VCU

School of Population Health

Addiction and Recovery Treatment Services

Interim Evaluation Report for Section 1115 Demonstration

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Disclaimer

The conclusions in this report are those of the authors, and no official endorsement by Virginia Commonwealth University or the Virginia Department of Medical Assistance Services is intended or should be inferred.

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1. Executive Summary

To address a growing epidemic of opioid and other substance use disorders (OUD and SUD), Virginia Medicaid received approval from the Center for Medicare and Medicaid Services (CMS) in 2016 for a Section 1115 demonstration waiver that expands coverage of treatment services for SUD for Medicaid members. The Virginia Medicaid SUD benefit is called Addiction and Recovery Treatment Services (ARTS), and expanded coverage of community-based services, as well as short-term residential treatment that meets the definition of an Institution for Mental Diseases (IMD), and inpatient detoxification services. Since the ARTS demonstration began in April 2017, Virginia expanded eligibility for Medicaid in 2019 for adults with incomes up to 138% of the federal poverty level through the Affordable Care Act, greatly increasing eligibility for and utilization of ARTS services. In addition, CMS approved an extension of the waiver in December 2019, effective January 1, 2020 through December 31, 2024.

CMS requires an independent evaluation of the Section 1115 demonstration waiver that authorized the ARTS benefit, including the 2019 renewal. The Virginia Department of Medical Assistance Services (DMAS) contracted with Virginia Commonwealth University to conduct an independent evaluation of the ARTS benefit. The evaluation has been conducted by faculty and staff from the Department of Health Policy (previously the Department of Health Behavior and Policy) since 2017. This report represents the fourth interim evaluation report for the demonstration renewal, covering both the original demonstration period as well as the renewal period (2016-2022). The final evaluation report for this renewal period will be submitted in December 2024. Among the major findings in this interim report:

Increases in treatment providers.

- The number of buprenorphine waivered prescribers treating Medicaid members more than doubled in the first two years of the waiver renewal, from 913 prescribers in 2020 to 1,900 prescribers in 2022.

- The number of providers prescribing buprenorphine to Medicaid patients further increased in the first two quarters of 2023, following the removal of federal waiver requirements at the beginning of 2023.[1]

- Changes in the number of other SUD providers treating Medicaid patients between 2020 and 2022 were more mixed. While the number of American Society of Addiction Medicine (ASAM) Level 1, 2, and 3 providers increased, there was a decrease in Office-Based Addiction Treatment (OBAT) providers and Opioid Treatment Programs (OTP) as well as ASAM Level 4 providers.

- Difference-in-differences analyses show that the number of buprenorphine prescribers and SUD treatment facilities accepting Medicaid patients increased in Virginia after

[1] Waiver Elimination (MAT Act) | SAMHSA

ARTS implementation in 2017 and Medicaid expansion in 2019, relative to other Southern non-expansion states.

Increases in utilization of ARTS services

- The number of members using ARTS services continued to increase in the first two years of the renewal, from 2,655 members using ARTS services per 100,000 members in 2020 to 2,911 per 100,000 members in 2022, a 9.6% increase.

- Service use per 100,000 members increased between 2020 and 2022 for ASAM 3 residential/inpatient treatment services (33%), and ASAM 2 level services (29%), while remaining mostly unchanged for ASAM 1 outpatient services and OBAT/OTP services.

MOUD treatment rates continue to increase

- MOUD treatment rates (the percent of members with diagnosed OUD receiving MOUD treatment) continued to increase, from 69.7% in 2020 to 77.9% in 2022, a 12% increase.

- Since the year prior to ARTS implementation in 2017, MOUD treatment rates have increased from 43% in 2016 to 77.9% in 2022, an increase of 81%.

- While there were disproportionate larger increases in methadone and naltrexone treatment between 2016 and 2020 relative to buprenorphine treatment, the more recent increases in treatment rates have been driven by buprenorphine treatment

SUD-related ED and acute inpatient admissions stabilize in recent years

- The overall number of behavioral health-related acute inpatient admissions (for both SUD and mental illness) decreased in Virginia following implementation of the ARTS benefit in 2017, relative to admissions in North Carolina (which did not implement a similar benefit or Medicaid expansion). However, admissions in Virginia increased following Medicaid expansion 2019.

- After more than doubling between 2018 and 2020 (likely due to Medicaid expansion), the number of SUD and OUD-related ED visits among Medicaid members stabilized between 2020 and 2022.

- After increasing between 2018 and 2020, the number of SUD and OUD-related acute inpatient admissions among Medicaid members decreased between 2020 and 2022.

Care coordination and care transition services increase.

- Claims for care coordination services through OBAT and OTP providers increased 33% in the first two years of the renewal, from 11,085 claims in 2020 to 14,807 claims in 2022.

- Overall, 60% of respondents to a representative survey of members receiving ARTS services reported receiving assistance with other non-SUD services, including 26% who received help for a medical problem, 38% who received help with a mental health problem, and 18% who received help with housing, food, or employment.

- The percent receiving MOUD treatment within 7 days of an OUD-related emergency department (ED) visit increased from 20.4% in 2020 to 24.7% in 2022. In 2016 – the year prior to the implementation of the ARTS benefit – less than 5% of members with an OUD-related ED visit received MOUD treatment within 7 days of the visit.

- The percent receiving MOUD treatment within 30 days of discharge from residential treatment increased from 38.1% in 2020 to 40.3% in 2022. In 2017 – the first year of the ARTS benefit, 27.3% of members discharged from residential treatment facilities received MOUD treatment within 30 days of discharge from residential treatment.

Decrease in fatal and nonfatal OUD-related overdoses

- After rising precipitously between 2018 and 2020, the number of fatal and nonfatal OUD-related overdoses among Medicaid members decreased, from a high of 236 overdoses per 100,000 Medicaid members in 2021 to 208 overdoses per 100,000 members in 2022. The change in overdoses among Medicaid members during this period is similar to trends in fatal overdoses among all Virginians, as reported by the Virginia Department of Health and the Center for Disease Control and Prevention.

Since first implemented in April 2017, the evidence indicates that the ARTS benefit has transformed the SUD treatment system for Medicaid members, resulting in increases in treatment providers – both community-based and residential treatment –and MOUD treatment rates among members with OUD. These trends continued and were amplified through large increases in the number of Virginians eligible for ARTS services through Medicaid expansion and federal Maintenance of Effort requirements stemming from the COVID-19 Public Health Emergency, although treatment *rates* among Medicaid members also increased. Disruptions in services and treatment arising from the COVID-19 pandemic are not evident from the results of this study. Instead, increases in treatment providers, utilization of ARTS services, and MOUD treatment rates increased between 2020 and 2022, while OUD-related ED visits, acute inpatient stays, and overdoses either stabilized or decreased. Although residential treatment services were greatly expanded by the ARTS demonstration by allowing federal payment for these services, the share of total ARTS spending on residential treatment has not changed since the demonstration was implemented.

2. Background on Demonstration

Fatal drug-related overdoses surged in Virginia and the nation between 2020 and 2022. Nationally, fatal drug overdoses peaked at about 110,000 deaths in the 12 months ending January 2023, a 52 % increase since January 2020.[1] Fatal drug overdoses peaked at about 2,600 in Virginia in January 2022 but decreased to about 2,500 by January, 2023.[2]

Opioids continue to account for the majority of overdose deaths in Virginia (82%), as well as nationally.[3] However, there has been a marked shift in the type of opioids responsible for overdoses. In Virginia, deaths from fentanyl overdoses more than doubled between 2019 and 2022 (from 964 to 1,952), while there was little change in deaths due to prescription opioids, and even a small decrease in deaths from heroin.[4] Fentanyl accounted for 93% of opioid-related fatal overdoses in Virginia in 2022, compared to 74% in 2019 and 55% in 2016. At the same time, overdose deaths in Virginia due to methamphetamines and cocaine increased by 183% and 85%, respectively, between 2019 and 2022.[5] An increase in alcohol use disorder is also contributing to increased mortality from substance use, accounting directly for 140,557 deaths nationally, as well as contributing to 22% of prescription opioid overdose deaths.[6,7]

To increase access to SUD treatment services for Virginia Medicaid members, Virginia received approval from the Center for Medicare and Medicaid Services (CMS) in December 2016 for the Addiction and Recovery Treatment Services (ARTS) benefit. Implemented in April 2017, ARTS expanded coverage of treatment services for SUD for Medicaid members, including community-based services, short-term residential treatment that meet the definition of an Institution for Mental Diseases (IMD),[8] and inpatient detoxification services.

ARTS was approved as an amendment to an existing Section 1115 demonstration waiver, the Virginia Governors Access Plan (GAP), that had originally been approved in January 2015. This demonstration provided a limited package of behavioral and physical health services to childless adults and non-custodial parents aged 21 through 64 with household incomes at or below 100 percent of the federal poverty line, and who had been diagnosed with a serious mental illness. After the December 2016 amendment expanded SUD benefits through the ARTS program, there was an additional amendment to the demonstration in September 2017 which added coverage for former foster care youth (FFCY) who aged out of foster care under the responsibility of another state and are now applying for Medicaid in the Commonwealth of Virginia.

CMS approved an extension of Virginia's Section 1115 Demonstration in December 2019, effective January 1, 2020, through December 31, 2024. Under this extension, Virginia continues to have the authority to provide services to Medicaid members through the ARTS benefit, and the demonstration no longer includes a separate GAP program, as these beneficiaries were transitioned into full Medicaid coverage starting January 1, 2019, through Virginia's Medicaid expansion.

With the end of the GAP program, the name of the demonstration changed to "Addiction and Recovery Treatment Services (ARTS) Delivery System Transformation" (Project Number 11-W-0029713). As most of the evaluation plan described below pertains to the ARTS benefit, we will use the term "ARTS" when describing the demonstration and evaluation activities.

The ARTS demonstration has the following goals that directly inform the evaluation analyses:

(1) Increase rates of identification, initiation and engagement in treatment for OUD and other SUDS
(2) Reduce utilization of emergency departments and acute inpatient stays through improved access to a continuum of care services
(3) Increase adherence to and retention in treatment
(4) Reduce preventable readmissions to the same level of care or higher
(5) Improve access to care for physical health conditions among beneficiaries
(6) Reduce overdose deaths, particularly those due to opioids

3. Evaluation Goals, Questions and Hypotheses

In July 2017, the Virginia Department of Medical Assistance Services (DMAS) contracted with Virginia Commonwealth University to conduct an independent evaluation of the ARTS benefit. The evaluation has been conducted by faculty and staff from the Department of Health Policy (previously the Department of Health Behavior and Policy) in the School of Population Health.

The VCU evaluation under the previous demonstration authority focused primarily on how the ARTS benefit affected (1) the number and type of health care practitioners providing ARTS services; (2) members' access to and utilization of ARTS services; (3) outcomes and quality of care, including hospital emergency department and inpatient visits; and (4) the performance of new models of care delivery, especially Preferred Office-Based Addiction Treatment (OBAT) programs (formerly known as Office-Based Opioid Treatment programs).

The results for the initial demonstration period found substantial increases in the supply and utilization of addiction treatment services among Virginia Medicaid members in the two years since the ARTS benefit was implemented (through March 2019).[9] This includes large increases in the number of providers across the continuum of care providing addiction treatment services to Medicaid members, including an almost four-fold increase in the number of outpatient practitioners submitting claims for ARTS services. In addition, the percent of members with SUD who received treatment increased from 24% before ARTS to almost 50 percent during the second year of ARTS. The use of medications for opioid use disorder (MOUD) treatment increased from 36 percent of those with opioid use disorder (OUD) before

ARTS, to 49 percent during the second year of ARTS. Evidence of improved quality of care and outcomes was shown by significant decreases in emergency department visits and inpatient stays for members with OUD, relative to other Virginia Medicaid members.[10]

Goals of the evaluation of ARTS demonstration renewal

The evaluation of the ARTS demonstration renewal has three main goals:

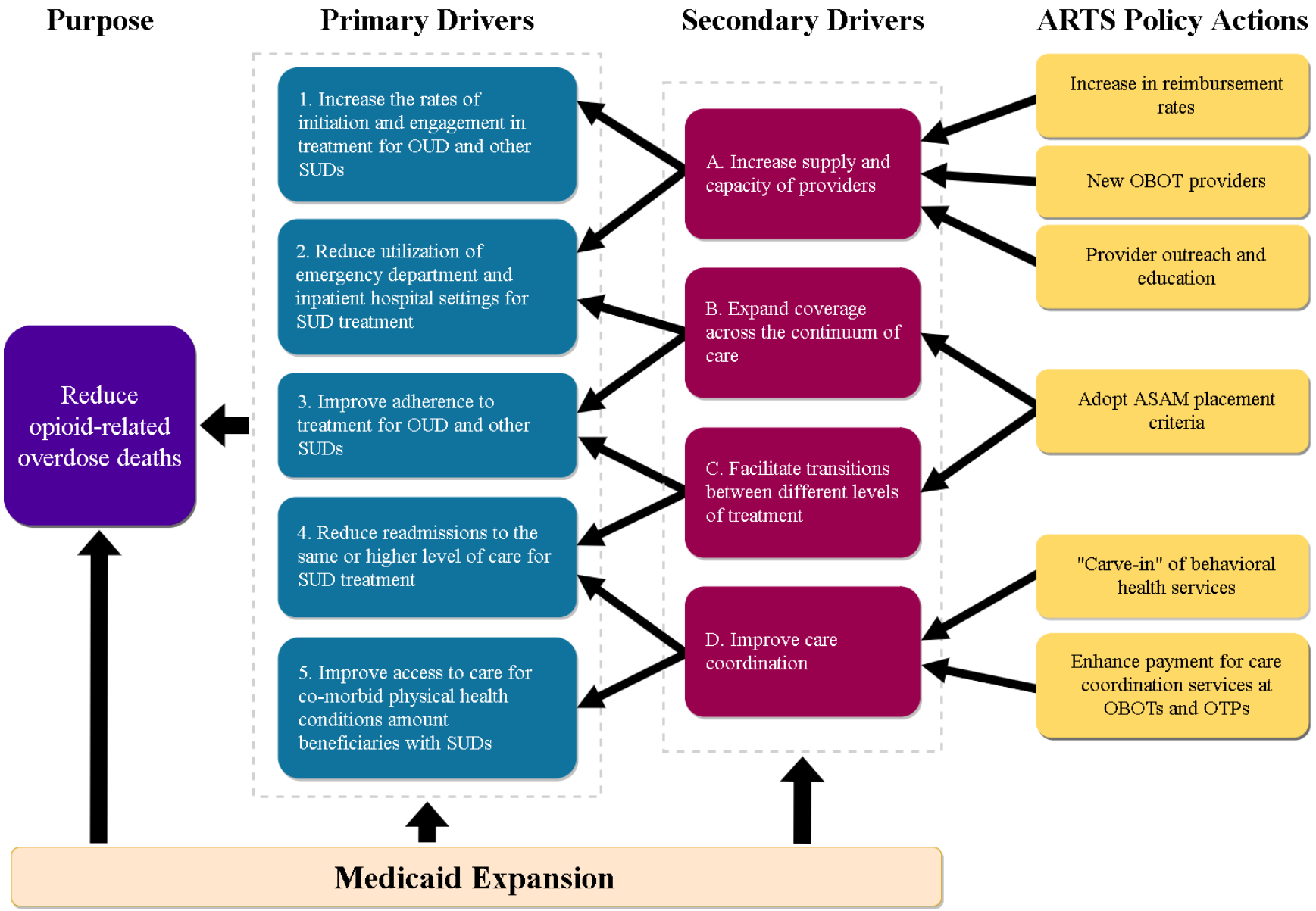
1) Extend the post-implementation period of the evaluation beyond the first two years of ARTS to include 2019-2023. In particular, the evaluation will examine and account for the impact of Virginia's Medicaid expansion in 2019 on SUD prevalence, access to and quality of treatment services, and outcomes among the Medicaid population.

2) To strengthen conclusions about the causal impact of ARTS on key measures of access and quality of care by comparing adjusted summary statistics in Virginia to other states using the Medicaid Outcomes Distributed Research Network (MODRN).

3) To examine the cumulative impact of ARTS and Medicaid expansion on addiction treatment services for the Virginia population, using national data sources that permit comparisons of treatment before and after expansion in Virginia with other states, and the overall U.S. on selected measures of SUD treatment access, utilization, quality of treatment, and rates of fatal overdoses.

Figure 1 conceptualizes the demonstration goals in terms of the overall purpose (reducing overdose deaths), the primary drivers that will directly lead to fewer overdose deaths (the other six goals of the ARTS demonstration), and secondary drivers that reflect the main mechanisms the ARTS demonstration uses to affect addiction treatment services and, ultimately, overdose deaths.

Figure 1. Driver Diagram for ARTS Demonstration Evaluation



The ARTS demonstration seeks to achieve its goals primarily through: (1) increasing the supply of addiction treatment providers serving Medicaid members; (2) increasing the capacity of existing treatment providers; (3) expanding services to cover the entire continuum of addiction treatment services, based on the American Society of Addiction Medicine (ASAM) criteria;[11] (4) facilitating transitions between different levels of treatment; and (5) improving the coordination of addiction treatment services with other physical health, mental health, and social service needs.

To increase the supply and capacity of addiction treatment providers, the ARTS benefit increased reimbursement rates for a number of services, such as residential treatment services, outpatient services, and MOUD treatment. To further increase outpatient capacity, the ARTS demonstration also established a new type of provider, the Preferred Office-Based Addiction Treatment model (Preferred OBAT) originally focusing on serving individuals with primary OUD but has since expanded to include all SUD. In addition, extensive provider training, outreach, and recruitment efforts by state agencies and managed care organizations are intended to increase provider participation in Medicaid addiction treatment services.

The ARTS demonstration also expanded Medicaid-covered services along the ASAM continuum of care, especially residential treatment services and medically managed intensive inpatient services, outpatient, as well as peer recovery support services. Improving transitions across different levels of care, and coordinating addiction treatment services with other physical, mental health, and social needs are to be accomplished by (1) shifting behavioral health services to a "carve-in" model so that they are provided by the same managed care organizations (MCOs) that provide other Medicaid services; (2) the use of licensed care coordinators by MCOs for addiction treatment services; and (3) enhanced payment for care coordination services by the new Preferred OBAT providers.

Finally, Medicaid expansion amplified the effects of the ARTS demonstration by extending access to treatment services to hundreds of thousands of Virginians, most of whom were uninsured prior to January 1, 2019, and did not have access to ARTS benefits. Additional coverage of people with SUD is expected to further decrease the rate of fatal overdoses in the Virginia population. In addition, greater coverage of addiction treatment services through Medicaid expansion is likely to strengthen the addiction treatment system by increasing the number and capacity of addiction treatment providers serving Medicaid patients.

The evaluation analyses and findings in this report are guided by four over-arching research questions related to each of the demonstration goals, around which specific hypotheses and measures were identified in the evaluation design. Table 1 summarizes the evaluation questions and hypotheses. Specific measures proposed to assess hypotheses are shown in the Evaluation Design for the ARTS Section 1115 Demonstration.[12]

Table 1. Evaluation questions, demonstration goals, and hypotheses.

Evaluation question 1: Does the demonstration increase access to and utilization of SUD treatment services?
Demonstration goal: Increased rates of initiation and engagement in treatment for OUD and other SUDS.
Hypothesis: The demonstration will increase the percentage of beneficiaries who are referred and engage in treatment for OUD and other SUDs
Demonstration goal: Reduce utilization of emergency departments and acute inpatient stays
Hypothesis: The demonstration will decrease the rate of emergency department visits and acute inpatient stays
Demonstration goal: Increase adherence to and retention in treatment
Hypothesis: The demonstration will increase adherence to and retention in treatment
Evaluation question 2: Does the demonstration improve quality of treatment through improved care coordination of services?
Demonstration goal: Reduce readmissions to the same or higher levels of care
Hypothesis: The demonstration will decrease the rate of readmissions to the same or higher level of care
Demonstration goal: Improve access to care for physical health conditions among beneficiaries
Hypothesis: The demonstration will increase the percentage of beneficiaries with SUD who receive treatment for co-morbid conditions.
Evaluation question 3: Are rates of opioid-related overdose deaths impacted by the demonstration?
Demonstration goal: Reduction in overdose deaths, particularly those due to opioids
Hypothesis: The demonstration will decrease the rate of overdose deaths due to opioids.
Evaluation question 4: How do costs for SUD-related and non-SUD related services change over the evaluation period?
Hypothesis: The demonstration will increase IMD SUD costs and outpatient SUD treatment costs and decrease SUD-related emergency room costs and inpatient stays

4. Methodology

The analysis for this interim report consists primarily of annual trends of key measures of SUD-related services, expenditures, and providers, emergency department and acute inpatient, and overdoses. Although the current demonstration renewal covers calendar years 2020-2024, the evaluation period covers the time period 2016 through 2022. This includes the beginning of the original ARTS benefit in April, 2017 and Medicaid expansion in 2019.

Analyses based on Virginia Medicaid claims

The primary data source used is Medicaid administrative claims and enrollment data maintained by DMAS. These data are used to compute measures of utilization and expenditures by ASAM level of care and MOUD treatment, the number of providers serving Medicaid members by each ASAM level of care, and SUD-related ED visits and inpatient stays. Analyses are restricted to paid claims for full-benefit Medicaid members.

Measures were derived both from the measure sets suggested by CMS, as well as measures developed internally by both DMAS and VCU, including measures based on the specific set of services that became available through the ARTS demonstration. For computing rates or proportions, denominators for some measures include all full-benefit Medicaid members who were enrolled at any point during the calendar year, as well as members with any diagnosis of OUD during the calendar year. The latter group also includes members who had any use of MOUD during the calendar year, even without a diagnosis of OUD.

