strategy to ensure continued patient access. Participants perceived that exiting an MCO contract would "create an enormous burden of changing MCOs on patients" and, as a result, almost always decided to continue contracting with all five MCOs. (Administrator, Pediatric Practice). In addition, an organizational mission akin to "serving all patients regardless of their insurance status" (Senior Administrator, FQHC) was

cited by FQHCs, LHDs, and health systems as an essential decision-making factor in contracting with all PHPs despite the challenges of working with them.

Increased Administrative burden

The transition from working with one contract under the prior fee-for-service program to managing up to five separate contracts with PHPs led to additional work and higher administrative costs of operationalizing the program. Managing up to five different PHPs added administrative complexity to the practices. Several participating healthcare organizations identified the misalignment between the increased administrative cost of operationalizing managed care contracts and the reimbursement rates as an initial contracting decision factor. A medical director of a health-system affiliated practice that contracted with three out of five PHPs described their initial decision as follows:

> It's an organizational level decision, and I understand that the organization has to make sure that the contract is right for us……Contracting doesn't seem like it should be difficult. It seems like they should all have the same standard, the same rules, the same pay mix, the same reimbursements. But they are five different plans, with different rules, and I mean, literally, we've got [individual's name] and our pop health team combing through, line by line, making graphics and grids to see what's required for each one, how does that differ from the other, and how we can make sure we're meeting the requirements of each of them. The amount of infrastructure that it is going to take to be able to meet the requirements of each tier, for each plan, it's astronomical.

Subsequent interviews revealed the increased administrative burden without corresponding reimbursement as an ongoing consideration for other practices. The administrative burden was primarily due to operational challenges, inadequate responsiveness and resolution of issues by PHPs related to billing and prior authorization requirements, and lack of standardization across PHPs. Several participants described improvement in operational challenges, yet there was variation among their experiences with PHPs.

The most common operational challenges described were attribution errors and higher rates of claim denials. Participants from healthcare organizations expressed that they faced difficulty in reconciling attribution errors because "some PHPs did not provide accurate attribution lists until October 2022," which is more than a year after the transition. (Senior administrator, FQHC)

High rates of denial of claims for some PHPs was another major challenge across all types of participating healthcare organizations that increased administrative burden. Some participating healthcare organizations faced staffing issues to reconcile denials. A health system leader described it as,

> I mean, it—and we've even talked about, due to the amount of demands on our administrative and our physician teams to correct denials, we can't stay in all these networks. Or at least, all of our hospitals can't. So we may be looking out in the region where the Medicaid population may not be as big or whatever, and reduce from four down to two to at least—you don't want to go down to one. (Senior Administrator, Health System)

Participants shared mixed experiences with the responsiveness of PHPs, with some having better responsiveness than others. Our results show variation in the kind of responsiveness by healthcare organization type. Interviewees from some health systems and large independent practices described having assigned representatives with some PHPs. Interviewees from small independent practices, federally qualified health centers, and local health departments usually lacked or didn't have consistent provider relations representatives. They described challenges communicating with some PHPs when dealing with issues such as denials. An interviewee described their experience of "getting questions answered and resolving issues without assigned reps as a nightmare" with one PHP. (Office Manager, Pediatric Practice) The level of responsiveness by PHPs and ability to resolve issues directly impacted administrative burden and was identified as a critical consideration for maintaining contracts with PHPs.

Overall, the experiences of participating organizations manifested as factors that either facilitated or hindered initial contracting with MCOs. The contracting process and administrative burden perpetuated by the imbalance between administrative costs and reimbursement rate were the main factors hampering contracting with PHPs. In contrast, patient access and contracting support were major motivators for contracting with all PHPs. Most, if not all, participants shared some challenges that led some healthcare organizations to consider dropping one or more PHPs.

Chapter 6. Survey Contributions to the Managed Care Component of the SUD 1115 Waiver

Medicaid Transformation Provider Experience Survey 2022

2022 Results Overview for Survey Participants

The Medicaid Transformation Provide Experience Survey was administered to organizations providing primary care and/or OB/GYN services to Medicaid patients in North Carolina. The survey provides a snapshot of organizational experiences, contracting, and satisfaction with Prepaid Health Plans (PHPs) in the transition to Medicaid managed care. Survey findings serve as a leading indicator for quality improvement for PHPs. This report details a general overview of findings at the end of the first year of managed care.

Survey development

This survey built on the initial instrument developed in consultation with clinicians, health system/practice leaders, and stakeholders from NC Department of Health Human Services in the fall of 2020. This survey was finalized in February 2022. We sampled and fielded the survey at the organizational level, given that most interactions with PHPs occur at the organizational (rather than individual clinician) level.

IQVIA OneKey data was used to identify 1,243 unique organizations providing primary care and OB/Gyn services in North Carolina, using Medicaid provider data to confirm the sample. Survey responses were collected between April and July 2022 from these identified organizations. Through the recruitment process using phone calls, mailings, and emails, we determined that approximately 63% of the organizations in our sample were eligible to receive the survey.