For this report, analyses based on Medicaid claims are limited to descriptive trends. The evaluation design includes interrupted time series (ITS) analyses on a number of measures to control for changes in the characteristics of Medicaid members (e.g. age, race/ethnicity, gender, co-morbidities) that may also influence changes on key measures of utilization and outcomes. This is especially important when considering changes in member characteristics as a result of Medicaid expansion in 2019, as well as policy changes during COVID-19 that increased Medicaid enrollment between 2020 and 2022. For example, prior reports have shown that members enrolled through Medicaid expansion differ from members enrolled through non-expansion eligibility criteria in a number of ways, including higher prevalence of SUD and OUD.[13]

ITS analyses will be based on annual files (2016-2023) constructed for the Medicaid Outcomes Distributed Research Network (MODRN), of which VCU and DMAS participates. Analyses for MODRN are based on the development of SAS-based Common Data Models (CDM), which includes many of the measures proposed for the evaluation. Constructing analytical files for ITS analyses from the CDM is more straightforward and efficient than using the raw Medicaid claims data. CDM datafiles were still in development at the time of the submission of the interim report, but are expected to be available for inclusion of ITS results in the Summative Evaluation Report.

Analyses comparing changes in Virginia to other states.

While ITS improves estimates of change by controlling for changes in member characteristics, an evaluation should ideally include a comparison group that is similar to the "treatment" group, but were not exposed to the same policy interventions. Since both ARTS and Medicaid expansion were implemented statewide, it is not feasible to identify a comparison group of Virginia Medicaid members who did not potentially benefit from the policy changes. Typically, other states that are similar to Virginia – but did not implement similar policies during the study period – are used as comparison groups.

This evaluation does not identify a single state or group of states to compare with Virginia across all measures, due to the difficulty of obtaining comparable Medicaid claims data from other states. Instead, the evaluation uses a number of strategies to compare changes in Virginia with other states when comparable data are available. Specific methods and data sources are described along with the findings, including:

- Changes in the number of buprenorphine waivered prescribers (BWP) between 2016 and 2020, which compares Virginia to other states in the U.S. South that did not expand Medicaid as of 2020. BWP for all states were obtained from the Substance Abuse and Mental Health Services Administration for 2002-2020 through a Freedom of Information Act request.

- Changes in the overall number of SUD treatment facilities in Virginia, as well as changes in the number of treatment facilities accepting Medicaid payment. These data are derived from the National Survey of Substance Use Treatment Services (N-SSATS) sponsored by the Substance Abuse and Mental Health Services Administration (SAMHSA). The analysis compares Virginia with other Southern states on changes in treatment facilities before and after the ARTS demonstration was implemented, as well as Medicaid expansion.

- Changes in statewide acute inpatient admissions for substance use and behavioral health problems between 2016-2020, comparing Virginia with North Carolina. Admissions data for North Carolina were obtained through the Healthcare Cost and Utilization Project, while equivalent data for Virginia were obtained through Virginia Health Information.

- The Medicaid Outcomes Distributed Research Network (MODRN), comprised of 13 state-university partnerships (including Virginia), uses a common data model for the purpose of conducting analyses with state Medicaid claims. Analyses are conducted by using standardized data and code developed by the data coordinating center. Currently supported through a grant from the National Institute on Drug Abuse (NIDA), a version 3.0 of the Common Data Model is in development that will include the years 2016-2022. It is expected that comparisons between Virginia and other MODRN states on some evaluation measures will be included in the final evaluation report.

ARTS member survey

VCU conducted a survey of members receiving ARTS services in 2020 and 2021 to understand their experiences with treatment and the effects of treatment on their daily lives. The survey is based on a stratified random sample of Medicaid members who were diagnosed and/or received treatment for OUD. The sample was identified through Medicaid enrollment and claims data, and was equally divided into the following four groups: (1) members who received treatment at Preferred Office-Based Opioid Treatment providers (OBOT) – a new model of care delivery created through the ARTS benefit; (2) members who received treatment through Opioid Treatment Programs (OTP), which provides methadone treatment for OUD in addition to buprenorphine and naltrexone; (3) members who received treatment at other outpatient providers which may include outpatient clinics or office-based providers that provide OUD treatment; and (4) members who were diagnosed with OUD, but received no ARTS services based on paid claims. The survey was conducted by mail, and included $2 incentives. Out of 10,250 persons in the initial sample draw, about 1,845 returned completed surveys, for a survey response rate of 18%. Survey weights adjusted for differences between respondents and nonrespondents on age, sex, race/ethnicity, and Virginia region. A full survey report includes additional detail on the survey design and analysis.[14]

Since the survey field period lasted from January 2020 through August 2021, we are able to compare early respondents to later respondents to assess changes in member experiences that correspond with the onset of the COVID-19 pandemic. Specifically, we compare survey responses received by April 2020 – which mostly includes experiences prior to the COVID pandemic – and survey responses received after August, 2020.

Survey of MCO Care Coordinators

In Virginia, the majority of Medicaid members are enrolled in an MCO, each of which offers care coordination for its members. Care coordination is to help ensure that Medicaid members can access the services that they need. DMAS has encouraged the expansion of the role of care coordination in multiple Medicaid programs. In the ARTS benefit, specific care coordinators play a key role in identifying members with a need for SUD services, facilitating entry into treatment, and following up after residential treatment stays or discontinuations with treatment. Therefore, care coordinators are in a unique position to comment on the strengths and challenges of the ARTS benefit in helping members with SUD.

To address these questions, the evaluation design proposed semi-structured interviews with about 18-24 care coordinators for ARTS services across the six MCOs, in addition to selected treatment providers. As planning for the interviews began, it became apparent that there were relatively few care coordinators dedicated to patients receiving ARTS services, while a much larger number of care coordinators were likely providing ARTS care coordination services in varying degrees. In addition, DMAS was in the process of making major changes to the way all care coordination services were provided to Medicaid members (Cardinal Care) and there was

interest in a more comprehensive and systematic assessment of MCO care coordination providers and services that could serve as a baseline from which to monitor changes following implementation of Cardinal Care. As a result, VCU conducted a web-based survey of Medicaid MCO care coordinators from May to July of 2022. The objective of the survey was to obtain information on care coordinators' personal and professional backgrounds; client characteristics; care coordinator activities, both generally and for members with SUD; tools used by coordinators for data gathering; and barriers faced by coordinators.

The survey was conducted by obtaining lists of care coordinators employed by the six Medicaid MCOs who were contracted with DMAS at the time of this survey. These lists included the universe of care coordinators employed by the MCOs (not specifically dedicated to SUD) to serve Medicaid members; a total of 1,318 as of early 2022. These include care coordinators primarily serving members enrolled in the Commonwealth Coordinated Care Plus program; members receiving SUD treatment and recovery services through the ARTS benefit; members with serious mental illness, and others. While the survey did not focus entirely on ARTS care coordinators or SUD services, we identified care coordinators who provided services to members with SUD and asked specific questions about how they identified members with SUD, and specific activities they performed for members with SUD. The survey was completed online between April and July of 2022. A total of 329 surveys were completed, for a response rate of 24%. A survey report includes additional detail on the survey design and analysis.[15]

Measures not in interim report

The evaluation design proposed a number of measures from a variety of data sources to address specific evaluation questions and hypotheses. The Interim Evaluation Report includes many of these analyses and measures, although some analyses are still in progress and will be in the Summative Evaluation report. A few of the proposed measures will not be in the Summative Evaluation Report. Table 2 lists specific measures proposed in the evaluation design that are not included in the Interim Evaluation Report, and plans for their inclusion in the Summative Evaluation Report. In most cases, the measures were not developed in time for the Interim Evaluation Report but will be included in the Summative Evaluation Report. Many of these measures rely on definitions and codes developed for use with the CDM of the MODRN project, and therefore were unavailable at the time of submission for the Interim Evaluation Report.

A few measures: (1) Average length of stay in treatment, by service setting; and (2) percentage of episodes in which treatment was completed; were to be obtained from the Treatment Episode Data Set (TEDS) from the Substance Abuse and Mental Health Services Administration (SAMHSA), and would have included comparisons with other states. However, preliminary analyses identified a number of inconsistencies and data gaps that would make comparisons over time and across states difficult and invalid. Therefore, we decided to drop the use of TEDS from the evaluation.

Table 2. Measures included in Evaluation Design that are not in Interim Report.

Question and hypothesis		
Question 1, Hypothesis: The demonstration will increase the percentage of beneficiaries who are referred and engage in treatment for OUD and other SUDs.	• Percentage of members diagnosed with a new episode of alcohol or drug dependency who initiated treatment within 14 days of diagnosis • Median number of Medicaid members receiving prescriptions of buprenorphine per prescriber who accepts Medicaid.	Include in Summative Evaluation Report Include in Summative Evaluation Report
Question 1, Hypothesis: The demonstration will increase adherence to and retention in treatment.	• Percentage of individuals with a diagnosis of OUD and at least one claim for OUD medication who have at least 180 days of continuous pharmacotherapy • Length of an episode of outpatient treatment • Average length of stay in treatment, by service setting • Percentage of episodes in which treatment was completed.	Include in Summative Evaluation Report Include in Summative Evaluation Report Dropped due to data limitations in TEDS Dropped due to data limitations in TEDS
Question 2, Hypothesis: The demonstration will decrease the rate of readmissions to the same or higher level of care.	• 30-day readmission rates to same ASAM level 3 service or higher • Percentage of members discharged from ASAM 3 services who receive follow up care within 30 days of discharge • Percentage of members discharged from ASAM level 4 service who receive follow up care within 30 days of discharge	Include in Summative Evaluation Report Included on p. 41 (follow-up MOUD care) Include in Summative Evaluation Report
Question 2, Hypothesis: The demonstration will increase the percentage of beneficiaries with SUD who receive treatment for co-morbid conditions.	Percentage of beneficiaries with OUD/SUD who receive/have: • Any use of ambulatory or preventive care services • Treatment for high blood pressure • Treatment for diabetes • Inpatient admission related to complication from diabetes • Flu vaccination • Screening for HIV, HCV, and HBV • Counseling/psychotherapy for mental health condition other than SUD/OUD	Include in Summative Evaluation Report

Question 3, Hypothesis: The demonstration will decrease the rate of overdose deaths due to opioids.	• Rate of opioid related overdose deaths (fatalities only), among people with Medicaid coverage in past year • Rate of overdose deaths due to other substances among people with Medicaid coverage in past year • Rate of drug overdose deaths in the Virginia population Note that the state does present trends in all OUD-related overdoses (fatal and non-fatal) and mentions plans for linking to cause of death data, but the omitted measures are not explicitly mentioned.	Include in Summative Evaluation Report Include in Summative Evaluation Report Include in Summative Evaluation Report
Question 4, Hypothesis: The demonstration will increase IMD SUD costs and outpatient SUD treatment costs and decrease SUD related emergency room visit and inpatient stay costs.	• Total costs PMPM • Total costs PMPM related to diagnosis and treatment for SUD • Total costs PMPM for residential SUD treatment • Total costs PMPM for non-IMD SUD treatment • Total non-SUD costs, PMPM • Total source of treatment cost drivers (sum of non-ED outpatient costs, ED outpatient costs, inpatient costs, pharmacy costs, and long-term care costs) • Costs with or without SUD diagnosis and/or procedure codes relating to non-ED outpatient treatment, PMPM • Costs with or without SUD diagnosis and/or procedure codes relating to ED outpatient treatment, PMPM • Costs with or without SUD diagnosis and/or procedure codes relating to inpatient treatment, PMPM • Costs with or without SUD diagnosis and/or procedure codes relating to pharmacy utilization, PMPM • Costs with or without SUD diagnosis and/or procedure codes relating to long-term care utilization, PMPM • Total payments summed across claims for MOUD treatment services • Total payments across claims for acute inpatient and ED services with a diagnosis of SUD	Include in Summative Evaluation Report

ASAM = American society of addiction medicine; ED = emergency department; HIV = human immunodeficiency virus; HCV = hepatitis C virus; HBV = hepatitis B virus; IMD = institution for mental diseases; MOUD = medications for opioid use disorder; OUD = opioid use disorder; SUD = substance use disorder; PMPM = per member per month

Analyses of fatal overdoses for Medicaid members in Virginia are based on cause of death data obtained from the Virginia Department of Health (VDH) linked to Virginia Medicaid members. At the time of the Interim Evaluation Report, these data were not yet available, but are expected to be available in time for inclusion in the Summative Evaluation Report.

5. Methodological Limitations

As stated previously, our analyses of measures based on Virginia Medicaid claims data are limited by the lack of comparison states, which limits our ability to make strong causal inferences about the effect of ARTS and Medicaid expansion for these measures. While the final report will include some comparisons with other states in the MODRN, these analyses will be descriptive in nature, and will not utilize formal difference-in-differences modeling.

In addition, the study period overlaps with the beginning of the COVID-19 pandemic in March 2020. Given the severe disruptions to the health care system caused by the pandemic, it is possible that changes due to both ARTS and Medicaid expansion are offset or confounded by changes due to the pandemic. Given the widespread effects of the pandemic, it is difficult to isolate pandemic-related changes from changes due to the demonstration or other factors. However, a number of analyses will provide some evidence on how much of an impact the pandemic had on SUD treatment and outcomes.

For example, the field period for the ARTS member survey overlapped with the beginning of the pandemic, making it possible to distinguish between survey respondents reporting on their treatment experiences prior to the pandemic and other survey respondents reporting on their treatment experiences after the start of the pandemic. These results are shown and discussed in Chapter 6.5. In general, there were few differences in patient experiences with care between members interviewed prior to the beginning of the pandemic and members interviewed after the beginning of the pandemic, suggesting only minimal effects on patient care due to the pandemic.

The Summative Evaluation Report will include additional analyses that will provide additional insight on the likely effects of the pandemic. For example, results based on analyses of the MODRN will compare Virginia and the other MODRN states on key MOUD measures between 2016 and 2023. Since the pandemic affected all states during roughly the same time period, any difference between Virginia and the other MODRN in changes observed between 2019 and 2021 are unlikely to be due to the pandemic. Finally, the ITS analysis described above can use sensitivity tests to exclude the main pandemic years (2020 and 2021) in the analysis.

6. Results

The findings for the evaluation are reported based on the four over-arching evaluation questions, as described in the introduction and evaluation design.

6.1 *Evaluation question #1: Does the demonstration increase access to and utilization of SUD treatment services?*

This demonstration research question assesses whether ARTS has increased the capacity of the treatment system – primarily through the number of providers who accept and treat Medicaid patients – as well as utilization of ARTS services.

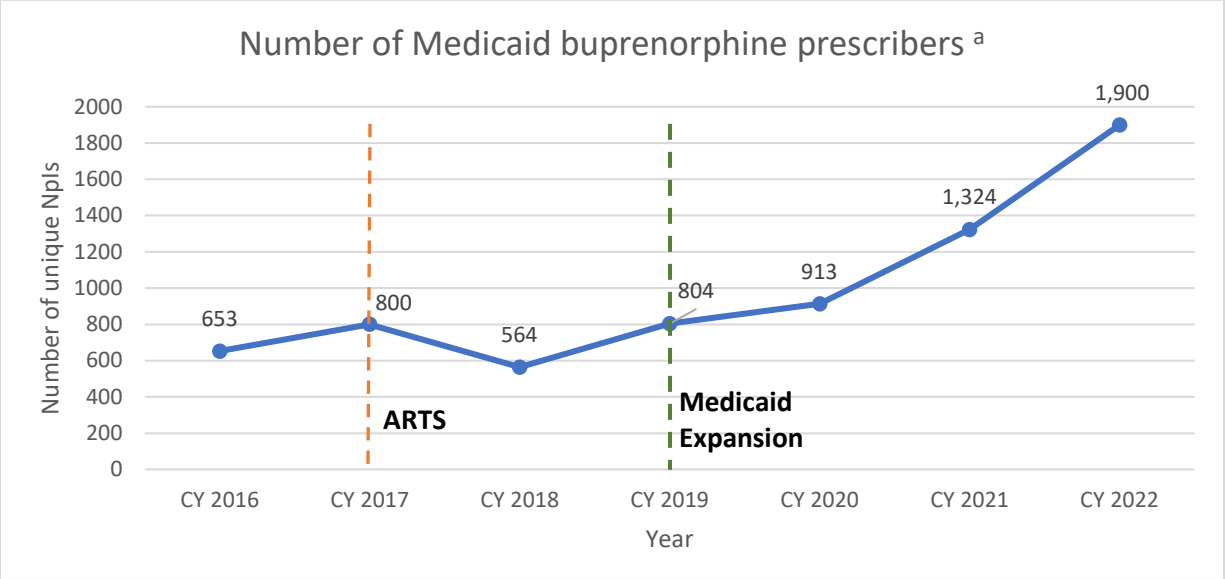
Buprenorphine prescribers. There are three Food and Drug Administration (FDA) approved medications for treatment of OUD: methadone, naltrexone and buprenorphine. Methadone for the treatment of OUD is federally limited to being dispensed in specially licensed clinics, although these restrictions were loosened during the COVID-19 pandemic to allow take-home dosages of up to a 28-day supply. Because buprenorphine treatment for OUD does not require that medication be administered at OTPs, it allows for greater access to MOUD treatment in a wider variety of treatment settings, provider types, and specialties. Virginia Medicaid has promoted the prioritization of patient choice in the selection of evidence-based medication for treatment of OUD. This includes a targeted effort to increase access to buprenorphine treatment through the Preferred OBATs in 2017 – an integrated care model that receives enhanced reimbursement for OUD treatment – and eliminating the need for prior authorization for buprenorphine prescribing for practitioners regardless if they are enrolled with DMAS, its contractors, or MCO networks.[2] During the COVID-19 pandemic, DMAS permitted a member's home to serve as the originating site via telemedicine for a prescription of buprenorphine, both for induction and maintenance dosing. Prior to the pandemic, buprenorphine prescriptions for inductions could only be obtained through a face-to-face meeting with authorized prescribers as required by Substance Abuse and Mental Health Services Administration (SAMHSA) and the Drug Enforcement Agency.

The expansion of benefits with ARTS, collaborative efforts with the Virginia Department of Health to train and encourage more providers to seek buprenorphine waivers, and the increase in Medicaid members eligible for ARTS services through Medicaid expansion has likely contributed to an increase in waivered prescribers. Prior reports based on the ARTS evaluation have shown steady increases in the total number of buprenorphine waivered prescribers (BWP) in Virginia since the implementation of the ARTS demonstration and Medicaid expansion. The figure below shows the number of unique BWP who prescribed to Medicaid patients at any time during the calendar year, based on counts of unique National Provider Identifiers (NPI) of the prescribing provider on pharmacy claims for buprenorphine treatment. Despite a decrease in

[2] First implemented in 2017 as Office-Based Opioid Treatment (OBOT) programs, they were expanded in March, 2022 to include treatment of other SUD and redesignated as Office-Based Addiction Treatment (OBAT) programs.

Medicaid prescribers in 2018, the number of prescribers increased each year beginning in 2019 (804 prescribers), with especially large increases in 2021 (1,324 prescribers) and 2022 (1,900 prescribers) (See Figure 2). Overall, the number of BWP prescribing to Medicaid members increased 191% between 2016 and 2022, including a 108% increase between 2020 and 2022.

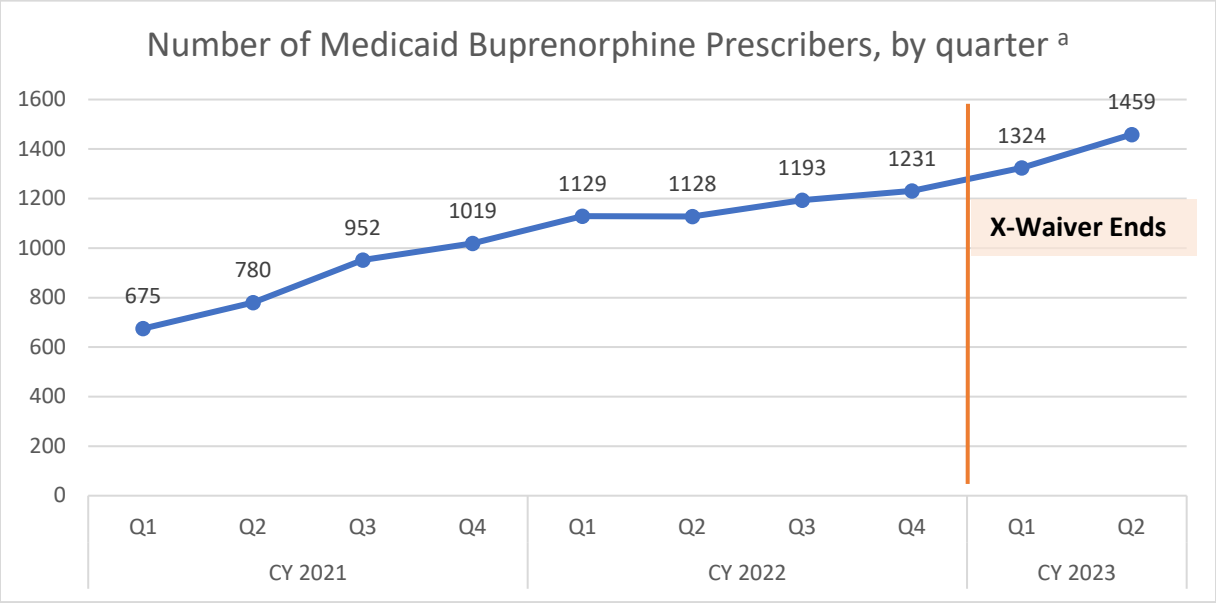
Figure 2: Medicaid buprenorphine prescribers



[a] Change between 2016 and 2022 is statistically significant at .05 level, based on a linear trend test

Beginning in 2023, waivers are no longer required to prescribe buprenorphine as a result of Section 1262 of the Consolidated Appropriations Act, 2023.[16] The legislation also removes other federal requirements associated with the waivers such as discipline restrictions, patient limits, and certification related to provision of counseling, although state laws regulating prescribing are still applicable. Removing federal waiver requirements has the potential to further increase the number of providers who prescribe buprenorphine to Medicaid members. The figure below shows counts of Medicaid buprenorphine prescribers on a quarterly basis from the beginning of 2021 through the second quarter of 2023. Following the removal of federal waiver requirements in 2023, the number of prescribers increased by about 200 between the last quarter of 2022 and the second quarter of 2023 (see Figure 3). As this may be part of a longer-term increase in the number of prescribers, it is too early to conclude that the removal of federal waiver requirements has increased the supply of prescribers.

Figure 3: BWP prescriber, by quarter



[a] Change between Q1 2021 and Q2 2023 is statistically significant at .05 level, based on a linear trend test

Changes in BWP supply in Virginia compared to other states. The evaluation also examined more systematically whether the combination of ARTS in 2017 and Medicaid expansion in 2019 increased the overall supply of BWP in Virginia, relative to other states in the U.S. South that did not expand Medicaid. The study period includes the first quarter of 2015 through the second quarter of 2020. Counts of BWP for all states and the District of Columbia were obtained from SAMHSA through a Freedom of Information Act (FOIA) request and are categorized by limits on the number of patients that waivered providers can prescribe buprenorphine to (30 or 100/275 patient limits). We obtained a de-identified comprehensive list of all waivered prescribers. The full study, including details of the data source, acquisition, and analytical methods are described elsewhere.[17]

A quasi-experimental design was employed that compares changes in BWP in Virginia to states that were similar to Virginia at baseline that did not implement Medicaid expansion or new SUD benefits similar to ARTS during the study period, such as a SUD Demonstration waiver. Therefore, comparison states consist of other non-expansion states in the U.S. South, including Alabama, Florida, Georgia, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, and Texas. We focus on states in the South due to historic similarity in Medicaid policies.

The main outcome of interest is the quarterly BWP rate per 100,000 residents for each waiver limit (overall 30 and 100/275 patients) calculated for each state. We combine counts of providers with waiver limits of 100 and 275, as it is not possible to distinguish these two groups based in the data.

In our main analysis, we fit a linear difference-in-difference (DD) model regressing quarterly BWP rates on state and intervention periods (Pre-interventions; Post-ARTS, Pre-Expansion; Post-ARTS and Expansion) fixed effects. To estimate the ARTS and Medicaid expansion intervention effects, we include an indicator variable for Virginia, the treatment state and interactions between Virginia and the Post-ARTS, Pre-Expansion and Post-ARTS and Expansion intervention periods. Due to the skewness in the distribution of BWP rates, all outcomes are log-transformed (see DD equation 1 below).

$$log(BWP/100{,}000\ residents) = \beta_0 + \beta_1(Virginia*Post\text{-}ARTS,\ Pre\text{-}Expansion) + \beta_2(Virginia*Post\text{-}ARTS\ and\ Expansion) + \beta_3 Virginia + \beta_4(Post\text{-}ARTS,\ Pre\text{-}Expansion) + \beta_5(Post\text{-}ARTS\ and\ Expansion) + \beta_6(Southern\ Non\text{-}expansion\ State) + \beta_7(Year) + \varepsilon$$

A Chi-square (χ^2) test is used to test the difference between the *Virginia*Post-ARTS, Pre-Expansion* and *Virginia*Post-ARTS and Expansion* intervention effects to assess the additional changes in BWP supply in Virginia occurring after Medicaid expansion compared to the period after ARTS implementation but prior to expansion. Pre-ARTS implementation trends in BWP supply between Virginia and comparator states appear similar (i.e., parallel), an assumption required for DD models to have statistical conclusion validity (see Supplementary Materials). Separate models are estimated for the overall BWP rate and for each BWP waiver limit. Standard errors are clustered by state.

Descriptive results are shown in Table 3. Rates of BWP per 100,000 people are generally similar in the Pre-ARTS policy period between Virginia and other states (5.95 BWP per 100,000 persons in Virginia compared to 6.36 in other southern non-expansion states). After ARTS implementation and Medicaid expansion, Virginia had a higher rate of increase in BWP providers (148%) compared to other southern non-expansion states (115%). The higher rate of increase in Virginia is similar for BWP at 30 patient limits and those with 100 or 275 patient limits.

Table 4 presents the adjusted estimates from our main regression model. In the overall model, no significant change in BWP rates in Virginia are observed after ARTS implementation or Medicaid expansion relative to the pre-interventions periods. Further, no intervention effects are significant in the 30 waiver limit model. However, in the 100/275 waiver limit model, results suggest that both ARTS and Medicaid expansion in Virginia are associated with increases in BWP supply and that the Post-Medicaid expansion increase is significantly larger than the increase in BWP occurring in the period after ARTS but before expansion. Specifically, the rate of 100/275 limit BWP provider increased by 7% in Virginia after ARTS, compared to the Pre-interventions period, and by 22% after expansion and ARTS compared to the Pre-interventions period ($p<0.05$ each). Post hoc tests indicate that the supply increase after Medicaid expansion in

Virginia (0.20) is significantly different than the increase after ARTS-implementation but before expansion (0.07; χ^2=5.63, p<0.05).

In sum, most states observed increases in BWP supply between 2015 and 2020, but the evidence suggests that Virginia's increase was greater than for comparable Southern states that did not implement Medicaid expansions or major SUD benefit increases, especially for BWP with higher waiver limits. It is not possible to fully differentiate between the effects of Medicaid expansion and the ARTS benefit, although it is reasonable to assume that providers are incentivized by both expansions in SUD benefits, as well as expansions in eligibility for these benefits. The end of federal waiver requirements for buprenorphine prescribing in 2023 may further increase the number of prescribers across all states, but coverage of buprenorphine and other SUD treatment services in Medicaid will still likely influence prescribing decisions by providers.

Supply of specialty treatment providers. A broad range of addiction treatment facilities and practitioners are available to Medicaid members along the continuum of care, as defined by the ASAM placement criteria.[18] These include hospital-based intensive inpatient facilities, residential treatment centers, and outpatient providers of varying types and treatment intensity. The ARTS benefit also introduced a new model of care delivery, the Preferred OBAT, that pays significantly higher reimbursement rates to qualified providers for medication-assisted treatment (including pharmacotherapy and behavioral health therapy) and coordination with other medical and social needs. The Preferred OBAT model initially was limited to individuals with primary OUD. However, DMAS expanded this benefit in 2022 to allow for reimbursement of other primary SUD.

Prior to ARTS implementation in 2017, there were few SUD treatment providers, other than ASAM level 1 outpatient providers and some services were not covered as a Medicaid benefit (OBAT, care coordination, ASAM 4). Since implementation of ARTS in 2017, the number of providers treating Medicaid patients has increased greatly across all provider types, and for most years through 2022. Residential/Inpatient treatment facilities (ASAM 3) treating Medicaid members increased from 4 in 2016 to 75 by 2022 (see Table 5). ASAM 2 facilities increased from 49 in 2016 to 270 by 2022. By 2022, there were over 6,088 outpatient providers treating Medicaid members for ASAM 1 level services, as well as 202 OBAT and OTP facilities.

Table 3. Summary statistics of Buprenorphine waiver provider rate(per 100000) in VA and other southern non-expansion states overbefore ARTS implementation, after ARTS but before Medicaid expansion, and after Medicaid expansion for different patient limits.

Waiver limit	States	Pre-ARTS period (Q1,2015-Q1,2017)	Post-ARTS, Pre-Expansion period (Q2,2017-Q4,2018)	Post ARTS & Expansion Period (Q1,2019-Q2,2020)	Percentage change (Q1,2015-Q2,2020)
		Mean (SD)	Mean (SD)	Mean (SD)	
Total	**Virginia**	5.95 (.59)	9.48 (1.26)	14.76 (2.18)	148.07%
	Southern non-expansion states	6.36(1.83)	9.12 (2.31)	13.67 (3.84)	114.98%
Limit 30	**Virginia**	3.87 (.34)	6.52 (.98)	10.38 (1.43)	168.22%
	Southern non-expansion states	3.73 (.97)	5.55 (1.48)	8.95 (2.97)	139.95%
Limit 100/275	**Virginia**	2.08 (.26)	2.96 (.30)	4.38 (.75)	110.58%
	Southern non-expansion states	2.63 (1.06)	3.56 (1.45)	4.72 (1.68)	79.47%

Table 4. Changes in Buprenorphine Waivered Provider Supply after ARTS and Medicaid Expansion.

	Total waiver limit			**Waiver limit 30**			**Waiver limit 100 and 275**		
	Estimate	SE	P-Value	Estimate	SE	P-Value	Estimate	SE	P-Value
Virginia	-0.20	0.04	**<0.01**	0.04	0.06	0.50	-0.55	0.02	**<0.01**
Pre-ARTS implementation	Ref	--	--	Ref	--	--	Ref	--	--
Post-ARTS, Pre-Expansion	0.48	0.06	**<0.01**	0.52	0.09	**<0.01**	0.39	0.03	**<0.01**
Post-ARTS & Expansion	0.91	0.12	**<0.01**	1.01	0.14	**<0.01**	0.74	0.08	**<0.01**
Virginia*Post-ARTS, Pre- Expansion	0.10 (+11%)	0.06	0.09	0.12 (+13%)	0.09	0.17	**0.07 (+7%)**	**0.03**	**0.03**
Virginia*Post-ARTS & Expansion	0.16 (+17%)	0.12	0.16	0.14 (+15%)	0.14	0.31	**0.20 (+22%)**	**0.08**	**0.01**
Difference in Post- ARTS, Pre-Expansion and Post-ARTS & Expansion treatment effects	*0.06(+6%)*			*0.02(+2%)*			***0.13(+14%)***		
Chi-sq (1 df)	*1.20*			*0.13*			***5.63***		
p-value	*0.27*			*0.72*			***0.02***		
Southern Non-expansion States									
Florida	0.04	<0.01	**<0.01**	0.26	<0.01	**<0.01**	-0.28	<0.01	**<0.01**
Georgia	-0.26	<0.01	**<0.01**	-0.02	<0.01	**<0.01**	-0.63	<0.01	**<0.01**
Mississippi	-0.30	<0.01	**<0.01**	-0.33	<0.01	**<0.01**	-0.26	<0.01	**<0.01**
North Carolina	-0.03	<0.01	**<0.01**	0.17	<0.01	**<0.01**	-0.33	<0.01	**<0.01**
Oklahoma	-0.30	<0.01	**<0.01**	-0.03	<0.01	**<0.01**	-0.74	<0.01	**<0.01**
South Carolina	-0.14	<0.01	**<0.01**	0.04	<0.01	**<0.01**	-0.41	<0.01	**<0.01**
Tennessee	0.15	<0.01	**<0.01**	0.06	<0.01	**<0.01**	0.24	<0.01	**<0.01**
Texas	-0.67	<0.01	**<0.01**	-0.41	<0.01	**<0.01**	-1.09	<0.01	**<0.01**
Year									
2015	-0.13	0.01	**<0.01**	-0.11	0.02	**<0.01**	-0.17	0.02	**<0.01**
2016	Ref	--	--	Ref	--	--	Ref	--	--
2017	-0.23	0.03	**<0.01**	-0.29	0.05	**<0.01**	-0.13	0.01	**<0.01**
2019	-0.20	0.02	**<0.01**	-0.21	0.01	**<0.01**	-0.20	0.03	**<0.01**
Intercept	**1.98**	**0.04**	**<0.01**	**1.35**	**0.05**	**<0.01**	**1.34**	**0.02**	**<0.01**

Note: All effects are on log scale. Percentage changes obtained by using antilogarithm are in parenthesis. standard errors are clustered by state. Some effects could not be predicted due to collinearity. All the bold p-values are significant at 5% level. df=degrees of freedom.

Table 5: Number of providers treating Medicaid members for SUD.

	Calendar Year						
	2016	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
Type of Service							
ASAM 1	1,087	2,574	3,339	4,526	5,058	5,703	6,088[a]
OBAT/OTP[1]	6	52	94	175	245	225	202[a]
Care Coordination	N/A	24	49	90	166	160	142[a]
ASAM 2	49	89	139	233	231	254	270[a]
ASAM 3	4	15	22	37	52	72	75[a]
ASAM 4	N/A	3	2	15	15	13	8

[1]Includes only OTP providers in 2016.
[a]Change between 2016 and 2022 is statistically significant at .05 level, based on linear trend test

Increases in treatment facilities accepting Medicaid patients compared to other states. The evaluation also examined more systematically the impact of ARTS and Medicaid expansion on: (1) changes in the percent of SUD treatment facilities in Virginia accepting Medicaid payment, relative to a group of comparison states; and (2) changes in the total number of SUD treatment facilities per 100,000 persons in Virginia, relative to a group of comparison states. The full analysis is described elsewhere and is summarized below for the purposes of this report.[19]

The analysis is based on data from the 2013-2019 National Survey of Substance Abuse Treatment Services (N-SSATS), which is an annual census of substance use treatment facilities conducted by the Substance Abuse and Mental Health Service Administration's (SAMHSA). The survey includes all public and private treatment facilities in SAMHSA's Inventory of Behavioral Health Services and facilities newly identified during the first three to five months of the field period. More detail about the survey and data collection methods is described elsewhere.[20]

The control group consisted of 13 non-expansion states that had not implemented an 1115 SUD waiver by 2019, including nine Southern states (Alabama, Florida, Georgia, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, and Texas), two Midwestern states (Missouri and South Dakota), and two Western states (Idaho and Wyoming). Difference-in-differences regression was used to estimate the treatment effect of the ARTS benefit (implemented in 2017) and Medicaid expansion (implemented in 2019) on the probability of facility acceptance of Medicaid relative to states without similar changes in SUD benefits or

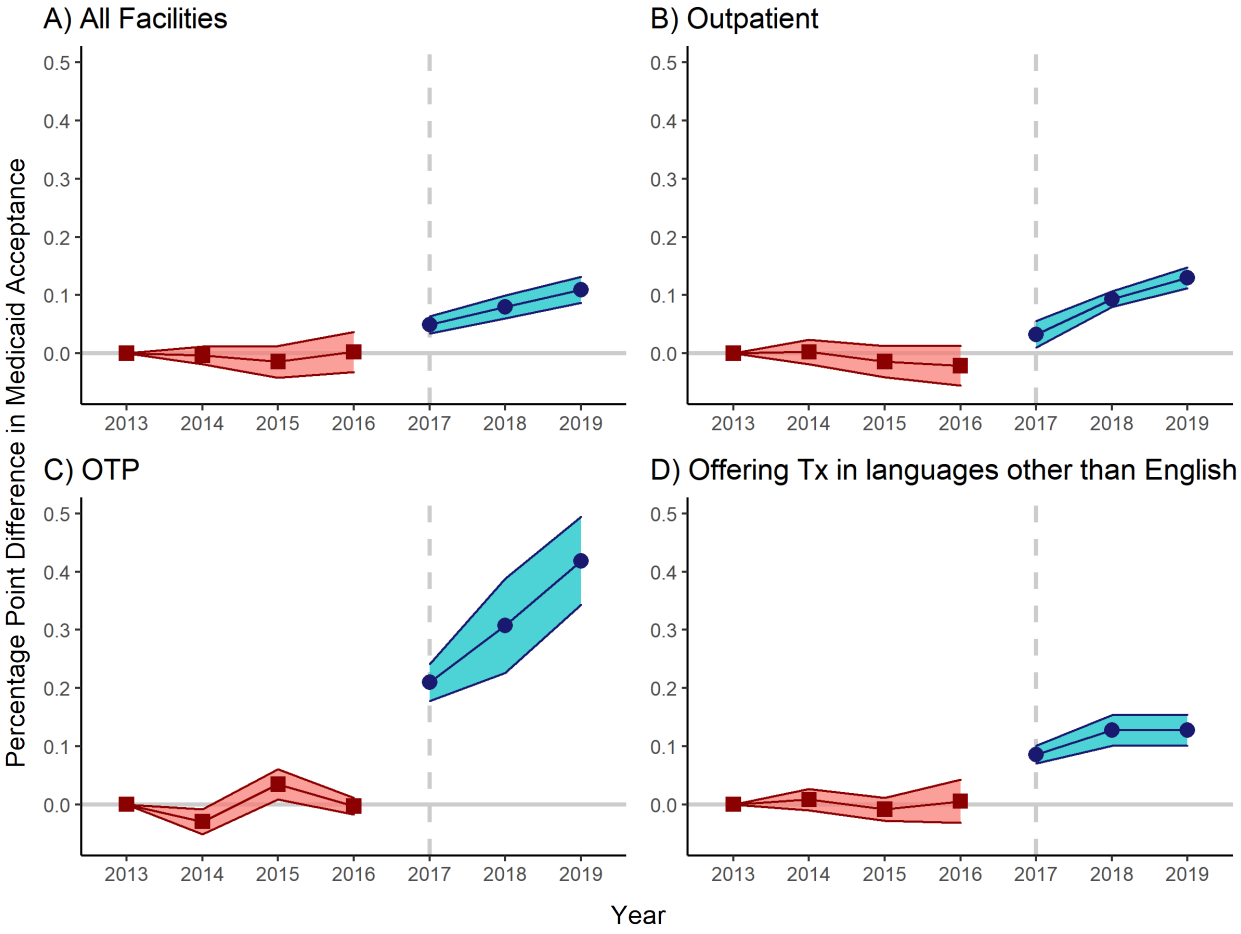
Medicaid expansion. Treatment effects were estimated using a linear probability model of the form:

$$y_{st} = \beta_0 + \beta_1 VA * year_{17} + \beta_2 VA * year_{18} + \beta_3 VA * year_{19} + \beta_4 VA + \alpha_t + \delta_s + \boldsymbol{X}_{st}\gamma + \boldsymbol{Z}_{ist}\lambda + \varepsilon_s$$

The intercept β_0 represents the mean outcome among control states without SUD benefit expansions in the baseline year. The parameters β_1 through β_3 represent the parameters of interest as separate treatment effects by interacting the Virginia indicator with year dummy variables for each post-treatment year, 2017–2019. Fixed effects for year and state were included to account for secular trends and time-invariant state differences, respectively represented by α and δ. The parameter γ represents a vector of pre-treatment, state-level characteristics, and λ represents a vector of facility-level characteristics, including ownership status (private, for-profit, private non-profit, or government-owned); other forms of payment accepted, including private insurance, other non-Medicaid forms of public insurance (e.g., Medicare, Tricare, or other state-financed health insurance), self-pay, and charity care; and SUD treatment services offered, including outpatient, residential, hospital inpatient, or MOUD. Annual state-level factors associated with the SUD provider supply and demand for SUD services were included from the ACS and CDC WONDER, including sex, age, race/ethnicity, level of urbanization, educational attainment, percentage of the state population below the poverty level, unemployment rate, and age-adjusted overdose death rate in the baseline year.

At baseline (years 2013-2016), there were a total of 897 SUD treatment facilities in Virginia, and 12,689 in the comparison states (findings not shown). Sixty percent of SUD treatment facilities in Virginia accepted Medicaid payment in the 2013-2016 period, compared to 58% of treatment facilities in the comparison states. Based on the difference-in-differences analysis described above, year-by-year percentage point differences in Medicaid acceptance between Virginia and the comparison states are shown in Figure 4 for all facilities as well as by facility type. These results show little difference in Medicaid acceptance rates between Virginia and other states prior to the implementation of ARTS in 2017. Following ARTS implementation, however, Medicaid acceptance rates increase in Virginia relative to the other states, with the gap generally widening each year. Changes in Medicaid acceptance rates following ARTS implementation were statistically significant.

Figure 4. Changes in SUD treatment facilities in Virginia accepting Medicaid patients, relative to other states.



Additional analysis examined changes in the total number of SUD treatment facilities per 100,000 people in the state after ARTS implementation, relative to the comparison states. However, the results showed that the number of treatment facilities in Virginia did not increase following ARTS implementation in 2017 relative to the comparison states.

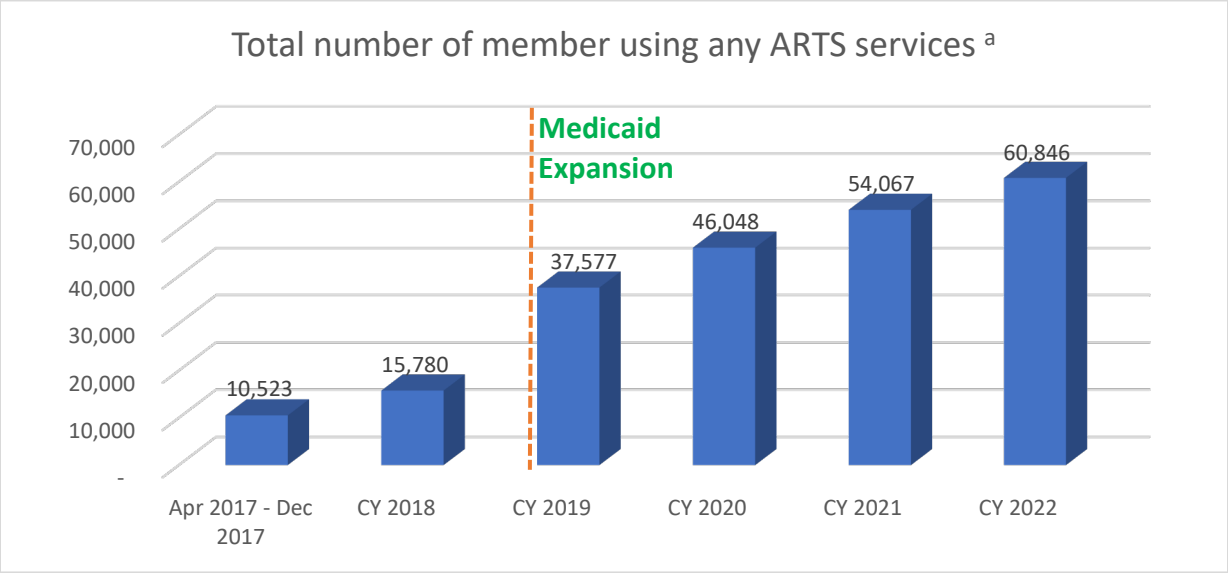
Utilization of ARTS services. Coverage of SUD services provided by the ARTS benefit is based on the ASAM National Practice Guidelines, which comprise a continuum of care from Early Intervention/Screening, Brief Intervention, and Referral to Treatment (SBIRT / Level 0.5), outpatient treatment (ASAM 1), intensive outpatient treatment and partial hospitalization (ASAM 2), residential/inpatient treatment services (ASAM 3) and medically managed intensive inpatient services (ASAM 4).[21] ARTS also emphasizes evidence-based treatment for OUD, which combines pharmacotherapy and counseling. In July 2017, DMAS added peer recovery support services as a covered service under the ARTS benefit, which serves to facilitate recovery from SUD. Care coordination services provided by Preferred OBAT and OTPs facilitate integration of addiction treatment services with physical health and social service needs.