Survey Response Rate

Table 6.1 summarizes overall characteristics of 394 respondent organizations. Our final response rate was 50%. Our sample includes a diverse set of organizations, from solo practice physicians to large integrated delivery systems.

Table 6.1 Organizational Respondent Overview

Organizational respondent overview

	Total (n = 394)
Ownership (self-reported)	
Health Systems	14 (4%)
Independent Practices/Medical Groups	380 (96%)
Size	
Small (1 – 2 physicians)	261 (66%)
Medium (3 – 9 physicians)	96 (24%)
Large (10+ physicians)	37 (12%)
Services (inclusive)	
Primary care	385 (98%)
Prenatal/Postnatal care	42 (11%)
Inpatient obstetrics care	23 (6%)

Contracting with PHPs

Rates of contracting with one of the five PHPs among surveyed provider organizations ranged from 73.3% to 94.5%. Among medical groups and independent practices, the mean number of plans surveyed organizations contracted with was 4.3.

Respondents had very similar dispositions toward each PHP; mean overall ratings for the five PHPs (on a scale of 1 to 4, with 1 being “poor” and 4 being “excellent”) ranged from 2.56 to 2.69.

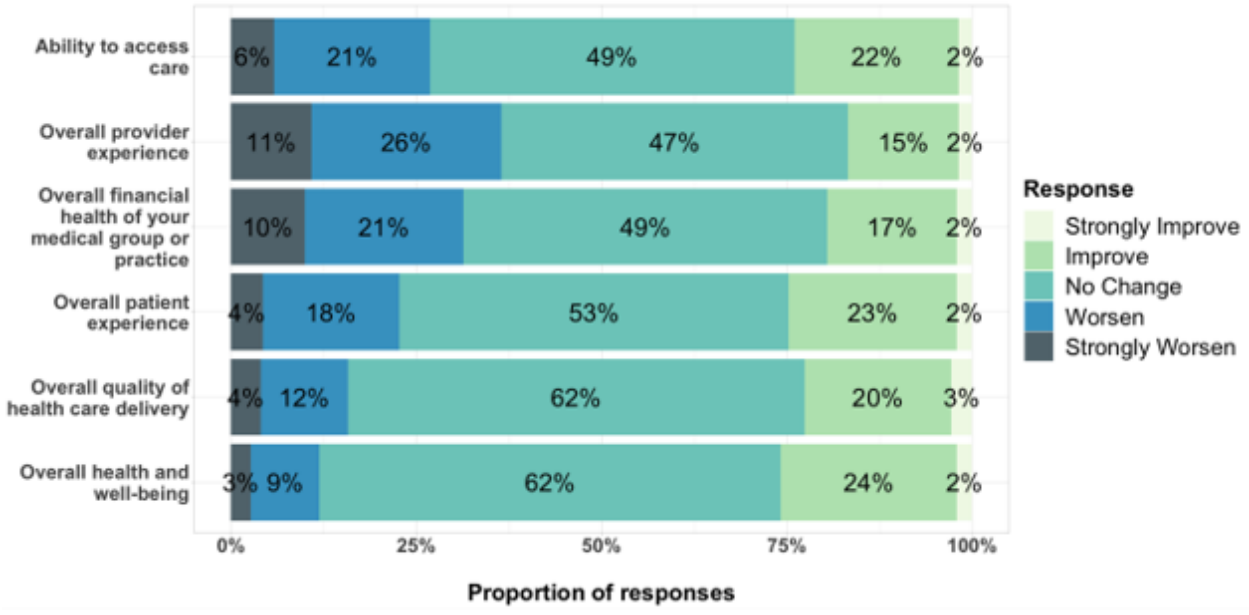
Overall perceived effects of PHPs on care delivery

While most organizational respondents felt ambivalent about the effects of PHPs on care delivery, about a third of respondents felt the PHPs would worsen or strongly worsen overall provider experience and overall financial health of medical groups/practices.

Experience with clinical and administrative factors

We asked provider organizations about their experiences with each PHP on thirteen different factors, split into clinical and administrative domains. Clinical factors included items like access to specialists, behavioral health prescribers, and formulary, while examples of administrative factors included timeliness of claims processing, timeliness to answer questions and/or resolve problems, and adequacy of reimbursement. Plans performed similarly to each other across clinical and administrative domains. Compared with the Legacy NC Medicaid program ("fee for service" or "Medicaid Direct"), PHPs performed lower on administrative domains. The lowest rated domain for PHPs was access to behavioral health providers. Interestingly, PHPs performed better than the Legacy NC Medicaid program in access to behavioral health providers.