Utilization of ARTS services across the continuum of care has increased every year since implementation of the benefit. In 2022, 60,846 members used ARTS services, a sixfold increase since the benefit was implemented in 2017 (See Figure 5 and Table 6). In particular, the number of members using ARTS services more than doubled in the first year of Medicaid expansion, from 15,780 members in 2018 to 37,577 members in 2019.

In terms of members using services per 100,000 members, utilization of ARTS services increased from 1,282 per 100,000 members using services in 2018 to 2,911 in 2022, a 125% increase (See Figure 6 and Table 7). ASAM 2 and ASAM 3 services – which few members used before or just after ARTS implementation in 2017 – increased over 200% during the same period while ASAM 1 level services – still the most frequently used service – increased by 131%.

DMAS continues to examine issues that may be leading to the low utilization of Early Intervention Services. As noted in the Mid-Point Assessment, DMAS hypothesizes that providers may be providing the service but not billing for it (for reasons still being identified), which would lead to an artificial deflation of the utilization of that service. DMAS has identified a lack of awareness about Screening, Brief Intervention, and Referral to Treatment (SBIRT) as an evidence-based practice to help identify individuals with or at risk of developing a substance use disorder. In addition to this general lack of awareness, there is a lack of understanding by providers about the service, what it includes, and how it can be billed. DMAS is working to educate providers and Managed Care Organizations about SBIRT, its importance and value, and why providers should increase the provision of this service for Members in the Commonwealth.

Figure 5. Total number of Medicaid members using any ARTS services by year



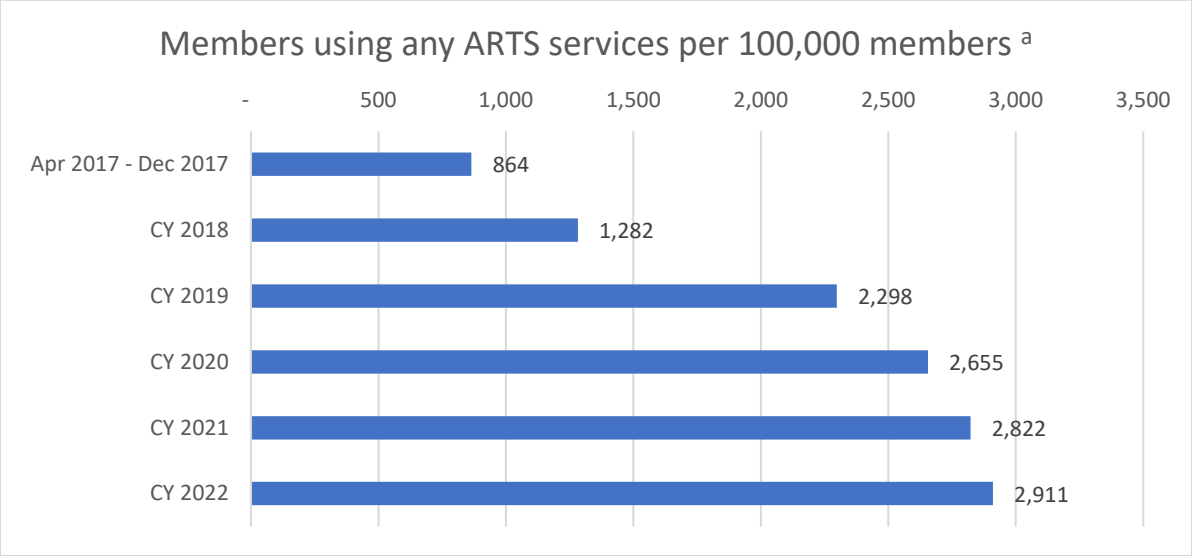
[a] Change between 2018 and 2022 is statistically significant at .05 level, based on a linear trend test

Table 6. Number of Medicaid members using ARTS services, by type of service and year.

Post – ARTS (Calendar Year)							
	Apr 2017-Dec 2017	**2018**	**2019**	**2020**	**2021**	**2022**	**% change 2018-2022**
Used any ARTS service	10,523	15,780	37,577	46,048	54,067	60,846 [a]	74.1%
Type of Service							
ASAM 1	8,991	13,215	31,273	39,129	46,300	51,901 [a]	74.5%
OBAT/OTP	1,805	4,012	11,447	15,007	17,014	17,941 [a]	77.6%
Care Coordination[1]	795	2,515	7,921	11,085	13,436	14,807 [a]	83.0%
ASAM 2	584	1,285	4,018	4,825	5,964	7,507 [a]	82.9%
ASAM 3	556	1,261	3,876	4,377	5,686	7,028 [a]	82.1%
ASAM 4	6	5	47	100	152	78	93.6%
Pharmacotherapy	8,382	12,516	24,300	30,959	37,608	43,234 [a]	71.1%
Case Management	641	930	2,842	3,975	4,241	4,445 [a]	79.1%
Peer Recovery Support Services	33	275	886	1,247	1,652	1,768 [a]	84.4%

[1]Refers to care coordination services through OBAT/OTP providers.
[a] Change between 2018 and 2022 is statistically significant at .05 level, based on a linear trend test.

Figure 6. Number of Medicaid members using any ARTS services, per 100,000 total members.



[a] Change between 2018 and 2022 is statistically significant at .05 level, based on a linear trend test

Table 7. Number of ARTS services users per 100,000 Medicaid members, by type of service and year.

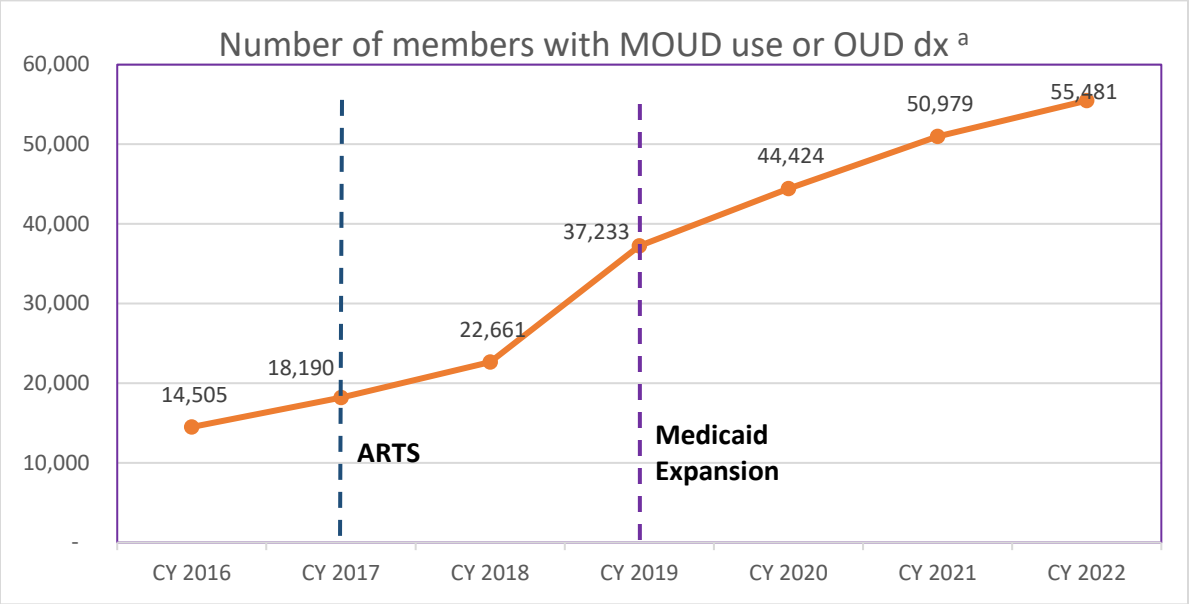
Post – ARTS (Calendar Year)							
	Apr 2017 - Dec 2017	**2018**	**2019**	**2020**	**2021**	**2022**	**% change 2018-22**
Used any ARTS service	864	1,282	2,298	2,655	2,822	2,911[a]	127.0%
Type of Service							
ASAM 1	739	1,074	1,913	2,256	2,417	2,483[a]	131.2%
OBAT/OTP	148	326	700	865	888	858[a]	163.3%
Care Coordination	65	204	484	639	701	708[a]	246.6%
ASAM 2	48	104	246	278	311	359[a]	243.9%
ASAM 3	46	102	237	252	297	336[a]	228.1%
ASAM 4	0.5	0.4	3	6	8	4	818.4%
Pharmacotherapy	689	1,017	1,486	1,785	1,963	2,068[a]	103.4%
Case Management	53	76	174	229	221	213[a]	181.4%
Peer Recovery Support Services	3	22	54	72	86	85[a]	278.5%

[a] Change between 2018 and 2022 is statistically significant at .05 level, based on a linear trend test

Use of MOUD. MOUD includes the use of buprenorphine, methadone and naltrexone as part of evidence-based treatment for OUD. This method is considered the evidence-based standard of care for treating OUD and has been found to be the most effective treatment in preventing OUD-related overdoses. The number of members receiving MOUD treatment has increased almost four-fold since the year prior to ARTS implementation, from 14,505 members receiving treatment in 2016 to 55,481 members in 2022 (see Figure 7 and Table 8). While MOUD use has increased every year since 2016, there was an especially large increase in the first year of Medicaid expansion, from 22,661 members receiving MOUD treatment in 2018 to 37,233 members in 2019.

MOUD treatment rates – the percentage of those with OUD who received MOUD treatment – have also increased every year, from 43% in 2016 to 78% by 2022 (see Figure 8 and Table 9). Buprenorphine has consistently been the most frequently used MOUD treatment throughout the study period, from 34% of members with OUD in 2016 to 47% in 2022. However, the largest increases in treatment rates were for methadone and naltrexone. While less than 5% of members with MOUD received methadone and naltrexone treatment in 2016, this increased to 25.5% for methadone and 11.2% for naltrexone by 2022.

Figure 7. Number of Medicaid members with any MOUD use, by calendar year



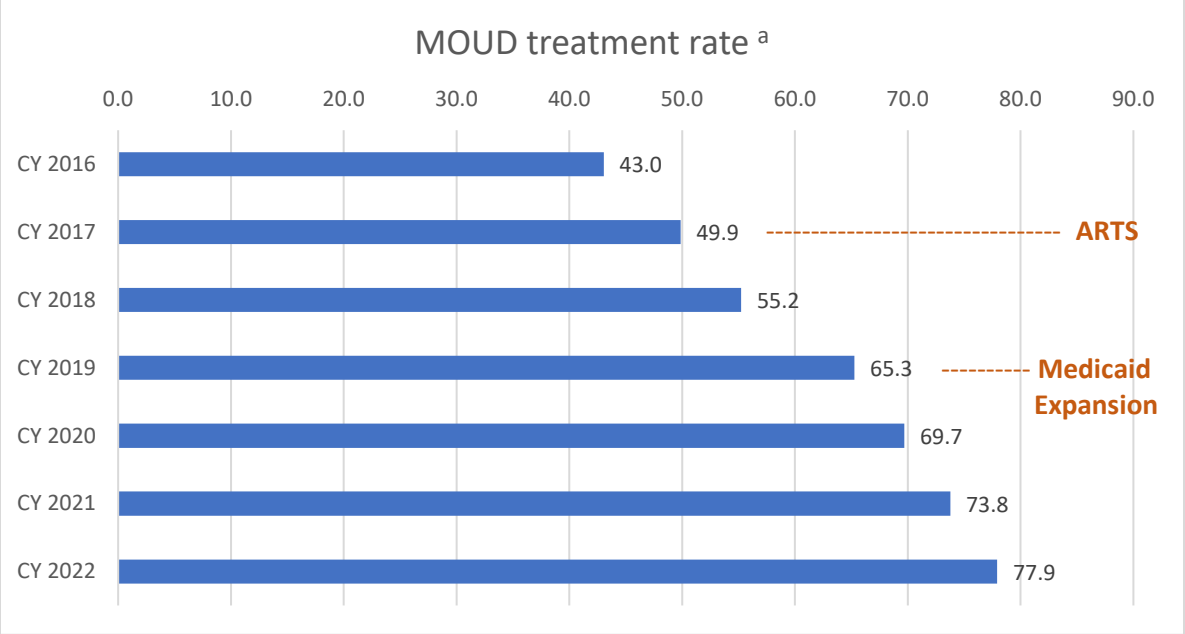
[a] Change between 2016 and 2022 is statistically significant at .05 level, based on a linear trend test.

Table 8. Number of Medicaid members with MOUD utilization, by calendar year

	Calendar Year						
	2016	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
Members with MOUD use or OUD dx	14,505	18,190	22,661	37,233	44,424	50,979	55,481[a]
Type of MOUD use							
Any MOUD	6,244	9,070	12,516	24,300	30,959	37,608	43,234[a]
Buprenorphine	4,968	6,093	7,240	13,281	17,175	21,702	26,025[a]
Methadone	709	2,402	4,719	9,878	12,506	13,740	14,175[a]
Naltrexone	645	932	1,472	3,173	4,037	5,191	6,206[a]

[a] Change between 2016 and 2022 is statistically significant at .05 level, based on a linear trend test

Figure 8. MOUD treatment rates (percent of those with OUD who used any MOUD, by calendar year



Change between 2016 and 2022 is statistically significant at .05 level, based on a linear trend test

Table 9. MOUD treatment rate, by type of MOUD and calendar year.

	Calendar Year						
MOUD treatment rate**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
Any MOUD	43.0	49.9	55.2	65.3	69.7	73.8	77.9[a]
Buprenorphine	34.3	33.5	31.9	35.7	38.7	42.6	46.9[a]
Methadone	4.9	13.2	20.8	26.5	28.2	27.0	25.5[a]
Naltrexone	4.4	5.1	6.5	8.5	9.1	10.2	11.2[a]

**Number of members with the specified MOUD use/ Number of members with MOUD use or OUD dx

[a] Change between 2016 and 2022 is statistically significant at .05 level, based on a linear trend test

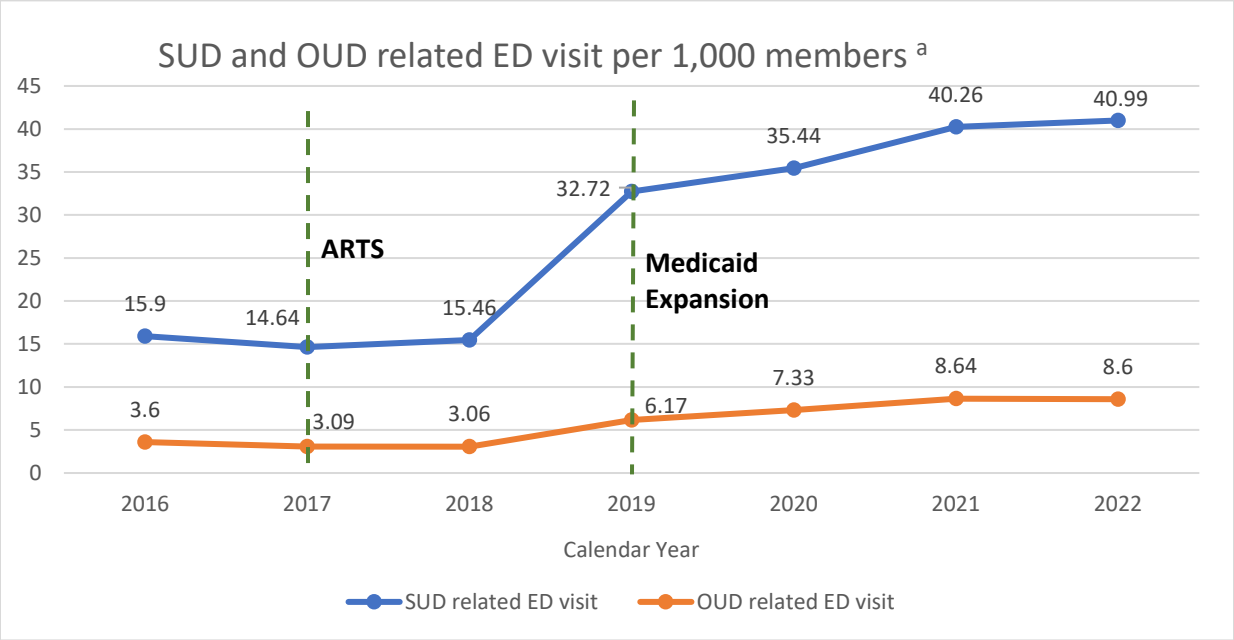
Emergency department (ED) visits. SUD and OUD-related ED visits declined initially in the year after ARTS implementation, but then increased greatly following the implementation of Medicaid expansion in 2019. ED visits with any SUD diagnosis decreased from 15.9 visits per 1,000 members in 2016 to 14.6 visits in 2017, and 15.5 visits in 2018 (see Figure 9). ED visits with any OUD diagnosed decreased from 3.6 visits per 1,000 members in 2016 to 3.1 visits in 2017 and 2018. Other evaluation research confirmed that ED visits among members with OUD decreased between 2016 and 2018, relative to members who did not have SUD or OUD diagnoses.[22]

SUD and OUD-related visits per 1,000 members doubled between 2018 and 2019, the first year of Medicaid expansion. SUD-related ED visits increased from 15.5 visits per 1,000 members in 2018 to 32.7 visits per 1,000 members in 2019, reaching almost 41 visits by 2022. OUD-related ED visits increased from 3.1 visits per 1,000 members in 2018 to 6.2 visits per 1,000 members in 2019, reaching 8.6 visits by 2021 and 2022.

The large increase in SUD and OUD-related ED visits since 2018 likely reflects the increase in Medicaid enrollment among members who have higher prevalence of SUD and OUD. Previous reports have shown that members enrolled through expansion and other nondisabled adults have much higher prevalence of SUD and OUD diagnoses compared to members enrolled through other eligibility categories.[23] In other words, the characteristics of Medicaid members changed after expansion in ways that increased prevalence of SUD and OUD, which also increased ED utilization for these diagnoses. In addition, the increase in SUD and OUD-related ED visits since 2019 likely reflects in part the overall increase in SUD prevalence in Virginia during this period, as indicated by a surge in fatal overdoses among all Virginians and nationwide. For these reasons, it is difficult to draw firm conclusions as to how ARTS has affected SUD and OUD-related ED visits since 2019.

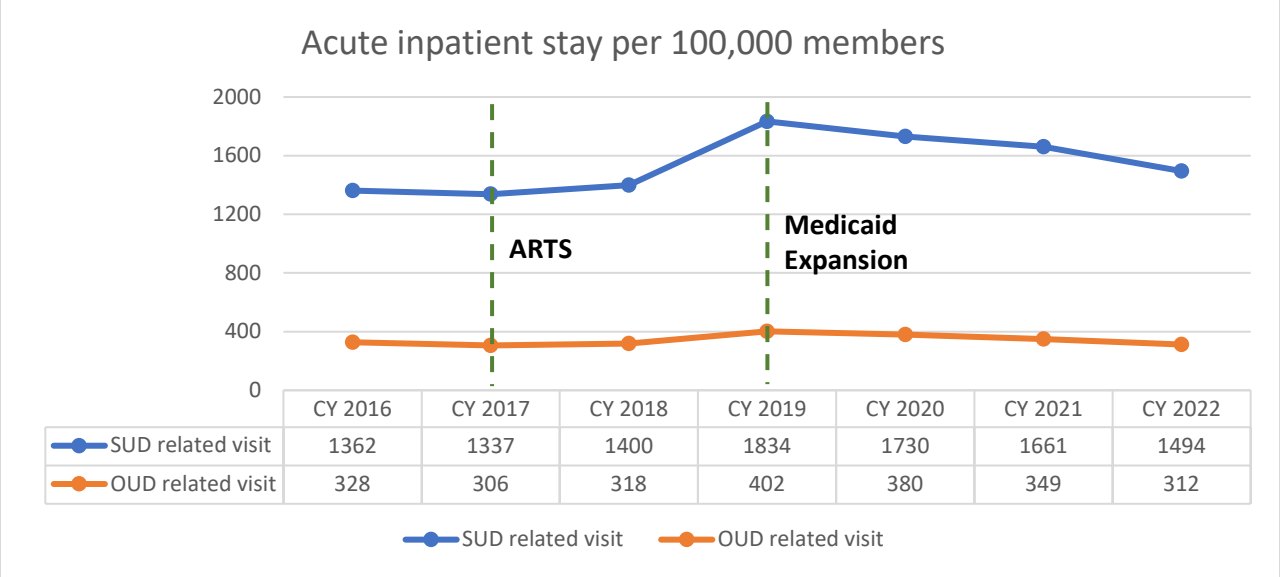
Acute inpatient admissions. SUD and OUD-related acute inpatient admissions have also fluctuated over the study period, increasing sharply at the beginning of Medicaid expansion in 2019 and decreasing after expansion. SUD-related acute inpatient stays increased from 1,400 per 100,000 members in 2018 to 1,834 in 2019, and decreasing steadily after that to 1,494 admissions per 100,000 members in 2022 (See Figure 10). A similar pattern was shown for OUD-related inpatient admissions. It is possible that the initial decrease in 2020 and 2021 reflects in part the overall decrease in hospital admissions during the early months of the pandemic – both for elective as well as acute illness admissions.[24] However, overall hospital admissions rebounded close to pre-pandemic levels by late 2020 and early 2021.

Figure 9. SUD and OUD related ED visit per 1,000 members.



[a] Change between 2016 and 2022 is statistically significant at .05 level, based on a linear trend test

Figure 10. Acute inpatient stays per 100,000 members



	CY 2016	CY 2017	CY 2018	CY 2019	CY 2020	CY 2021	CY 2022
SUD related visit	1362	1337	1400	1834	1730	1661	1494
OUD related visit	328	306	318	402	380	349	312

[a] Change between 2016 and 2022 is statistically significant at .05 level, based on a linear trend test

Changes in behavioral health related inpatient admissions in Virginia compared to North Carolina. The evaluation also assessed the cumulative effects of ARTS and Medicaid expansion on overall changes in behavioral-health related acute inpatient admissions in Virginia, using an all-payer database that includes all inpatient admissions to acute care hospitals throughout the state. A quasi-experimental event study regression analysis was used to assess changes in both SUD-related and mental illness-related acute inpatient admissions in Virginia between 2016 and 2019, relative to changes in inpatient admissions in North Carolina, a neighboring state that did not expand Medicaid nor implement major changes in SUD benefits during the study period. The details of this analysis are described elsewhere.[25]

Data on inpatient admissions from Virginia were obtained from Virginia Health Information's (VHI) Patient Level Data, while data from North Carolina were obtained from the Agency for Healthcare Research and Quality's (AHRQ) Healthcare Cost and Utilization Project (HCUP) Central Distributor. VHI was used as the source for inpatient admissions in Virginia because such data are not available through the HCUP Central Distributor. However, VHI and North Carolina HCUP data are essentially comparable in content and structure, especially as it relates to this study. Analysis for this study was restricted to adults between 18 and 64 years old admitted to general, acute, short-term hospitals with any diagnosis of behavioral health disorders (primary or secondary), including both SUD-related and mental-illness related. SUD and mental illness-related admissions are examined together and separately since the two conditions often co-occur. Also, a major objective of ARTS is to coordinate SUD treatment with other mental and physical health problems.

The analysis aggregates behavioral health-related inpatient admissions by county (and independent cities in VA) and quarter, so that the unit of analysis is the county/quarter. For Virginia, this results in a total of 2,128 observations—133 (95 counties and 38 independent cities) by 16 quarters- (January 2016 through December 2019). For North Carolina, there are 1600 observations—100 counties by 16 quarters.

The analysis uses Poisson fixed-effect event study regression to examine the number of behavioral health-related inpatient admissions in the quarters before and after ARTS and Medicaid expansion in Virginia, and comparing these trends to the same quarters in North Carolina. This analysis expands the difference-in-difference analyses by creating a separate parameter for each quarter of interest. To control for time-invariant characteristics of counties and independent cities, we include county-level fixed effects in all multivariate analyses. We also include time dummies and a quarter-specific measure of the uninsured percentage under 65 years old as a time varying measure (obtained from the United States Census Bureau's Small Area Health Insurance Estimates (SAHIE) Program. The formal model is specified as:

$$\text{Inpatient admission}_{it} = b_0 + Y_t + b_j (\text{state}_t * Y_t) + x_{it} + \alpha_i + u_{it}$$

Where Y_t represents a full set of quarterly dummy variables (1 quarter is a reference + 15 dummy variables). $\text{State}_t * Y_t$ represents the set of interactions between a dummy variable for VA

and the quarterly dummies starting with the first quarter of 2016 to the fourth quarter of 2019 with indication of second quarter of 2017 as a reference when ARTS came into effect. x_{it} is the percentage of uninsured. α_i is the county fixed effect. u_{it} notates the error term.

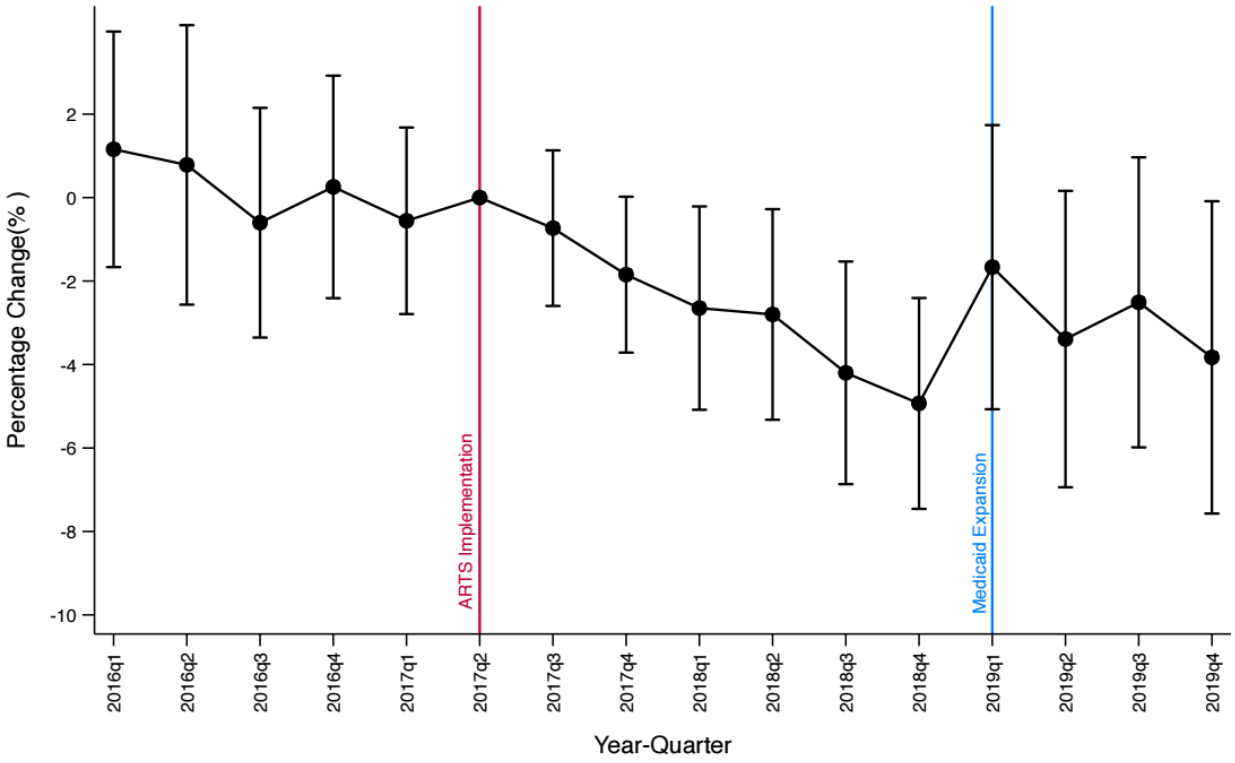
Table 10 shows descriptive changes in average quarterly inpatient admissions per county in Virginia and North Carolina, divided into the Pre-ARTS period (January 2016 to March, 2017), the period between ARTS and Medicaid expansion (April 2017 to December 2018) and Post-Medicaid expansion (2019). In Virginia, there was little change in behavioral health-related admissions, from an average of 334 admissions in the Pre-ARTS period to an average of 337 admissions in the Post-Medicaid expansion period. While there was little change for mental-illness related admissions, SUD inpatient admissions increased slightly during the three time periods. By contrast, behavioral health-related admissions increased in North Carolina, from an average of 666 admissions in the Pre-ARTS period to an average of 700 admissions in the Post-Medicaid expansion period (a 5% increase). There were increases in both mental illness-related and SUD-related inpatient admissions in North Carolina.

Table 10. Mean Number of County-Quarter Inpatient admissions Before ARTS, Between ARTS and Medicaid Expansion and After Medicaid Expansion

Virginia	**Pre-ARTS (5 quarters)**	**Between ARTS and Medicaid expansion (7 quarters)**	**Post-Medicaid expansion (4 quarters)**
Total admissions (average for counties)	797	788	780
All behavioral health-related inpatient admissions (%)	334 (41.9)	335 (42.5)	337 (43.2)
Mental illness inpatient admissions (%)	293 (36.8)	293 (37.2)	295 (37.8)
SUD inpatient admissions (%)	117 (14.7)	119 (15.1)	123 (15.8)
North Carolina	**Pre-ARTS (5 quarters) in VA**	**Between ARTS and Medicaid expansion (7 quarters) in VA**	**Post-Medicaid expansion (4 quarters) in VA**
Total admissions (average for counties)	1326	1320	1318
All behavioral health-related inpatient admissions (%)	666 (49.1)	685 (51.9)	700 (53.1)
Mental illness inpatient admissions (%)	582 (43.9)	599 (45.4)	613 (46.5)
SUD inpatient admissions (%)	234 (17.7)	241 (18.3)	249 (18.9)

The results of the event-study regression for all behavioral health-related admissions are depicted in Figure 11. Each data point on the line reflects the results for bj in the above equation, or the percentage change in admissions for Virginia relative to North Carolina, using the first quarter of ARTS implementation (2017, quarter 2) as the reference period. While was essentially no change in admissions in Virginia in the Pre-ARTS period, admissions decreased in Virginia after ARTS implementation and before Medicaid expansion relative to North Carolina. This trend was disrupted following the beginning of Medicaid expansion in 2019, quarter 1.

Figure 11. Results of Poisson Fixed Effect Regression for Percentage Change in Behavioral Health-Related Inpatient Admissions prior to and after ARTS implementation in Virginia Relative to North Carolina.



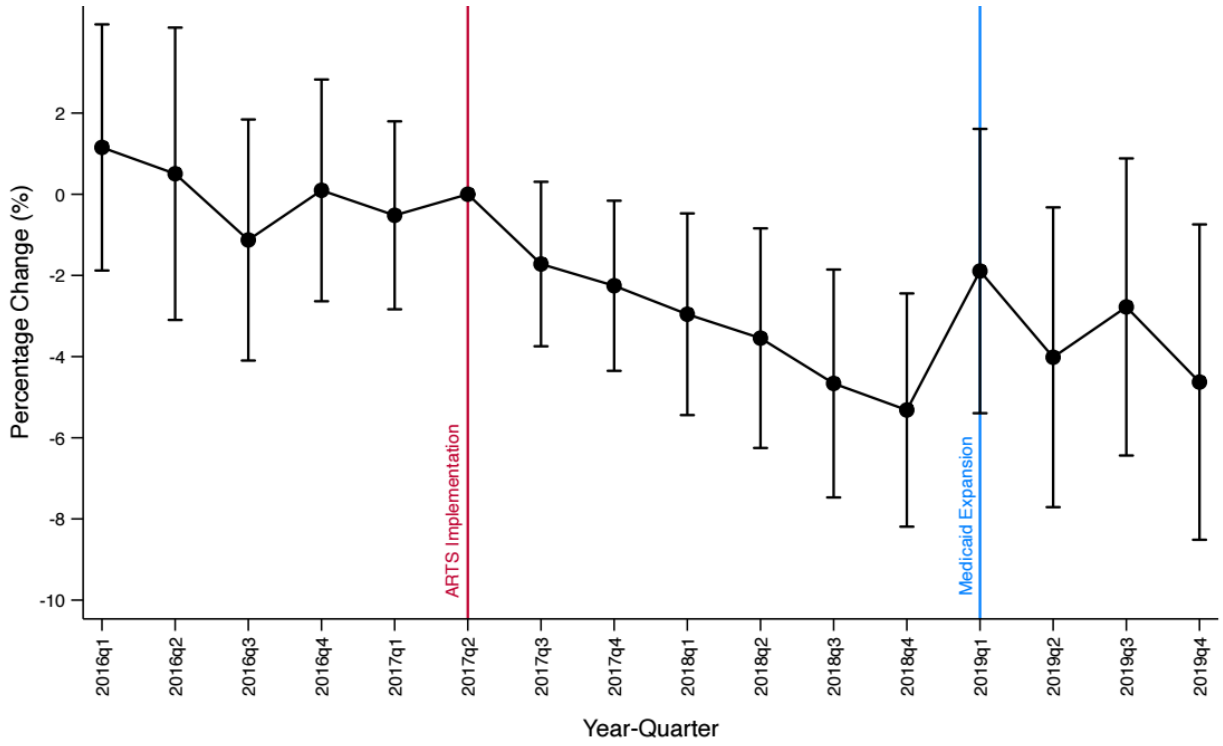
Source: Data on inpatient admissions from Virginia are from Virginia Health Information's (VHI) Patient Level Data. Data from North Carolina are from the Healthcare Cost and Utilization Project (HCUP) Central Distributor. The line reflects the coefficient for bj (statet^*Y_t) from the model described above, and is interpreted as the percentage change in admissions relative to 2017q2 (the beginning of the ARTS demonstration) for Virginia relative to North Carolina.

The decrease in admissions in Virginia relative to North Carolina is most apparent for mental-illness-related admissions, as shown in Figure 12, but less so for SUD-related admissions, as shown in Figure 13. Relative to the Pre-ARTS period, the change in admissions in Virginia during the Post-ARTS and Pre-Medicaid expansion period was statistically significant at the $p < .01$ level for all behavioral health-related admissions, as well as for mental illness-related admissions. However, changes in SUD-related admissions during the Post-ARTS and Pre-Medicaid expansion period (relative to Pre-ARTS) were not statistically significant. In addition, changes in admissions after Medicaid expansion (relative to the Pre-ARTS period) were not statistically significant across all three admission types.

In sum, the findings suggest that implementation of ARTS resulted in an initial decrease in behavioral health-related inpatient admissions, especially mental illness-related admissions (which may or may not have also included a SUD diagnosis). However, the period following

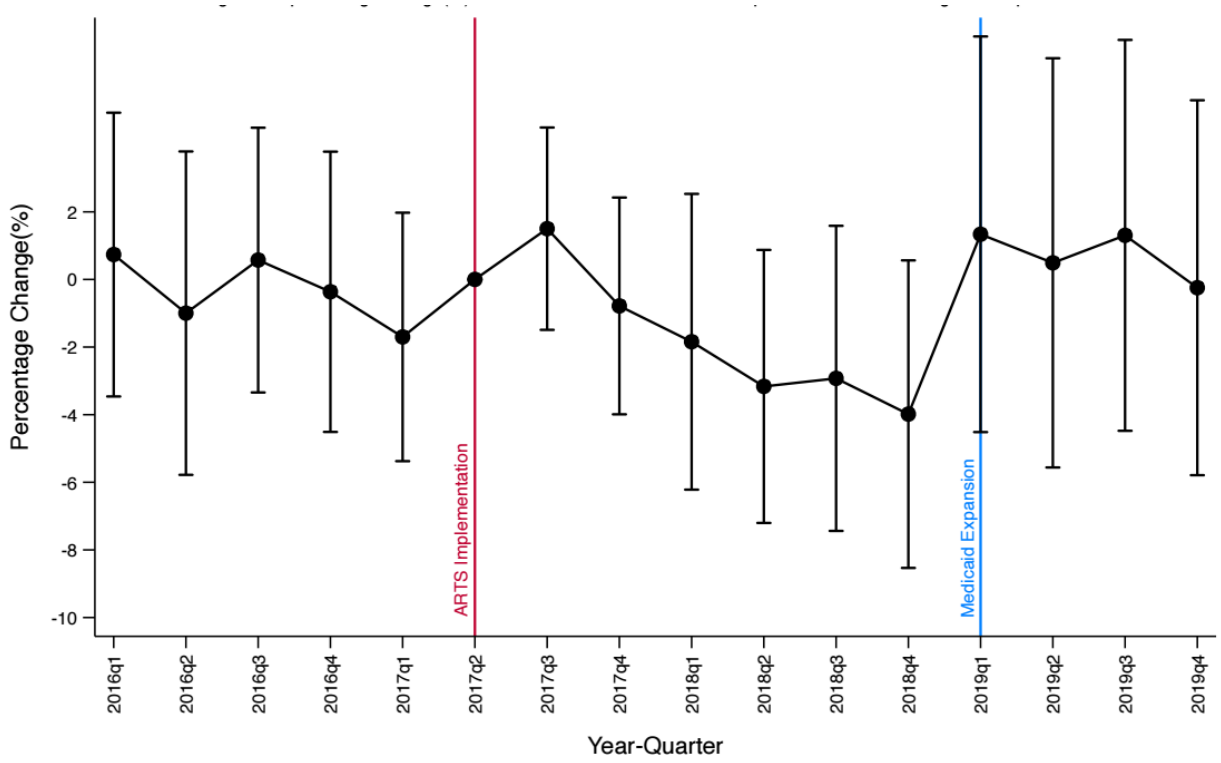
Medicaid expansion appears to have interrupted that trend, perhaps due to pent-up demand for inpatient care among members newly enrolled in Medicaid who had pre-existing behavioral health problems, or because of the increasing prevalence of SUD that began affecting both states in 2019. It is possible that this initial increase in admissions after Medicaid expansion would have tapered off (as evidenced by the decrease in Medicaid admissions beginning in 2020, as shown in Figure 10).

Figure 12. Results of Poisson Fixed Effect Regression for Percentage Change in Mental Illness-related Admissions prior to and after ARTS implementation in Virginia Relative to North Carolina.



Source: Data on inpatient admissions from Virginia are from Virginia Health Information's (VHI) Patient Level Data. Data from North Carolina are from the Healthcare Cost and Utilization Project (HCUP) Central Distributor. The line reflects the coefficient for bj (statet*Y_t) from the model described above, and is interpreted as the percentage change in admissions relative to 2017q2 (the beginning of the ARTS demonstration) for Virginia relative to North Carolina.

Figure 13. Results of Poisson Fixed Effect Regression for Percentage Change in Substance-Use Related Admissions prior to and after ARTS implementation in Virginia Relative to North Carolina.



Source: Data on inpatient admissions from Virginia are from Virginia Health Information's (VHI) Patient Level Data. Data from North Carolina are from the Healthcare Cost and Utilization Project (HCUP) Central Distributor. The line reflects the coefficient for β_j ($state_t * Y_t$) from the model described above, and is interpreted as the percentage change in admissions relative to 2017q2 (the beginning of the ARTS demonstration) for Virginia relative to North Carolina.

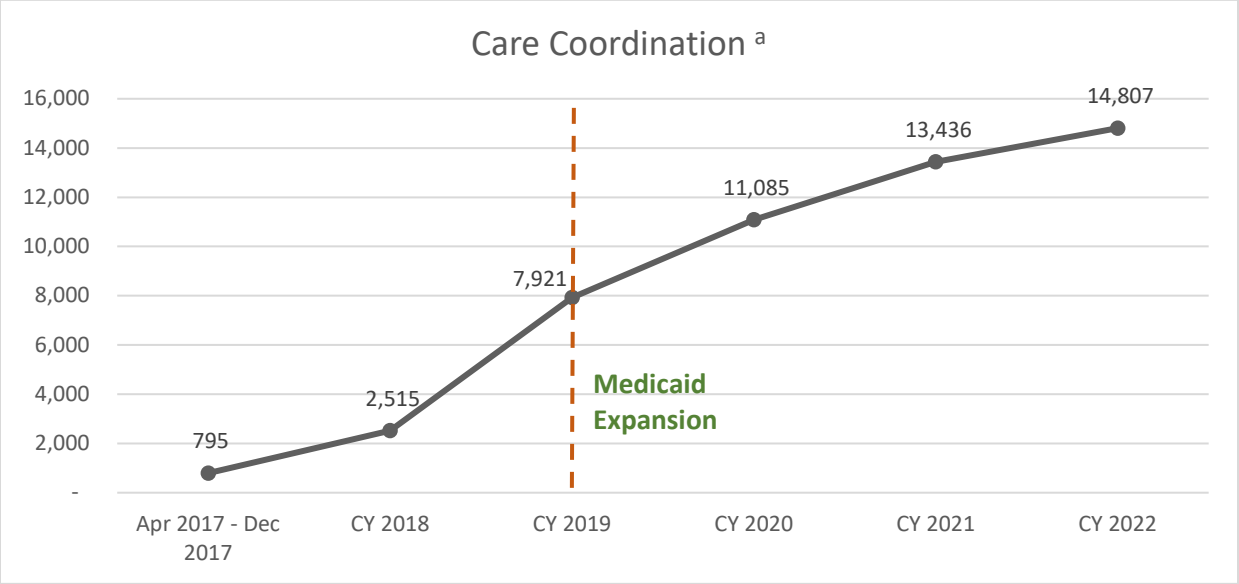
6.2 *Evaluation question #2: Does the demonstration improve quality of treatment through improved care coordination efforts?*

An important goal of the ARTS demonstration is to improve transitions across different levels of care, and coordinating addiction treatment services with other physical, mental health, and social needs. This is to be accomplished by, (1) shifting behavioral health services to a "carve-in" model so that they are provided by the same managed care organizations (MCOs) that provide other Medicaid services; (2) the use of licensed care coordinators by MCOs for addiction treatment services; and (3) enhanced payment for care coordination services by the new Preferred OBAT providers.

Use of care coordination services. Enhanced payment for care coordination services through Preferred OBAT and OTP providers is central to the objective of increasing coordination with other physical and mental health services, and improving transitions of care. Introduced

with the ARTS benefit in 2017, the number of claims for care coordination services through OBATs has increased exponentially, from 795 claims in 2017 to almost 15,000 by 2022 (see Figure 14).

Figure 14. Number of claims for new care coordination services, by calendar year



[a] Change between 2018 and 2022 is statistically significant at .05 level, based on a linear trend test

DMAS continues to review and identify opportunities to support and strengthen care coordination and ensure that Managed Care Organizations are providing care coordination services as required by the Cardinal Care Managed Care contract. Integration and utilization of the Emergency Department Care Coordination program is one example of how DMAS has made progress with care coordination. Unfortunately, some of the challenges that care coordinators cited – caseloads, identifying appropriate providers, appointment delays – are issues over which DMAS has limited control. DMAS is working to collaborate with MCOs to provide awareness and education to ensure that the MCOs are fulfilling all their contractual obligations concerning care coordination for members receiving ARTS services. These include, but are not limited to:

- Emphasizing Care Management for any Member with SUD transitioning from emergency departments, residential or inpatient stays as well as correctional settings
- Make every effort to provide outreach and Care Management to Members who are at higher risk for a fatal overdose
- When clinically indicated, assign each member to an ARTS Care Manager to provide Care Management support throughout the course of substance use disorder treatment, ensuring that all relevant information is shared with the treating providers through care transitions.

Assistance with other health and personal needs. The ARTS member survey conducted in 2020-21 asked respondents whether they had received assistance with other health and

personal needs at their OUD treatment provider (though not necessarily through a care coordinator) Overall, 60% of respondents receiving OUD treatment reported receiving assistance with other non-SUD services, including 26% who received help for a medical problem, 38% who received help with a mental health problem, and 18% who received help with housing, food, or employment (see Table 11). Assistance reported by respondents decreased during the COVID-19 pandemic relative to before the pandemic, and was lower among Non-Hispanic Black respondents compared to Non-Hispanic White respondents.

Table 11. Assistance with other health and social needs.