Figure 6.2 Proportion of responses



Behavioral health and Tailored Plans

In this survey, we asked provider organizations about their approach to integration of care with behavioral health providers and their plans regarding the upcoming Tailored Plans. 24% of provider organizations

reported that they have embedded or co-located behavioral health professionals in primary care offices. For those organizations without embedded or co-located behavioral health, the most common reasons were not enough space, unable to sustain a position with current reimbursement, not enough demand from patients, and administrative processes are burdensome. 44% reported that they did not have access to a psychiatrist to support the Collaborative Care Model.

Regarding plans to contract with Behavioral Health and Intellectual/Developmental Disability Tailored Plans, 30% said yes. **51% were not aware of Tailored Plans.** These responses suggest that primary care and OB/GYN practices were not focused on Tailored Plans and may not understand any potential care delivery changes and resources that may become available for these populations.

Chapter 7. Conclusions

This Interim Evaluation Report contains a wealth of data – quantitative and qualitative. With hundreds of pages of charts and tables, it can be difficult to synthesize and develop overall takeaways at this stage of the transformation. Here, we synthesize and generalize the findings in order to identify some major takeaways. As stated earlier, the public health emergency and other statewide disruptions have led us to temper our conclusions due to the uncertainty of these confounding effects. As additional time passes, we expect the pandemic effects to continue to diminish and specific effects of the implementation will be easier to identify.

For this concluding chapter, we reviewed each of the main effects for all quantitative measures – how did the metric value in the most recent period compare to the estimated value *that would have occurred* in the absence of the North Carolina Medicaid Transformation? We also assessed the figures from a qualitative standpoint – given the disruption of the pandemic, what do the overall trends suggest? Do the figures tell a clear story of post-transformation trends, or are the trends sufficiently complex that it is challenging to see the clear effect of transformation? In this manner, we are combining statistical evidence with the high-level trends. We also combined the following takeaways with those collected via other methods (e.g. provider survey, focus group, interviews), synthesizing findings as appropriate.

For each takeaway, we include specific examples supporting the conclusion.

Takeaways

1. **There is some evidence of decreases in use and expenditure in certain service lines.** This provides some support for Hypotheses 2.1 and 2.3 – that the use of the emergency room for preventable conditions and expenditures in some services would decrease after the introduction of managed care. This evidence supports managed care Goal 2: maximizing high value care to ensure sustainability of the Medicaid program. However, other expenditure reductions may not be aligned with Medicaid's goals to increase access to high-value and community-based services.
    a. **Expenditures in outpatient care – both outpatient evaluation and management (E&M) and outpatient non-E&M -- decreased**, which is also consistent with a decrease in Access to Preventive/Ambulatory Health Services (AAP). Although decreases in expenditures was a goal

of the Transformation, so was increased access to care, so the decrease in values for these three measures is important to consider.

b. **Hospitalizations for preventable conditions** (e.g. PDI 18, PDI 15, PDI 14, PDI 08) **have decreased**. This pattern holds across the preventable conditions and is an important finding, since hospital stays for community-treatable conditions are not only costly and inefficient but suggestive that these conditions are being managed in more appropriate settings – or prevented altogether.

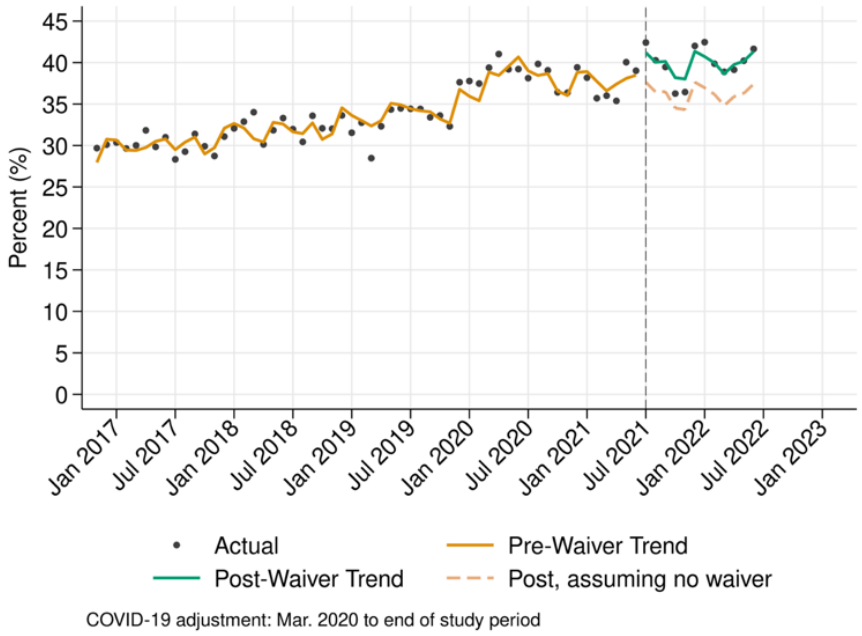
c. **ED visits decreased, but there has also been (a) increases in potentially preventable visits [metric "Potentially Avoidable ED Visits"] and (b) expenditures for ED visits that did not result in inpatient admissions [metric "ER expenditures (not resulted in inpatient)"]**. The latter is not the hypothesized effect – we had hypothesized that the Transformation would have led to decreases in the use of the ED for potentially preventable conditions.

d. Medicaid Transformation has generally had little impact on inpatient hospital use. Despite being carved-out of Standard Plan benefits, **dental expenditures and use have decreased**. Combined with the decreases in outpatient and preventative visits (point a above), this may indicate that outpatient visits are an important leverage point for providing encouragement for preventative dental care. This finding is also consistent with challenges in referrals to dental providers and dissatisfaction in access to dental services by beneficiaries outlined in qualitative work.

2. **The Transformation has appeared to improve care for those with behavioral health diagnoses.** This is a significant finding because a significant proportion of Standard Plan enrollees have either behavioral health conditions that **are not eligible for** Tailored Plan enrollment or may be newly diagnosed (incident) behavioral health episodes that have not yet resulted in a shift into a Tailored Plan. Initiation and engagement in treatment for opioid use disorder, initiation in care for alcohol use disorder and overall initiation and engagement in care for substance use disorders all showed signs of improvement after SP implementation. In addition, antidepressant medication management improved in both the initiation and continuation phases. These are important metrics that could precipitate more positive long-term accomplishments that this report cannot capture, given that our follow-up period is only approximately 18 months after SP launch. Some of these changes could potentially be due to the SUD components of the waiver, which have been implemented over time, as pointed out in the separate interim report focused on beneficiaries with SUD. Research consistently shows that individuals with

behavioral health conditions often face challenges in managing self-care for mental health and associated chronic illnesses. They are less likely to adhere to medication regimens and are at an increased risk of hospitalization. Improvements in access to treatments for behavioral health conditions is an important first step towards more positive future outcomes. Finally, the 2023 survey results found that participants were more positive about their ability to access behavioral health services, consistent with **these** improving trends.

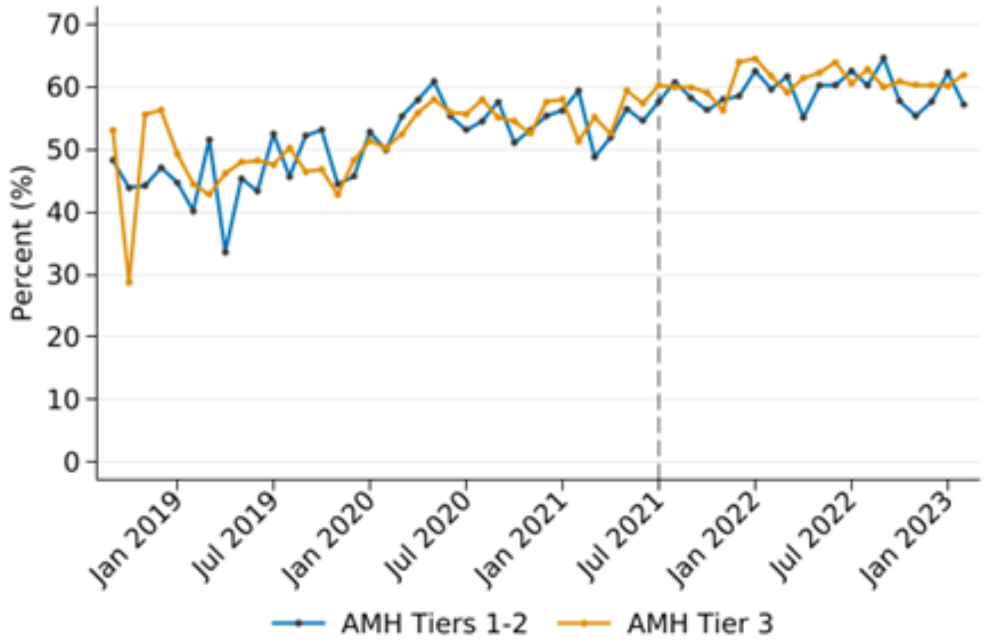
Figure 0.1 Antidepressant Medication Management (AMM): Effective Continuation Phase Treatment



3. **Tier 3 Advanced Medical homes are an effective mechanism to increase access to care management but have not yet resulted in improved patterns of care.** Of the 26 measures examined, including some measures from the AMH measure set as well as additional measures reflecting a broad set of quality and process indicators, none were higher for Tier 3 AMHs than they were for Tier 1-2 AMHs and a few were lower. From our interview data, we know that many practices were very cautious about taking on the additional roles required to contract as a Tier 3 AMH, given the modest funding levels available to support the additional care management requirements. Sometimes the lack of a difference in outcomes was because measures for all AMH Tiers increased after the implementation of Standard Plans. Figure 7.2 shows this trend for

Antidepression Medication Management – there is no clear difference between AMH tiers, but this measure has been trending up for both groups during the study period. We found that Tier 3 Advanced Medical Homes provided substantially more care management than did Tier 1 and Tier 2 AMHs. However, we did not see any consistency in improved outcomes for beneficiaries assigned to AMH Tier 3 practices versus those assigned to AMH Tier 1 and 2 practices. This analysis controls for the selection bias inherent in the voluntary participation in the Tier 3 AMH program and thus uses a more rigorous analysis approach by examining improvements since AMH recognition rather than allowing practices with long-standing track records of quality improvement that predate SP launch to drive differences by AMH tier.