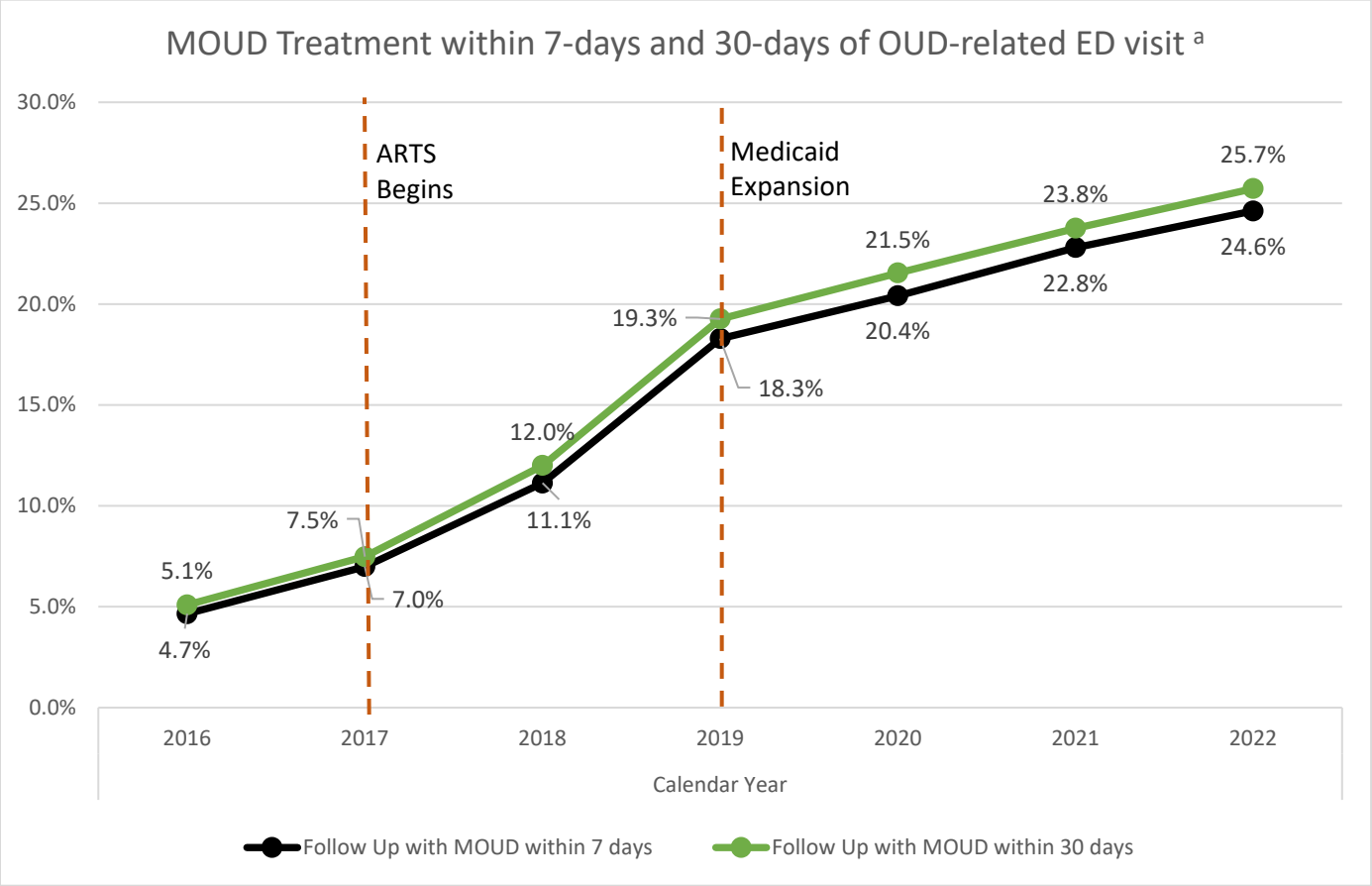
	Received help with other health and social needs			
	Received any help with other health or personal needs	Received help for a medical problem	Received help with a mental health problem	Received help with housing, food, or employment
All (n=1,057)	59.6%	25.6%	38.2%	17.9%
Adjusted percentages[1]				
OUD treatment location				
Preferred OBOT	64.3%	30.6%	42.6%	17.1%
OTP	49.1%*	16.9%*	28.5%*	14.9%
Other outpatient	69.1%	29.4%	44.7%	13.7%
Race				
Non-Hispanic White	60.8%	25.8%	38.3%	16.3%
Non-Hispanic Black	55.0%*	21.3%*	33.1%*	14.9%
Other	71.7%*	16.1%*	39.6%	26.4%*
Survey period				
Before COVID	64.7%	24.8%	39.0%	15.7%
During COVID	57.2%*	24.4%	36.5%	16.9%
RUCA Classification				
Urban	60.2%	24.1%	37.3%	19.7%
Rural	60.8%	26.0%	38.1%	9.2%*

*Statistically significant difference at .05 level with reference groups (other outpatient, Non-Hispanic White, Before COVID, urban classification).

[1]Adjusted percentages are derived from logistic regression analysis that included the following independent variables: sample group, race/ethnicity, survey period, age, gender, general perceived health, serious mental illness, polysubstance use, urban/rural residence, and whether they had been in prison or jail in the past 12 months.

MOUD treatment within 7 days of OUD-related ED visit. A crucial role for care coordination is to assist with care transitions from hospitals and other institutional settings. Getting patients started on MOUD while at the ED or shortly thereafter (within 7 days) is considered crucial for preventing overdoses. Many health systems have started "ED-Bridge" programs that seek to get OUD patients started on buprenorphine treatment in the emergency department and provide them with a warm handoff to treatment providers in the community for follow-up treatment and maintenance of MOUD after the ED visit.[26,27] Prior research has shown that a seven day follow-up after an OUD-related ED visit is generally low among Medicaid members, although there is considerable variation across states.[28] Nevertheless, the percent of Virginia Medicaid members receiving MOUD treatment within seven days of an OUD-related ED visit has increased from less than 5% prior to the ARTS demonstration in 2016, to 18% by 2019, and almost 25% by 2022 (see Figure 15). MOUD treatment with 30 days of an ED visit showed similar trends.

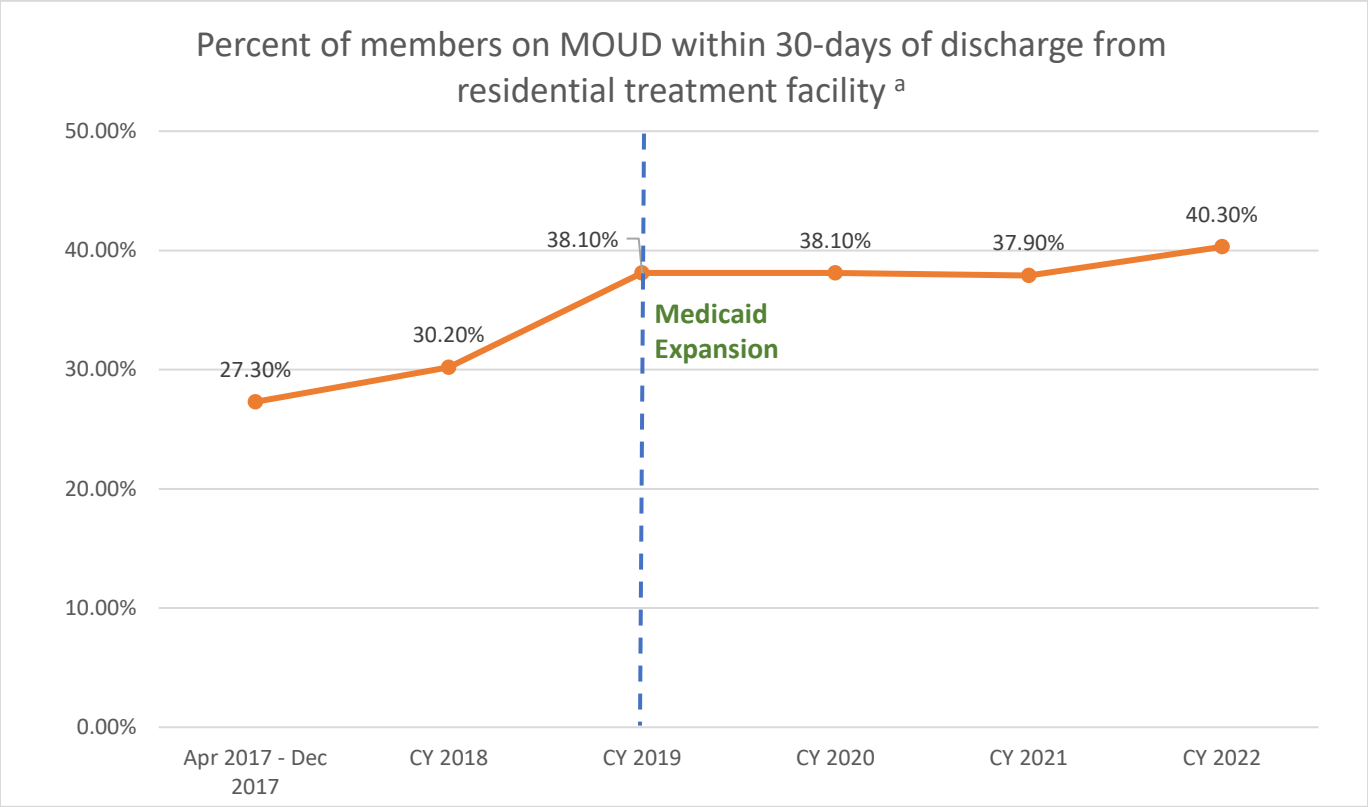
Figure 15. MOUD treatment within 7 days and 30 days of OUD-related ED visit.



[a] Change between 2016 and 2022 is statistically significant at .05 level, based on a linear trend test

MOUD treatment within 30 days of discharge from residential treatment. Another crucial transition is starting or continuing members on MOUD treatment following discharge from residential treatment. The percent of members on MOUD within 30 days of discharge from residential treatment increased from 27% in 2017 to 38% by 2020 and 40% by 2022 (see Figure 16). Despite the increases, less than 50% of members discharged from residential treatment are on MOUD within 30 days of discharge.

Figure 16. Percent of members on MOUD within 30 days of discharge from residential treatment facility



[a] Change between 2018 and 2022 is statistically significant at .05 level, based on a linear trend test

Results from Survey of Care Coordinators. The 2021 survey of Medicaid MCO care coordinators describes the processes of identifying Medicaid members with SUD, engaging them with treatment, the most frequent activities performed for members with SUD, and the most common obstacles involved in getting assistance for members with SUD. About 46% of care coordinators reported that less than 25% of their caseload included members with SUD, while 30% of care coordinators reported that 50% or more of their caseload included members with SUD (findings not shown).

Most care coordinators reported that they identify members with SUD either through a referral by the MCO (31.3%) or through a health risk assessment (35.6%) (see Table 12). Many care coordinators (38%) also report identifying members who overdosed through the Emergency Department Care Coordination (EDCC) program, which is a statewide real-time communication and collaboration program among healthcare providers and health plans. Although DMAS requires the MCOs to participate in the EDCC program per the contract with the State, almost half of MCO care coordinator respondents were unfamiliar with these reports.

Care coordinator survey respondents report that the most important factors in getting members engaged with SUD treatment are time to initial appointment (37%), and having the support of family, friends, or peers (22%). Somewhat surprisingly, fewer report that convenience of treatment providers (12%) and overcoming stigma (10%) are the most important factors for getting members engaged with treatment.

Table 12. Care coordinator survey findings on identifying members with SUD and engaging them in treatment.

	Number	%
How care coordinators learn about Medicaid members having a substance use disorder		
Member is referred by the MCO	87	31.3
Member is referred by healthcare provider	42	15.1
Member screens positive during a health risk assessment	99	35.6
Member requests help	50	18.0
Most important factor for member engagement with treatment		
Convenience of treatment providers to home	30	11.5
Time to initial appointment	96	36.6
Member satisfaction with quality of care	38	14.5
Support of family, friends or peers	57	21.8
Overcoming stigma of having a substance use disorder or people finding out	16	6.1
Other	25	9.5
Use EDCC reports to identify Medicaid members in the ED due to an overdose		
Yes	105	37.6
No	37	13.3
Don't know what EDCC reports are	137	49.1

Care coordinators provide a wide range of activities for members with SUD (see Figure 17). Among the activities they provide the most frequently include following up after an overdose or acute hospital visit (63%), following up if the member discontinued care (46%), working with treatment providers (37%), monitoring whether members are keeping appointments and filling prescriptions (36%), and assisting with transportation to treatment providers (35%).

Survey respondents also report a number of obstacles and barriers in assisting Medicaid members, including assistance in locating treatment providers (38%), facilitating admissions for residential treatment (35%), facilitating care transitions after discharge from residential treatment (24%), and working with treatment providers (22%) (see Figure 18).

Figure 17. Frequency of activities for members with SUD performed by care coordinators

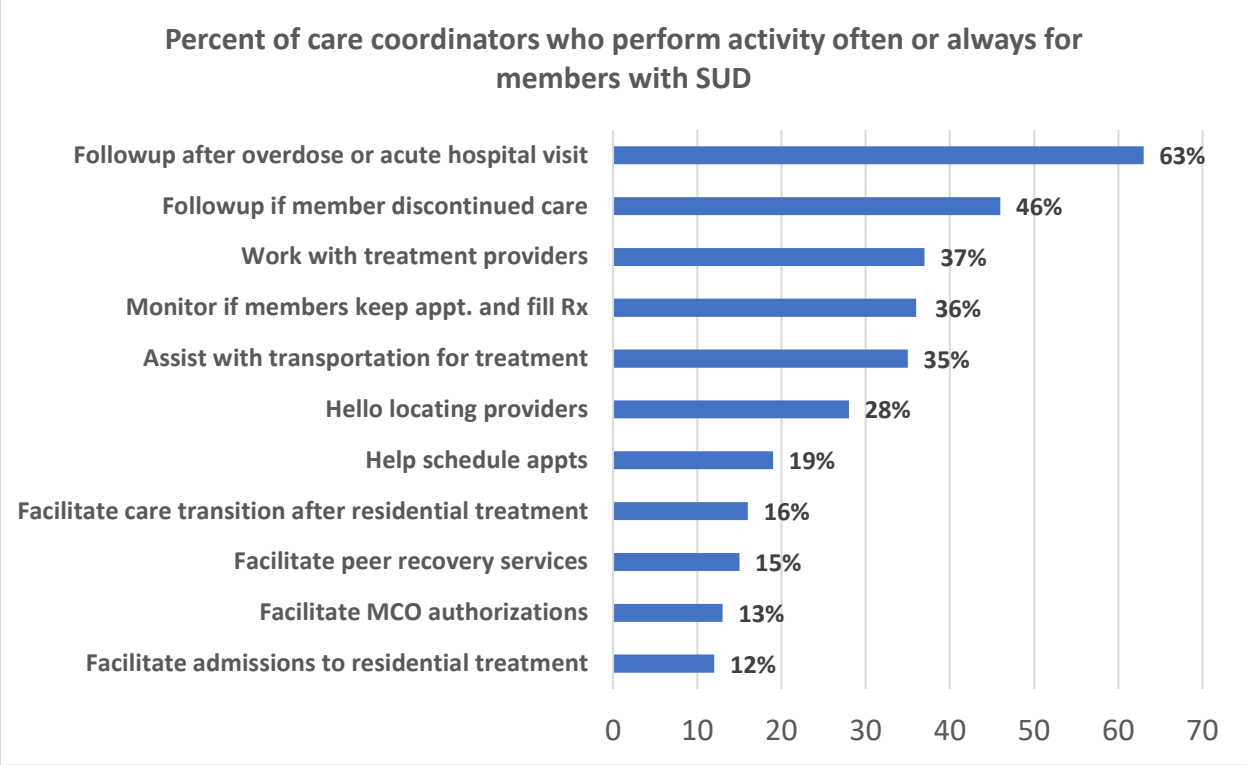
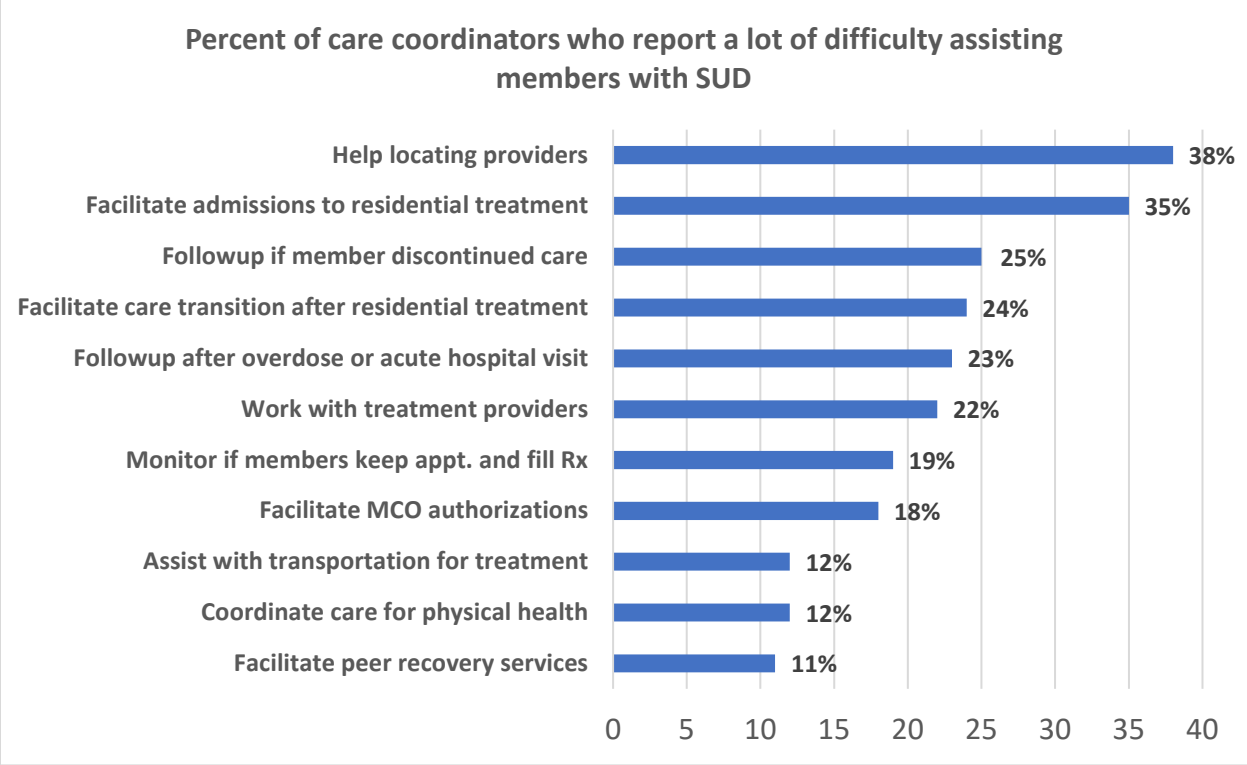


Figure 18. Barriers for care coordinators to assisting members with SUD.

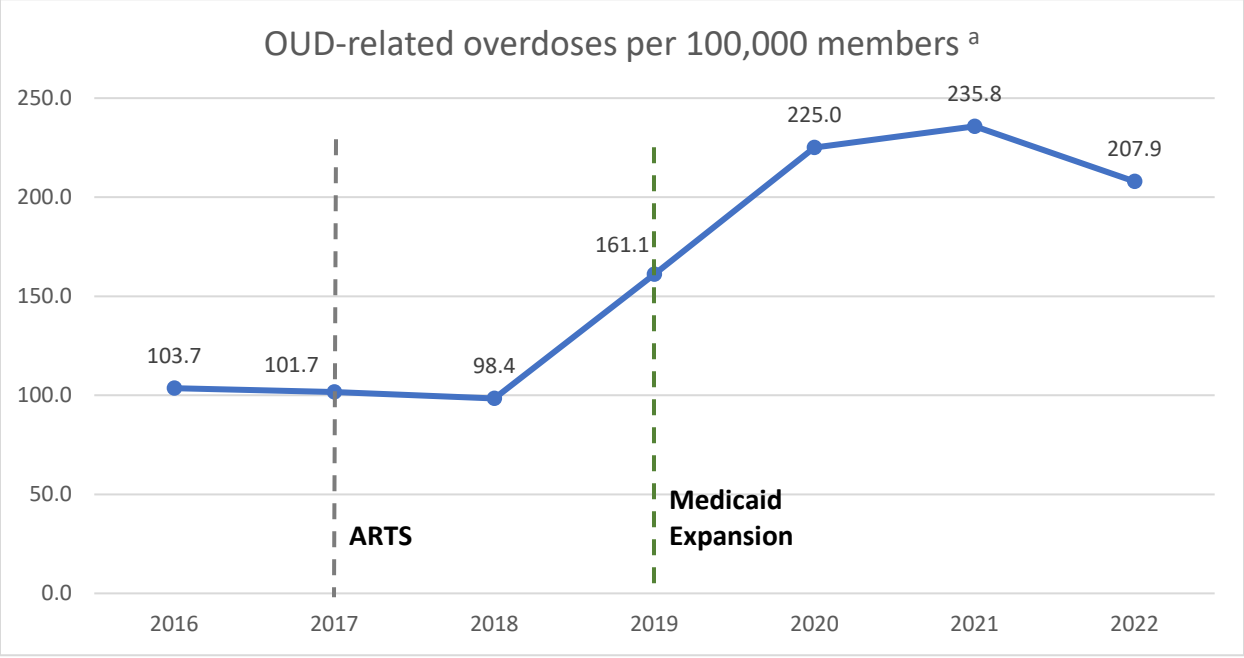


6.3 *Evaluation question #3: Are rates of opioid-related overdose deaths impacted by the demonstration?*

Nonfatal overdoses among Virginia Medicaid members. Based on Medicaid claims data, nonfatal OUD-related overdoses decreased after ARTS implementation and before Medicaid expansion, from 104 overdoses per 100,000 members in 2016 to 98 overdoses per 100,000 members by 2018 (see Figure 19). However, overdoses surged to 161 per 100,000 members following Medicaid expansion in 2019, increasing to 236 overdoses per 100,000 members by 2021. Similar to the trends for OUD-related ED and acute inpatient visits, the increase following Medicaid expansion likely reflects changes in the characteristics of Medicaid members, including members who had a SUD prior to enrolling in Medicaid. The decrease in overdoses between 2021 and 2022 marks the first decrease since the 2017-2018 period.