Figure 0.2 Antidepressant Medication Management (AMM): Acute Phase Retention

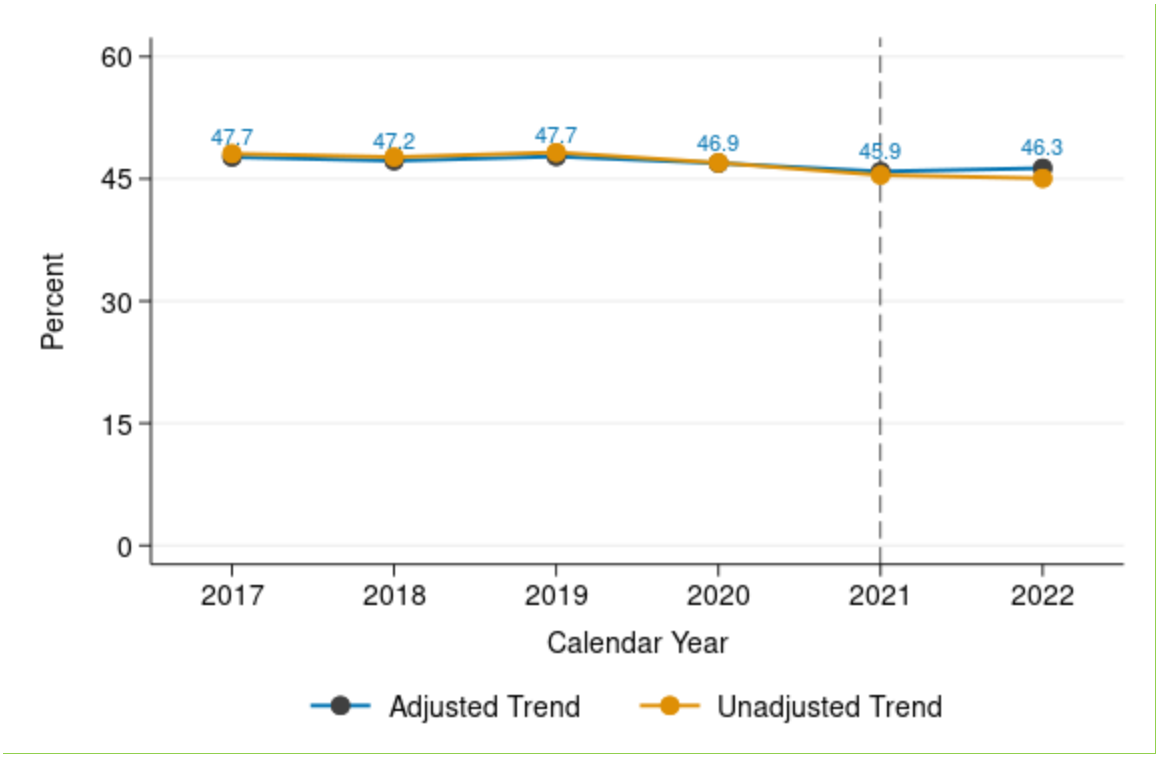


4. **Annual measures struggle to identify implementation effects.** Some measures are only available at an annual level or are technically specified at an annual level. The relatively short post-transformation timeframe rendered it challenging to see many clear patterns, and the number of datapoints is too small to identify any clear evidence. Annual measures typically showed little effect of the Transformation in either direction, but we believe this is more about the ability of such highly

aggregated data to identify a change than the true effect of the measure. Despite the limitations of monthly values (namely, precision and clinical relevance) they are better able to identify implementation effects. Perhaps this will change for the summative evaluation report as we have more post-transformation "run out," but it seems clear that monthly measures are better able to capture the effect of Transformation.

The example below (Breast Cancer Screening) is typical - the one data point post-transformation shows an increase in screening rates, but despite the statistical results, from a qualitative standpoint there is no clear evidence of improvement shown in the figure. Additional years of data should help provide a clearer picture.

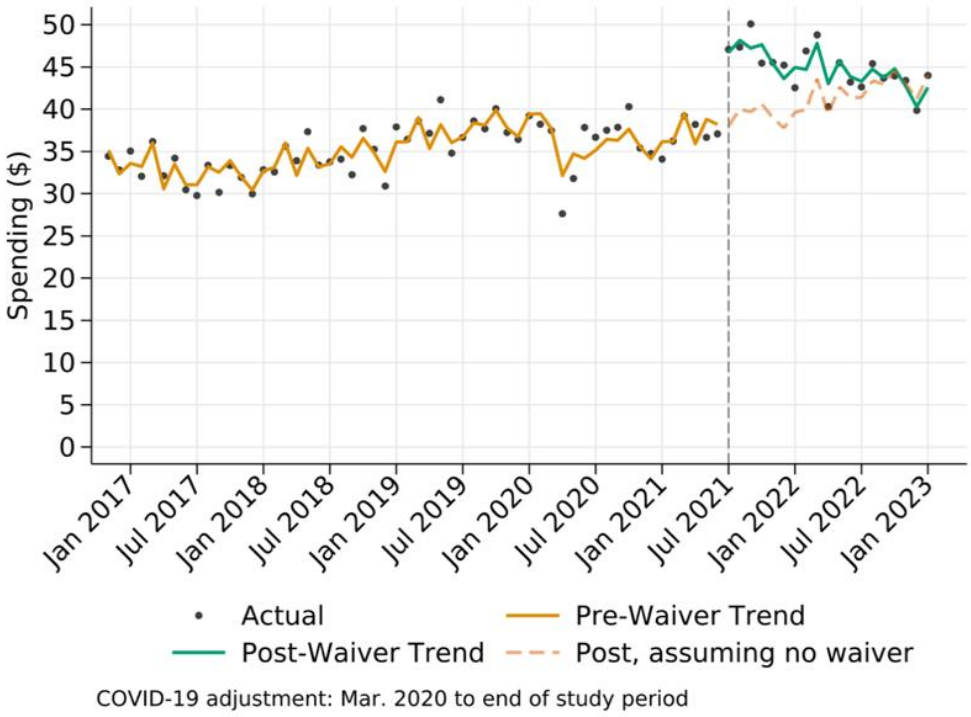
Figure 0.3 Trends in breast cancer screening



5. **There is some evidence of immediate post-implementation changes, but this often restabilized to reflect pre-transformation trends.** This type of pattern may reflect a true disruption – that is, an immediate change in a metric from its pre-implementation value - or this may be a consequence of the

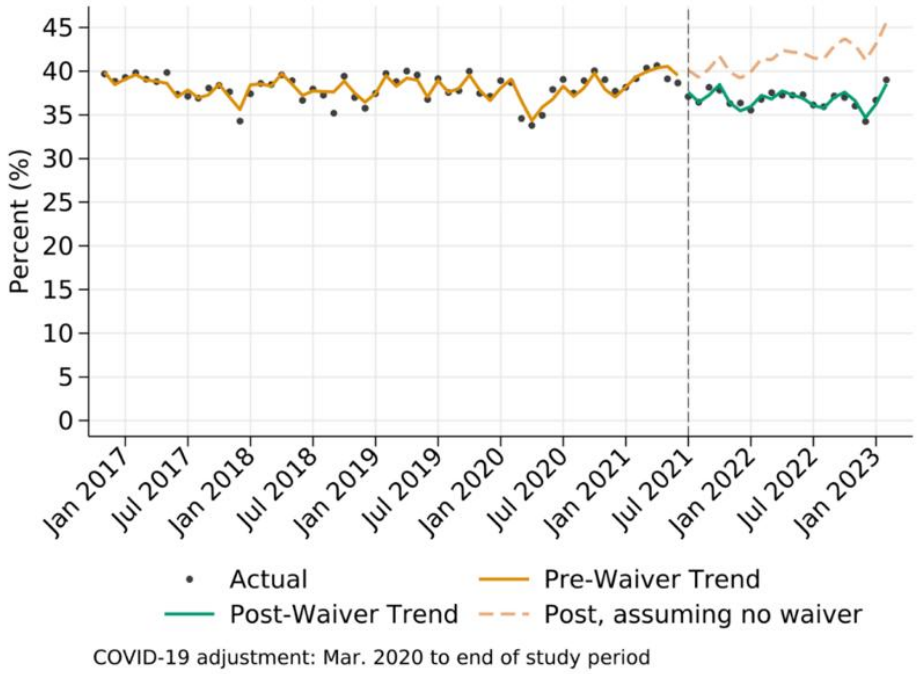
switch in data feeds from fee-for-service claims data to managed care-generated encounter data. For example, expenditures with behavioral health providers had a large instantaneous increase (see Figure 7.4 below), but the post-transformation values are trending back towards the counterfactual – what we think would have occurred in the absence of the transformation. The qualitative work identified referrals to specialists as being challenging after the transition – the downward trend is consistent with this.

Figure 0.4 Expenditures: Behavioral Health Providers



6. **There are some anomalous results that should be further explored. For example, the Medicaid Transformation was associated with decreases in counseling and screening services (e.g. Weight Assessment and Counseling for Nutrition and Physical Activity for Children/Adolescents (WCC), Transitions in Care (TRC)).** This is incongruous with the increase in care management and the fact that one of the expectations of Medicaid Transformation care management was to provide support to members during transitions of care.