Given the changes that have occurred since ARTS implementation in 2017, including Medicaid expansion in 2019, the COVID-19 pandemic starting in 2020, and the worsening of the opioid epidemic nationally, it is difficult to assess the impact of ARTS on fatal overdose mortality among Medicaid members based on these data. Linkages of cause of death data to Medicaid administrative data will permit assessment of whether Medicaid members with OUD who received ARTS treatment services (e.g. MOUD treatment) were less likely to experience fatal overdoses compared to members with OUD who did not receive treatment.

Figure 19. OUD related overdoses among Virginia Medicaid members, by calendar year



[a] Change between 2016 and 2022 is statistically significant at .05 level, based on a linear trend test

6.4 *Evaluation question #4: How do costs for SUD-related and non-SUD related services change over the evaluation period?*

Expenditures for ARTS services. Based on actual payment amounts in the Medicaid claims data, spending on ARTS services totaled $284.6 million in 2022, about 5.5 times the spending in the first full year of the ARTS demonstration ($51.9 million in 2018), and more than double the first year of Medicaid expansion ($128.3 million in 2019) (see Table 13). Pharmacotherapy (MOUD) was the single largest spending item in 2022 ($96.9 million) comprising about one-third of total spending on ARTS services. Residential treatment services are the second largest spending item ($48.2 million), comprising about 17% of total spending on ARTS services. Spending has increased across all ARTS services since 2018, with spending on peer recovery services increasing the most (2824% increase).

Table 13. Total cost of ARTS services, by calendar year (in thousands)

	Calendar Year						
	Apr 2017 - Dec 2017	**2018**	**2019**	**2020**	**2021**	**2022**	**% change from 2018-2022**
Total Cost	$28,208	$51,897	$128,262	$186,851	$251,936	$284,560[a]	
Type of service							
ASAM 1	$2,820	$5,569	$15,448	$21,467	$28,184	$34,728[a]	524%
OBAT/OTP	$2,796	$6,771	$17,741	$27,531	$36,954	$36,454[a]	438%
Care Coordination	$783	$3,067	$10,949	$16,695	$22,829	$24,508[a]	699%
ASAM 2	$2,858	$4,513	$12,792	$19,081	$30,244	$37,474[a]	730%
ASAM 3	$6,022	$8,484	$27,089	$29,393	$44,275	$48,235[a]	469%
ASAM 4	$49	$24	$481	$2,251	$2,623	$563	2212%
Pharmacotherapy	$12,449	$22,673	$41,115	$66,053	$81,563	$96,924[a]	328%
Case Management	$429	$774	$2,485	$4,142	$4,854	$5,080[a]	556%
Peer Recovery Support Services	$1.4	$20.3	$162	$239	$410	$593[a]	2824%

[a] Change between 2018 and 2022 is statistically significant at .05 level, based on a linear trend test

ARTS spending has also increased for most services for members using specific ARTS services. Spending on pharmacotherapy services increased from an average of 1,812 per member using pharmacotherapy in 2018 to $2,242 in 2022, a 23.8% increase (see Table 14). Spending per user on peer recovery services – while the lowest among ARTS services – increased the most, from $74 per person using peer recovery in 2018 to $335 in 2022, a 355% increase. While overall utilization and spending on residential treatment services increased between 2018 and 2022, spending per user increased only 2% (from $6,728 in 2018 to $6,863 in 2022).

Table 14. Average cost of ARTS service per member using services, by calendar year

	Calendar Year						
	2017 (Apr – Dec)	**2018**	**2019**	**2020**	**2021**	**2022**	**% change from 2018-2022**
Type of service							
ASAM 1	$314	$421	$494	$549	$609	$669[a]	58.8%
OBAT/OTP	$1,549	$1,688	$1,550	$1,835	$2,172	$2,032[a]	20.4%
Care Coordination	$985	$1,220	$1,382	$1,506	$1,699	$1,655[a]	35.7%
ASAM 2	$4,894	$3,512	$3,184	$3,955	$5,071	$4,992	42.1%
ASAM 3[1]	$10,830	$6,728	$6,989	$6,715	$7,787	$6,863	2.0%
ASAM 4[1]	$8,212	$4,873	$10,234	$22,507	$17,259	$7,222	48.2%
Pharmacotherapy	$1,485	$1,812	$1,692	$2,134	$2,169	$2,242	23.8%
Case Management	$670	$832	$874	$1,042	$1,145	$1,143[a]	37.3%
Peer Recovery Support Services	$42	$74	$183	$192	$248	$335[a]	354.9%

[1]Reflects payments to the facility, not for professional services that are billed separately.

[a] Change between 2018 and 2022 is statistically significant at .05 level, based on a linear trend test

6.5 *ARTS Member Survey Findings on the Patient Experience with Treatment*

Unmet need for health services. Medicaid members with OUD were asked about their ability to obtain treatment for drug or alcohol use: "Was there any time in the past 12 months that they needed but did not receive treatment for drug or alcohol use." Similar questions were also asked regarding other health services, including mental health counseling, prescription drugs, medical care, and dental care.

Overall, 15% of survey respondents reported that they had an "unmet need" with respect to treatment for drug or alcohol use. Although there are no pre-ARTS estimates of unmet need, survey respondents reported less difficulty accessing drug and alcohol treatment compared to other health services. For example, 22.5% reported unmet need for mental health counseling, 29.9% reported unmet need for prescription drugs, 27.8% for general medical care, and 50.8% for dental care (see Table 15). Levels of unmet need for drug and alcohol use did not differ significantly for members surveyed prior to the beginning of the COVID-19 pandemic compared to members surveyed during the pandemic.

Table 15. Member survey results on perceived unmet needs for health services.

	Percent with unmet need in the past year for health services				
	Drug or alcohol counseling	**Mental health counseling**	**Prescription drugs**	**Medical care**	**Dental care**
All (n=1,845)	14.7%	22.5%	29.9%	27.8%	50.8%
Adjusted percentages[1]					
Race					
Non-Hispanic White	8.6%	18.9%	28.4%	27.1%	53.2%
Non-Hispanic Black	13.0%*	20.7%	29.7%	24.3%	50.5%
Other	12.1%*	16.7%	27.1%	30.3%	46.3%*
Survey period					
Before COVID	10.3%	19.3%	30.7%	28.5%	51.4%
During COVID	8.9%	19.0%	27.1%	25.3%	53.0%
RUCA Classification					
Urban	9.0%	19.5%	28.3%	26.5%	52.7%
Rural	10.9%	18.3%	29.2%	27.0%	51.4%

Source: 2020-21 ARTS Member Survey

*Difference with reference groups (other outpatient, Non-Hispanic White, Before COVID, Urban classification) is statistically significant at .05 level.

[1]Adjusted percentages are derived from logistic regression analysis that included the following independent variables: sample group, race/ethnicity, survey period, age, gender, general perceived health, mental health co-morbidity, polysubstance use, rural/urban residence, and whether they had been in prison or jail in the past 12 months.

Survey respondents receiving SUD treatment also reported on specific SUD services that they needed but were unable to use (see Table 16). About 6% reported unmet need for residential treatment services in 2020-2021. This compares with 10.1% having unmet need for doctor's office or clinic, 3.6% of inpatient hospitalization, and 15.9% for MOUD. Unmet need for residential treatment was somewhat higher during COVID than before COVID, among racial/ethnic minorities, and patients in urban areas. However, none of the differences were statistically significant.

Table 16. Member survey results on self-report unmet need for SUD services.

	Needed or wanted to use service, but not able to						
	AA/NA, self-help (%)	**Church or religious (%)**	**Doctor's office/ clinic (%)**	**Inpatient hosp. (%)**	**Residential treatment (%)**	**MOUD (%)**	**Any of the above (%)**
All (n=1,057)	5.9%	3.8%	10.1%	3.6%	6.2%	15.9%	28.5%
Adjusted percentages[1]							
Race							
Non-Hispanic White	2.4%	1.9%	9.5%	1.2%	3.6%	11.3%	23.1%
Non-Hispanic Black	3.5%	1.8%	6.2%	3.5%	5.3%	11.7%	25.2%
Other	12.2%	7.6%	15.1%	3.1%	9.8%	16.0%	31.6%
Survey period							
Before COVID	3.8%	1.7%	8.9%	1.2%	3.4%	12.0%	21.9%
During COVID	2.0%	2.3%	9.3%	1.8%	4.5%	11.0%	25.6%
RUCA Classification							
Urban	2.2%	1.5%	8.2%	1.2%	4.2%	10.1%	21.9%
Rural	4.5%	3.6%	11.8%	2.4%	3.4%	15.6%*	28.5%

Source: 2020-21 ARTS member survey

*Difference with reference groups (other outpatient, Non-Hispanic White, Before COVID, Urban classification) is statistically significant at .05 level.

[1]Adjusted percentages are derived from logistic regression analysis that included the following independent variables: sample group, race/ethnicity, survey period, age, gender, general perceived health, mental health co-morbidity, polysubstance use, urban/rural residence, and whether they had been in prison or jail in the past 12 months.

Member Satisfaction with Treatment Services. Survey respondents receiving treatment for SUD services reported high levels of satisfaction with their treatment providers. Members responded "usually" or "always" to the following statements (see Table 17):

- Explained things in a way you can understand (84%)
- Showed respect for what you had to say (85%)
- Often felt safe at place of treatment (89%)
- Involved you as much as you wanted in your treatment (84%)
- Provided information on different kinds of treatment (72%).

In addition, 74% of survey respondents reported that they felt able to refuse treatment.

Table 17. Survey respondents who replied "usually" or "always" to statements about treatment quality.

	Perceptions of practitioners where treatment received					
	Explained things in a way you can understand[1]	Showed respect for what you had to say[1]	Often felt safe at place of treatment[1]	Involved as much as you wanted in your treatment[1]	Provided information on different kinds of counseling or treatment[2]	Felt able to refuse treatment[2]
All (n=1,057)	83.7%	85.2%	88.8%	84.4%	72.0%	74.2%
Adjusted percentages[3]						
OUD treatment location						
Preferred OBOT	87.0%	90.5%	93.0%	90.2%	76.0%	73.6%
OTP	84.4%	82.7%*	92.3%	86.7%	71.8%	75.3%
Other outpatient	86.7%	90.2%	93.1%	88.9%	74.0%	76.5%
Race						
Non-Hispanic White	86.9%	88.9%	92.6%	89.3%	75.4%	78.4%
Non-Hispanic Black	80.2%*	85.5%*	92.4%	83.0%*	68.2%*	60.7%*
Other	85.9%	74.4%	83.8%*	81.7%*	65.7%*	68.1%*
Survey period						
Before COVID	85.8%	86.5%	91.8%	87.7%	74.5%	74.3%
During COVID	86.1%	89.4%	92.8%	88.7%	73.6%	77.1%
RUCA Classification						
Urban	84.9%	87.7%	92.4%	88.2%	74.3%	76.7%
Rural	88.3%	88.9%	92.3%	88.4%	73.3%	73.5%

*Statistically significant difference at .05 level with reference groups (other outpatient, Non-Hispanic White, Before COVID, urban classification).

[1]Estimates reflect percent who responded "usually" or "always" to statement.

[2]Estimates reflect percent who responded "yes" to statement.

[3]Adjusted percentages are derived from logistic regression analysis that included the following independent variables: sample group, race/ethnicity, survey period, age, gender, general perceived health, mental health co-morbidity, polysubstance use, urban/rural residence, and whether they had been in prison or jail in the past 12 months.

In addition, survey respondents generally reported positive perceptions of how they were helped by treatment (see Tables 18 and 19). Members "agreed" or "strongly agreed" with the following statements:

- Confident they were no longer dependent on alcohol or drugs (79%).
- Able to deal more effectively with daily problems (79%)
- Felt better about themselves (78%)
- Better able to deal with a crisis (73%)
- Able to get along better with family (79%)
- Do better in social situations (65%)
- Able to enjoy leisure activities (72%)
- Improved housing situation (60%)
- Improved employment situation (43%)

Table 18. Percent of survey respondents who "agree" or "strongly agree" with statement on personal outcomes related to treatment.

	Respondent perceptions of how they were helped by treatment			
	Confident no longer dependent on alcohol or drugs[1]	Deal more effectively with daily problems[1]	Feel better about myself[1]	Better able to deal with a crisis[1]
All (n=1,057)	79.2%	79.2%	77.9%	72.8%
Adjusted percentages[2]				
OUD treatment location				
Preferred OBOT	86.1	83.3	85.1*	80.1*
OTP	84.6	86.5*	87.0*	83.5*
Other outpatient	81.9	78.6	78.9	70.6
Race				
Non-Hispanic White	84.8	84.2	84.2	78.3
Non-Hispanic Black	83.7	74.5*	79.8*	77.0
Other	80.2*	82.4	86.8	84.0*
Survey period				
Before COVID	86.0	83.7	84.4	77.9
During COVID	82.9	82.1	83.0	78.7
RUCA Classification				
Urban	84.4	82.0	83.3	77.0
Rural	84.8	85.0	84.8	81.3

*Statistically significant difference at .05 level with reference groups (other outpatient, Non-Hispanic White, Before COVID, urban classification).

[1]Estimates reflect percent who "strongly agree" or "agree" with statement.

[2]Adjusted percentages are derived from logistic regression analysis that included the following independent variables: sample group, race/ethnicity, survey period, age, gender, general perceived health, mental health co-morbidity, polysubstance use, urban/rural residence, and whether they had been in prison or jail in the past 12 months.

Table 19. Percent of survey respondents who "agree" or "strongly agree" with statement on social and economic outcomes of treatment.

	Perceptions of how members were helped by counseling or treatment				
	Able to get along better with family[1]	Did better in social situations[1]	Able to enjoy leisure activities[1]	Housing situation improved[1]	Employment situation improved[1]
All (n=1,057)	79.2%	65.0%	71.6%	60.1%	43.0%
Adjusted percentages[2]					
OUD treatment location					
Preferred OBOT	82.6%*	71.0%*	76.4%	65.1%*	44.0%*
OTP	86.6%*	69.9%*	78.3%*	64.7%*	39.9%
Other outpatient	76.9%	62.3%	72.6%	53.8%	35.4%
Race					
Non-Hispanic White	84.4%	68.1%	76.5%	61.5%	40.1%
Non-Hispanic Black	72.9%*	64.4%*	73.6%	60.0%	38.3%
Other	82.3%	75.1%	74.7%	54.1%*	33.3%*
Survey period					
Before COVID	83.9%	67.9%	75.5%	59.1%	36.1%
During COVID	81.9%	67.9%	76.5%	62.8%	43.0%*
RUCA Classification					
Urban	83.7%	68.8%	73.8%	60.4%	40.8%
Rural	80.8%	65.8%	80.8%*	62.5%	36.8%

*Statistically significant difference at .05 level with reference groups (other outpatient, Non-Hispanic White, Before COVID, urban classification).

[1]Estimates reflect percent who "strongly agree" or "agree" with statement.

[2]Adjusted percentages are derived from logistic regression analysis that included the following independent variables: sample group, race/ethnicity, survey period, age, gender, general perceived health, mental health co-morbidity, polysubstance use, urban/rural residence, and whether they had been in prison or jail in the past 12 months.

7. Conclusion

The ARTS demonstration combined with Medicaid expansion has transformed the SUD treatment system for Virginia Medicaid members, resulting in increases in treatment providers, utilization of various treatment services, and MOUD treatment rates among members with OUD. Comparisons with other states that did not implement similar benefits suggest that the demonstration increased the number of buprenorphine prescribers and other treatment providers that accepted Medicaid patients beyond what would have occurred without the demonstration. Furthermore, evidence suggests that SUD-related ED visits and inpatient stays decreased in the early years of ARTS, although these downward trends were disrupted by Medicaid expansion, the worsening of the opioid epidemic nationally, and the COVID-19 pandemic.

Medicaid expansion in 2019 amplified many of these trends by increasing the number of Medicaid members eligible to receive treatment through the ARTS benefit. An exception was an increase in SUD-related ED visits and inpatient stays at the beginning of Medicaid expansion, which may have coincided with a worsening of the opioid epidemic nationally, as well as "pent-up" demand for acute care services for newly enrolled Medicaid members. It is possible that these increases were temporary, and would have abated over time as newly enrolled members gained access to MOUD and outpatient treatment services. SUD-related ED and acute inpatient stays decreased between 2020 and 2022, although it is likely that much of this is related to the COVID-19 pandemic, rather than ARTS and Medicaid expansion. Nevertheless, concerns about large-scale disruptions in treatment with the COVID-19 pandemic did not materialize. In fact, the supply of treatment providers, utilization of ARTS services, and MOUD treatment rates increased between 2020 and 2022.

The ultimate goal of the ARTS demonstration is to reduce fatal drug overdoses, especially those related to opioids. The final report will include a more complete assessment of the impact of the ARTS demonstration and Medicaid expansion on fatal overdoses. Such an analysis is complicated by the changing nature of the opioid epidemic, which saw a surge in fatal overdoses between 2020 and 2023 that affected nearly every state, as well as the predominance of fentanyl that has driven the recent surge in overdoses. Fatal and nonfatal overdoses have decreased slightly in the past few years in Virginia, although it is too early to conclude whether this is only temporary, or the beginning of a longer-term trend.

Regardless, the evaluation results so far show that far more Medicaid members with OUD are receiving treatment than prior to the demonstration, and close to 80% of members with diagnosed OUD are receiving MOUD, the standard of care for OUD that has been shown to reduce overdoses. More members with OUD who are being discharged from hospital EDs and residential treatment centers are continuing with or being started on MOUD, although there are still large gaps in such care transitions.

Finally, the Section 1115 waiver that allows federal payment for residential/inpatient treatment also requires a robust continuum of care offered to patients, especially outpatient and community-based services. Although a key part of the continuum of care, the inclusion of residential/inpatient treatment services is not intended to replace outpatient services or become

the dominant form of treatment service. While residential/inpatient treatment capacity has expanded greatly since the ARTS demonstration began, and utilization of residential/inpatient treatment services increased 82% between 2018 and 2022, the share of total ARTS spending on residential/inpatient treatment has stayed fairly constant at about 16%. Growth in the capacity and utilization of outpatient services has matched or exceeded growth in residential/inpatient treatment, thereby alleviating concerns that waiving the Institution of Mental Disease (IMD) exclusion may inadvertently make residential treatment services a more preferred option for OUD treatment. Combining the IMD waiver along with an enhancement of other services along the continuum of care has contributed to strong and balanced growth in the SUD treatment infrastructure in Virginia Medicaid.

8. Endnotes

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Appendix A
Evaluation Design

Building and Transforming Coverage, Services, and Supports for a Healthier Virginia Section 1115 Demonstration Evaluation Design: Substance Use Disorder (SUD) and Former Foster Care Youth (FFCY) Demonstration Components
Demonstration Period: January 1, 2020-December 30, 2024

1.0 General Background Information

1.1 Description and history of demonstration

The number of fatal drug overdoses more than doubled in Virginia between 2007 and 2017, from 721 fatalities in 2007 to 1,526 in 2017.[1] After a small decrease in 2018, fatal drug overdoses resumed their upward trend in 2019. More than 80 percent of fatal drug overdoses in 2018 were due to prescription or illicit opioids, with heroin and fentanyl driving the increase in fatalities in recent years. However, overdoses due to cocaine and methamphetamines have also been rising sharply.

To increase access to substance use treatment services for Virginia Medicaid members, Virginia received approval from the Center for Medicare and Medicaid Services (CMS) in December 2016 for the Addiction and Recovery Treatment Services (ARTS) benefit. Implemented in April 2017, ARTS expanded coverage of treatment services for substance use disorders (SUD) for Medicaid members, including community-based services, short-term residential treatment that meet the definition of an Institution for Mental Diseases (IMD), and inpatient detoxification services.

ARTS was approved as an amendment to an existing Section 1115 demonstration waiver, the Virginia Governors Access Plan (GAP), that had originally been approved in January, 2015. This demonstration provided a limited package of behavioral and physical health services to childless adults and non-custodial parents aged 21 through 64 with household incomes at or below 100 percent of the federal poverty line, and who had been diagnosed with a serious mental illness. After the December 2016 amendment expanded SUD benefits through the ARTS program, there was an additional amendment to the demonstration in September 2017 which added coverage for former foster care youth (FFCY) who aged out of foster care under the responsibility of another state and are now applying for Medicaid in the Commonwealth of Virginia.

CMS approved an extension of Virginia's Section 1115 Demonstration in December 2019, effective January 1, 2020 through December 31, 2024. Under this extension, Virginia will continue to have the authority to provide services to Medicaid members through the ARTS benefit, as well as to provide coverage to FFCY up to age 26 who aged out of foster care in another state and now reside in Virginia. The demonstration will no longer include a separate GAP program (which provided limited benefits to people at or below 100 percent of FPL), as these beneficiaries were transitioned into full Medicaid coverage starting January 1, 2019 through Virginia's Medicaid expansion.

With the end of the GAP program, the name of the demonstration has been changed to "Addiction and Recovery Treatment Services (ARTS) Delivery System Transformation" (Project Number 11-W-0029713). As most of the evaluation plan described below pertains to the ARTS

[1] Virginia Department of Health. Fatal Drug Overdose Quarterly Report: First quarter 2019 (July, 2019). http://www.vdh.virginia.gov/content/uploads/sites/18/2019/07/Quarterly-Drug-Death-Report-FINAL-Q1-2019.pdf

benefit, we will use the term "ARTS" when describing evaluation activities. In section 5.0, we describe the evaluation of Medicaid coverage of FFCY who aged out of foster care in another state.

1.2 Evaluation of ARTS program

In July 2017, the Virginia Department of Medical Assistance Services (DMAS) contracted with Virginia Commonwealth University School of Medicine to conduct an independent evaluation of the ARTS benefit. The evaluation has been conducted by faculty and staff from the Department of Health Behavior and Policy.

The VCU evaluation under the previous demonstration authority focused primarily on how the ARTS benefit affected; (1) the number and type of health care practitioners providing ARTS services; (2) members' access to and utilization of ARTS services; (3) outcomes and quality of care, including hospital emergency department and inpatient visits; (4) the performance of new models of care delivery, especially Preferred Office-Based Opioid Treatment (OBOT) programs.