Figure 0.5 Transitions of Care (TRC): Patient Engagement in post-discharge care



7. **Other measures of quality of care had mixed evidence of change.** For example, there is evidence of a decrease in statin use (Statin Therapy for Patients with Cardiovascular Disease, SPC and Statin Therapy for Patients with Diabetes, SPD) and an increase in the appropriate use of strep test (Appropriate Testing for Pharyngitis, CWP). Negative findings should be closely monitored to ensure that they do not slide further.

Figure 7.6 Statin Therapy for Patients with Cardiovascular Disease (SPC)

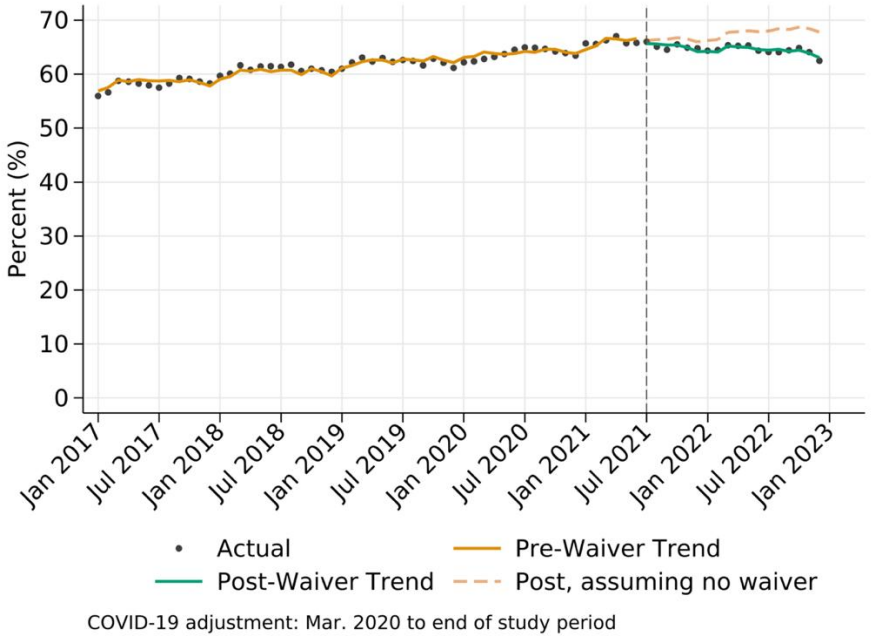
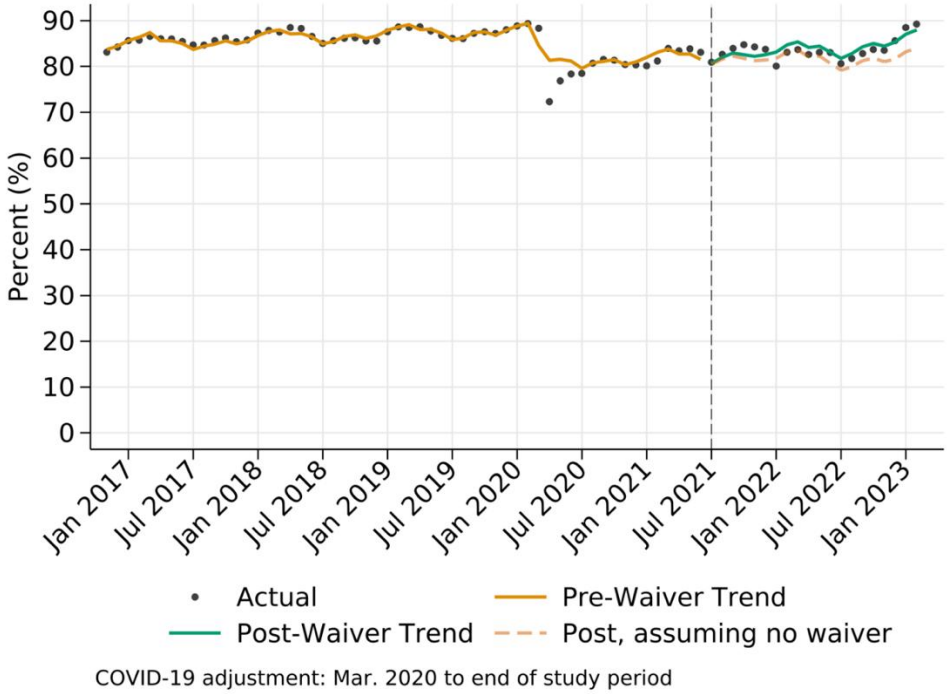


Figure 7.7 appropriate testing for pharyngitis



8. **Care management increased dramatically.** Investments in care management and clear guidance on care management expectations resulted in greater care management engagements with a greater push by SPs to identify and connect with Medicaid beneficiaries.

9. **The transformation did affect populations differently, although there is no clear takeaway on whether disparities narrowed.** The evidence for differential effects was strongest by age and race – especially Black and White races. There was less evidence of differential effects by rurality and sex. The metrics most likely to have differential effects are those with the broadest inclusion criteria – for example, expenditures and metrics for whom many beneficiaries are eligible (e.g. dental visits). Statistically, this makes sense; the larger sample size strengthens the precision of the model. For each of the monthly metrics, we conducted stratified analyses, comparing populations across multiple population characteristics: age, rurality, ethnicity, sex, disability status, and race.

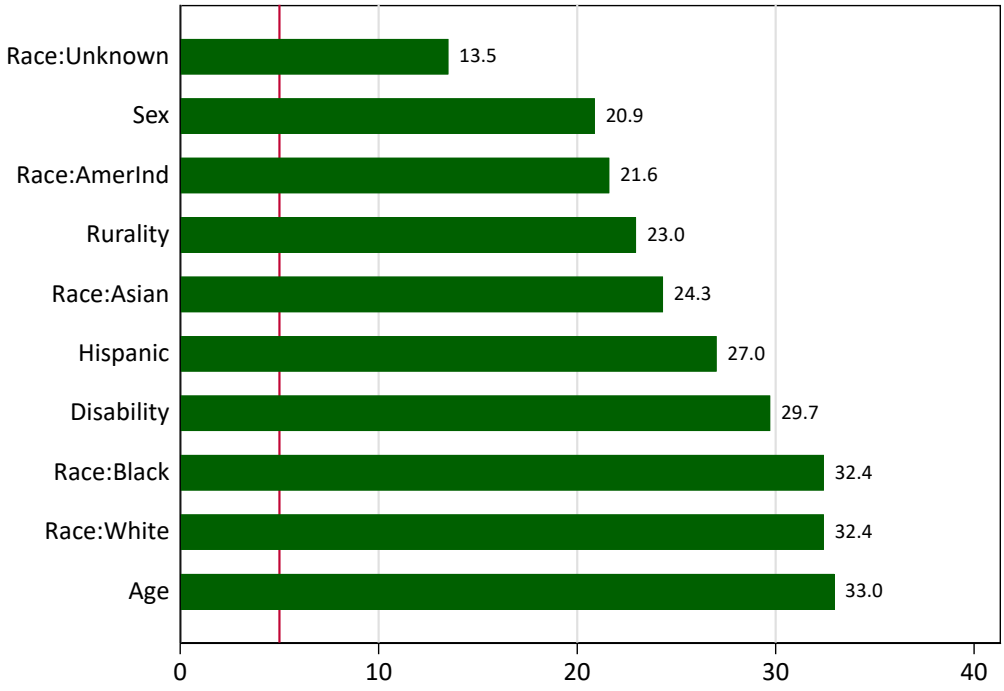
   Across all the metrics, there were approximately 800 models testing whether there was heterogeneity of treatment effect. For this report, we took a broad view and looked for evidence of differential effects; subsequent analyses will investigate these issues in more detail. It is important to understand that with 800 models, there will be many that are deemed statistically significant when in fact there is no true effect; analysts must be careful in the context of this *multiplicity* – even with no true effect, there will be plenty that are statistically significant. Based on the 95 percent confidence interval, we would expect at least 5 percent of models to return statistically significant results; to conclude there is heterogeneity, we would be looking for considerably more than 5 percent of models to return statistically significant results.

   The figure below shows, by stratification category, the percent of metrics for which there is evidence of differential effects at the final month of the study period. The vertical red line denotes 5 percent, the percent we expect if there was no true effect.

   For three stratification variables – age, White race, and Black race – nearly one third of the models have evidence of differential effects of SP implementation. All have substantially more cases with differential effects than the 5 percent expected level. More than a quarter of metrics identified differential effects for Hispanic ethnicity and disability status. There is good evidence of differential

effects across these populations. Note that the two of the three stratification variables least likely to have differential effects have small populations. Interestingly, other than "Race Unknown vs Not Unknown", Sex (Male vs. Female) is the stratification least likely to identify differential effects (but still has many).

Figure 7.8 Percent of Metrics with Differential Effects



In summary, the interim analyses showed mixed results in terms of achieving targeted outcomes during the move from fee for service Medicaid Direct to Standard Plan managed care. Of course, implementation during the COVID-19 PHE complicated many plans for successful launch, interrupted many trends in care, and even complicated the statistical methods used herein. We attempted to control for the time periods affected by the PHE by looking at trends in the non-SP population so that we could identify when each service type "returned to normal," but the non-SP population and SP populations are somewhat heterogeneous; therefore the statistical methods don't entirely match to SP beneficiaries nor do they entirely tease out the difference in trends due to SP launch versus the PHE.

Adjusting for beneficiary risk factors and provider characteristics, we noted many bright spots, but also many areas of concern that should motivate the future evolution of SP programs, incentives and monitoring.