A recently published report by the VCU evaluation team found substantial increases in the supply and utilization of addiction treatment services among Virginia Medicaid members in the two years since the ARTS benefit was implemented (through March 2019).[2] This includes large increases in the number of providers across the continuum of care providing addiction treatment services to Medicaid members, including an almost four-fold increase in the number of outpatient practitioners submitting claims for ARTS services. In addition, the percent of members with SUD who received treatment increased from 24 percent before ARTS to almost 50 percent during the second year of ARTS. The use of medications for opioid use disorder (MOUD) treatment increased from 36 percent of those with opioid use disorder (OUD) before ARTS, to 49 percent during the second year of ARTS. Evidence of improved quality of care and outcomes was shown by significant decreases in emergency department visits and inpatient stays for members with OUD, relative to other Virginia Medicaid members.[3]

1.3 Goals of the evaluation of ARTS demonstration renewal

CMS guidelines require independent evaluations of approved demonstrations, including for renewals of existing demonstrations. The state must submit a draft evaluation design, for CMS comment and approval, no later than 180 calendar days after approval of the demonstration, which occurred December 30, 2019. To meet this requirement, DMAS requested that the VCU evaluation team prepare an evaluation plan for the ARTS demonstration renewal.

The evaluation design described in this document will build on and continue the evaluation of the ARTS program conducted under the December 2016 amendment that authorized the ARTS program, and will also take advantage of data sources not available at the time of the initial evaluation plan, which increase opportunities for identifying suitable comparison groups and including a broader set of measures.

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[2] VCU Department of Health Behavior and Policy. *Addiction and Recovery Treatment Services (ARTS): Access and Utilization During the Second Year (April 2018 – March 2019).* https://hbp.vcu.edu/media/hbp/policybriefs/pdfs/FinalARTS2yearreport.Feb2020.pdf

[3] Barnes A, et al., Hospital Use Declines After Implementation of Virginia Medicaid's Addiction and Recovery Treatment Services Program. *Health Affairs*. 2020(2): 238-246. https://www.healthaffairs.org/doi/10.1377/hlthaff.2019.00525

Also, while the renewal includes no changes to benefits and services covered under the ARTS benefit, the number of members eligible for and using ARTS services has increased substantially since January 1, 2019, when the state expanded Medicaid eligibility to all adults with family incomes less than 138 percent of the federal poverty level. In just the first three months of expansion (January through March 2019), there were an additional 12,000 members with SUD who had enrolled through Medicaid expansion. As of April 2020, more than 28,000 members enrolled through Medicaid expansion had received ARTS services.[4]

The evaluation of the ARTS demonstration renewal has three main goals:

1) Extend the post-implementation period of the evaluation beyond the first two years of ARTS to include the years 2019-2024. In particular, the evaluation will examine and account for the impact of Virginia's Medicaid expansion in 2019 on SUD prevalence, access to and quality of treatment services, and outcomes among the Medicaid population.
2) To strengthen conclusions about the causal impact of ARTS on key measures of access and quality of care by comparing adjusted summary statistics in Virginia to other states using the Medicaid Outcomes Distributed Research Network (MODRN).
3) To examine the cumulative impact of ARTS and Medicaid expansion on addiction treatment services for the Virginia population, using national data sources that permit comparisons of treatment before and after expansion in Virginia, and between Virginia, other states, and the overall U.S. on selected measures of SUD treatment access, utilization, quality of treatment, and rates of fatal overdoses.

2.0 EVALUATION QUESTIONS AND HYPOTHESES

The specific evaluation questions and hypotheses for the evaluation are directly informed by the stated goals of the ARTS demonstration, as described on p. 25 of the Special Terms and Conditions: These include:

- Increase rates of identification, initiation, and engagement in treatment;
- Increase adherence to and retention in treatment;
- Reduce overdose deaths, particularly those due to opioids;
- Reduce utilization of emergency departments and inpatient hospital settings through improved access to a continuum of services;
- Reduce preventable admissions to the same or higher level of care; and
- Improve access to care for physical health conditions among beneficiaries.
- Increase IMD SUD costs and outpatient SUD treatment costs and decrease SUD-related emergency room visit and inpatient stay costs.

Figure 1 conceptualizes these goals in terms of the overall purpose (reducing overdose deaths), the primary drivers that will directly lead to fewer overdose deaths (the other six goals of the ARTS demonstration), and secondary drivers that reflect the main mechanisms the ARTS demonstration uses to affect addiction treatment services and, ultimately, overdose deaths.

[4] Estimates from Medicaid Expansion Access and Health Services Dashboard as of April 15, 2020. Virginia Department of Medical Assistance Services. https://www.dmas.virginia.gov/#/accessdashboard

The ARTS demonstration seeks to achieve its goals primarily through: (1) increasing the supply of addiction treatment providers serving Medicaid members; (2) increasing the capacity of existing treatment providers; (3) expanding services to cover the entire continuum of addiction treatment services, based on the American Society of Addiction Medicine (ASAM) criteria; (4) facilitating transitions between different levels of treatment; and (5) improving the coordination of addiction treatment services with other physical health, mental health, and social service needs.

To **increase the supply and capacity of addiction treatment providers**, the ARTS program increased reimbursement rates for a number of services, such as residential treatment services, outpatient services, and MOUD treatment. To further increase outpatient capacity, the ARTS demonstration also established a new type of provider, the Preferred Office-Based Opioid Treatment model (P-OBOT). In addition, extensive provider training, outreach, and recruitment efforts by state agencies and managed care organizations are intended to increase provider participation in Medicaid addiction treatment services.

The ARTS demonstration also **expanded Medicaid-covered services along the ASAM continuum of care**, especially residential treatment services and medically managed intensive inpatient services, outpatient, as well as peer recovery services. **Improving transitions across different levels of care,** and **coordinating addiction treatment services with other physical, mental health, and social needs** are to be accomplished by, (1) shifting behavioral health services to a "carve-in" model so that they are provided by the same managed care organizations (MCOs) that provide other Medicaid services; (2) the use of licensed care coordinators by MCOs for addiction treatment services; and (3) enhanced payment for care coordination services by the new Preferred OBOT providers.

Finally, Medicaid expansion will amplify the effects of the ARTS demonstration by extending access to treatment services to hundreds of thousands of Virginians, most of whom were uninsured prior to January 1, 2019 and did not have access to ARTS benefits. Additional coverage of people with SUD is expected to further decrease the rate of fatal overdoses in the Virginia population. In addition, greater coverage of addiction treatment services through Medicaid expansion is likely to strengthen the addiction treatment system by increasing the number and capacity of addiction treatment providers serving Medicaid patients.

Table 1 describes the specific research questions, hypotheses, and performance metrics that will be used to assess whether the ARTS demonstration has achieved the goals as described above. These research questions and hypotheses are grouped into four over-arching evaluation questions:

1) Does the demonstration increase access to and use of SUD treatment services?
2) Does the demonstration improve the quality of treatment through improved care coordination of services?
3) Does the demonstration reduce the rate of overdose deaths due to substance use disorders?
4) How do costs for SUD-related and non-SUD-related services change over the evaluation period?

Figure 1. Driver Diagram for ARTS Demonstration Evaluation

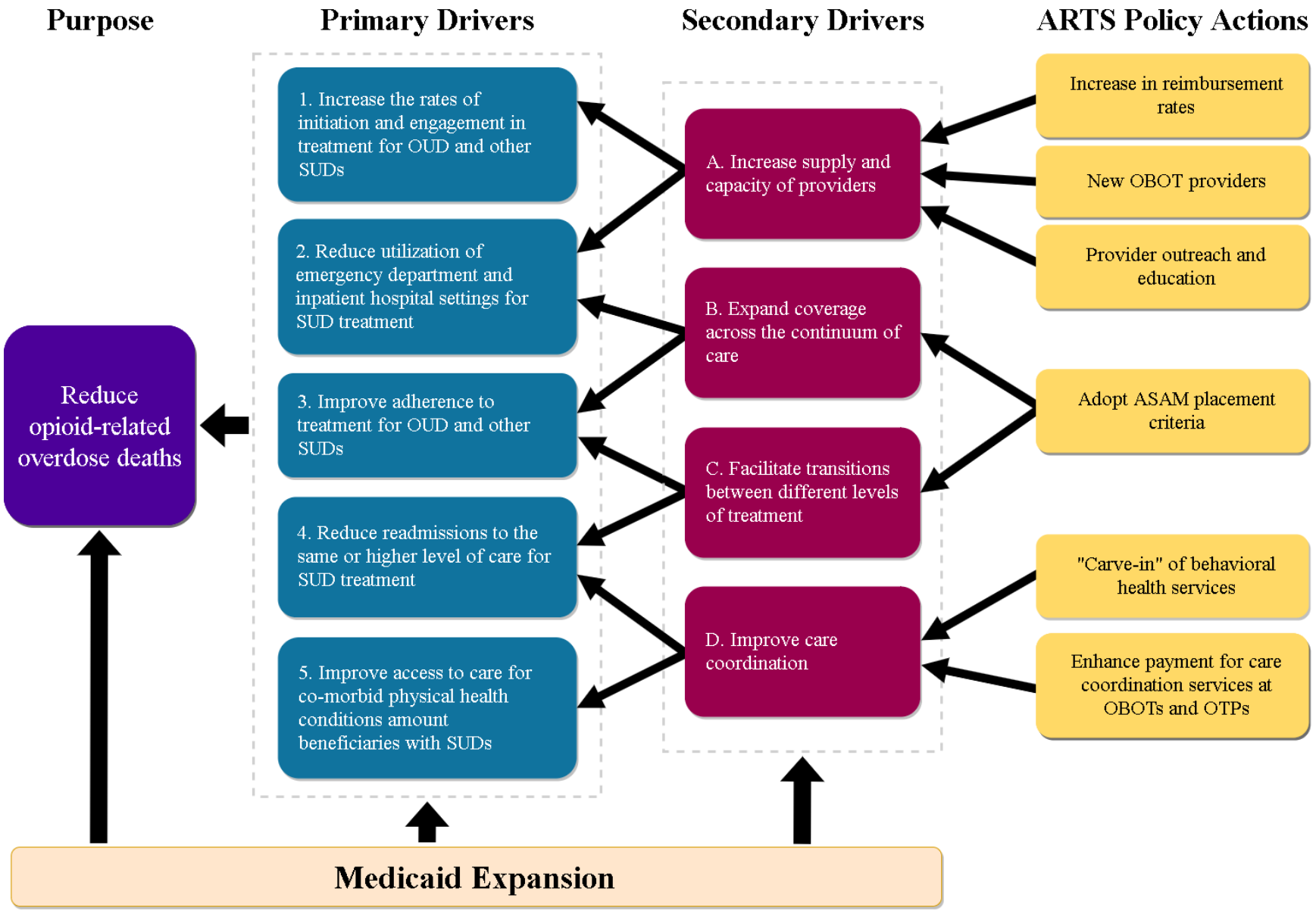

Table 1. Research questions and hypotheses

Driver	Measure description	Measure steward, endorsement	Numerator	Denominator	Data source	Analytic approach
Evaluation Question 1: Does the demonstration increase access to and utilization of SUD treatment services?						
Demonstration Goal: Increased rates of initiation and engagement in treatment for OUD and other SUDS **Evaluation Hypothesis:** The demonstration will increase the percentage of beneficiaries who are referred and engage in treatment for OUD and other SUDs						
Primary Driver 1 (Increase rates of IET for OUD and other SUDs)	Initiation and engagement with alcohol and other drug dependence treatment	NQF #0004	Number of members who initiated treatment through inpatient, intensive outpatient, residential, outpatient, telehealth, or MOUD within 14 days of diagnosis	Members who were diagnosed with a new episode of alcohol or drug dependency during the first 10.5 months of the measurement year	MODRN (claims data)	Summary statistics with comparisons to MODRN states
Secondary Driver A (Increase supply and capacity of Medicaid treatment system)	Supply of buprenorphine waivered prescribers relative to the state population	None	Number of providers (physicians, nurse practitioners, and physician assistants) who received DATA 2000 waivers from DEA to prescribe buprenorphine	Total population of state	DEA list of waivered prescribers	Difference-in-difference approach that controls for Medicaid expansion across states
	Supply of buprenorphine waivered prescribers who treat Medicaid patients	None	Number of providers (physicians, nurse practitioners, and physician assistants) who received DATA 2000 waivers from DEA to prescribe buprenorphine, and had at least one claim for Medicaid prescription	Number of Medicaid members	DEA list of waivered prescribers linked to Medicaid claims data	Interrupted time-series
	Number of specialty treatment providers who accept Medicaid payment	None	Number of facilities who accept Medicaid payment	Total number of facilities	National Survey of Substance Abuse Treatment Services (N-SSATS)	Difference-in-difference approach that controls for Medicaid expansion across states

Driver	Measure description	Measure steward, endorsement	Numerator	Denominator	Data source	Analytic approach
	Number of providers who are providing services at each ASAM level of care	None	Number of unique providers billing for ARTS services at different ASAM levels		Medicaid claims data	Interrupted time series
	Number of buprenorphine waivered prescribers with patient limits at 75, 100, and 250	None	Number of providers (physicians, nurse practitioners, and physician assistants) who received waivers from DEA to prescribe buprenorphine at patient limits of 75, 100, and 250	Total population of state	DEA list of prescribers linked to Medicaid claims data	Difference-in-difference approach that controls for Medicaid expansion across states
	Median number of Medicaid members receiving prescriptions per prescriber who accepts Medicaid	None	Total number of Medicaid patients receiving buprenorphine prescriptions from waivered prescribers	Total number of waivered prescribers who had any Medicaid patients	DEA list of prescribers linked to Medicaid claims data	Interrupted time-series

Driver	Measure description	Measure steward, endorsement	Numerator	Denominator	Data source	Analytic approach
Demonstration Goal: Reduce utilization of emergency departments and inpatient hospital settings through improved access to a continuum of services **Evaluation Hypothesis:** The demonstration will decrease the rate of emergency department and acute inpatient stays.						
Primary Driver 2 (Reduced utilization of emergency department and inpatient hospital	Emergency department visits for SUD and OUD, per 1000 member months	MODRN	The number of ED visits with SUD/OUD in any diagnosis field during the measurement period	Cumulative number of months members enrolled in Medicaid during the measurement period	MODRN (Medicaid claims data)	Summary statistics with comparisons to MODRN states

settings for SUD treatment						
	Inpatient admissions for SUD and OUD, per 1000 member months	MODRN	The number of inpatient admissions with SUD/OUD in any diagnosis field during the measurement period	Cumulative number of months members enrolled in Medicaid during the measurement period	MODRN (Medicaid claims data)	Summary statistics with comparisons to MODRN states
	Rate of SUD-related admissions for the population	None	Number of inpatient admissions with SUD/OUD in any diagnosis field during the year	Number of people in the state	HCUP Fast Stats	Difference-in-difference approach that controls for Medicaid expansion across states
Secondary Driver B (Expand coverage across continuum of care)	Percent of members with SUD/OUD using ARTS services, by type of service	None	Number of members using ARTS services by ASAM level and type of service (based on billing code)	Number of members with OUD	Medicaid claims data	Interrupted time-series
	Percent of members with OUD who receive MOUD treatment	CMS Adult Core Measures	Members with OUD who received MOUD treatment	Members with OUD	MODRN (Medicaid claims data	Summary statistics with comparisons to MODRN states
Driver	**Measure description**	**Measure steward, endorsement**	**Numerator**	**Denominator**	**Data source**	**Analytic approach**
Demonstration Goal: Increase adherence to and retention in treatment **Evaluation Hypothesis:** The demonstration will increase adherence to and retention in treatment						
Primary Driver 3 (Increase adherence to and retention in treatment)	Continuity of pharmacotherapy for OUD	NQF #3175	Number of members who have at least 180 days of continuous pharmacotherapy with a medication prescribed for OUD without a gap of more than 7 days	Individuals who had a diagnosis of OUD and at least one claim for an OUD medication	MODRN (Medicaid claims data)	Summary statistics with comparisons to MODRN states

	Length of an episode of outpatient treatment	None	Total number of days in treatment for an episode, defined as having at least 2 treatment claims in a month. Start and end of an episode based on not having any treatment claims in 3 months prior to start or 3 months after last claim for an episode	Number of members receiving treatment	Claims data	Interrupted time series
	Average length of stay in treatment, by service setting	None	Number of days in treatment between admission and discharge date	Number of treatment episodes	Treatment Episode Data Set	Difference-in-difference approach that controls for Medicaid expansion across states
	Percent of episodes in which treatment was completed	None	Number of discharges in which the reason for discharge was "treatment completed"	Number of discharges	Treatment Episode Data Set	Difference-in-difference approach that controls for Medicaid expansion across states

Driver	**Measure description**	**Measure steward, endorsement**	**Numerator**	**Denominator**	**Data source**	**Analytic approach**
Evaluation Question 2: Does the demonstration improve quality of treatment through improved care coordination of services						
Demonstration Goal: Reduce readmissions to the same or higher levels of care **Evaluation Hypothesis:** The demonstration will decrease the rate of readmissions to the same or higher level of care						
Primary Driver *4* (Reduce readmissions to the same or higher level care for SUD	30 day readmission rates to same ASAM level 3 service or higher	None	Number of members admitted to ASAM 3 or 4 level of care within 30 days of discharge from a prior stay at the same level	Members who were discharged from ASAM 3 level of care for SUD	Claims	Interrupted time-series
Secondary Driver C (Improved transitions between	Number of members discharged from ASAM 3 services who receive	None	Number of members who received any lower level of ASAM care or pharmacotherapy within	Members who were discharged from ASAM 3	Claims	Interrupted time-series

Driver	Measure description	Measure steward, endorsement	Numerator	Denominator	Data source	Analytic approach
different levels of care)	followup care within 30 days of discharge		30 days of discharge from ASAM 3 stay	level of care for SUD		
	Number of members discharged from ASAM level 4 service who receive followup care within 30 days of discharge	None	Number of members who received any lower level of ASAM care or pharmacotherapy within 30 days of discharge from ASAM 4 stay	Members who were discharged from ASAM 4 level of care for SUD		Interrupted time-series
	Number of members with SUD/OUD-related emergency department visit who receive followup care within 7 and 30 days	NCQA-FUA-AD	Number of ED visits with a principal diagnosis of SUD/OUD that had a followup visit for treatment with a primary diagnosis of SUD/OUD with 7 (and 30) days of the visit	Number of ED visits with a principal diagnosis of SUD/ OUD	MODRN (Medicaid claims)	Summary statistics with comparisons to MODRN states
Demonstration Goal: Improve access to care for physical health conditions among beneficiaries **Evaluation Hypothesis:** The demonstration will increase the percentage of beneficiaries with SUD who receive treatment for co-morbid conditions						
Primary Driver *5* (Improve access to care for co-morbid physical health conditions among beneficiaries with SUD	Any use of ambulatory or preventive care services	None	Members who had an ambulatory care or preventive care visit without a principal or secondary diagnosis of SUD/OUD	Members with a diagnosis of SUD/OUD	Claims	Interrupted-time series
	Controlling high blood pressure	NCQA (CMS Core indicators)	Members with OUD/SUD who received treatment for high blood	Members with a diagnosis of SUD/OUD	Claims	Interrupted-time series
	Comprehensive diabetes care	NCQA (CMS Core Indicators)	Members with OUD/SUD who received treatment for diabetes	Members with a diagnosis of SUD/OUD	Claims	Interrupted-time series
	Diabetes short-term complications admission rate	NCQA (CMS Core Indicators)	Members with OUD/SUD who had inpatient admission related to	Members with a diagnosis of SUD/OUD	Claims	Interrupted-time series

Driver	Measure description	Measure steward, endorsement	Numerator	Denominator	Data source	Analytic approach
			complications from diabetes			
	Members with flu vaccinations	NCQA (CMS Core indicators)	Members with OUD/SUD who received flu vaccination	Members with a diagnosis of SUD/OUD	Claims	Interrupted-time series
	Screening for HIV, HCV, HBV among enrollees with an OUD diagnosis	MODRN	Members with SUD/OUD who have at least one claim for HIV/HBV/HCV screening during the measurement year	Members with a diagnosis of SUD/OUD	MODRN (Medicaid claims)	Summary statistics with comparisons to MODRN states
	Received counseling or psychotherapy for mental health condition	None	Members with SUD/OUD with visit for counseling/psychotherapy for mental health condition other than SUD/OUD	Members with a diagnosis of SUD/OUD	Claims	Interrupted-time series
Secondary Driver D (Greater use of care coordination services among treatment providers)	Number of members with claim for care coordination or case management service related to SUD	None	Number of members with SUD/OUD who had a claim for care coordination or case management	Number of members with SUD/OUD	Claims	Interrupted-time series analysis
	Members who received help with other health and social needs	None	Members who reported receiving help with other medical problem, mental health problem, or assistance with food or housing at their SUD treatment provider	Members with SUD who are receiving treatment	ARTS member survey	Cross-sectional analysis

Driver	Measure description	Measure steward, endorsement	Numerator	Denominator	Data source	Analytic approach
Evaluation Question 3: Are rates of opioid-related overdose deaths impacted by the demonstration?						
Demonstration Goal: Reduction in overdose deaths, particularly those due to opioids. **Evaluation Hypothesis:** The demonstration will decrease the rate of overdose deaths due to opioids.						
Purpose (Reduce overdose fatalities related to SUD)	Rate of opioid-related overdose deaths, among people with Medicaid coverage in past year	None	Number of fatal drug overdoses due to opioids among people enrolled in Medicaid	Number of Medicaid members	Cause of death data linked to claims	Difference-in-difference analysis comparing within state Medicaid overdose rate to non-Medicaid overdose rate
	Rate of overdose deaths due to other substances among people with Medicaid coverage in past year	None	Number of fatal overdoses due to substances other than opioids	Number of Medicaid members	Cause of death data linked to claims	Difference-in-difference analysis comparing within state Medicaid overdose rate to non-Medicaid overdose rate
	Rate of drug overdoses in the Virginia population	None	Number of fatal overdoses due to drugs and alcohol	State population	Vital Statistics from the Center for Disease Control	Difference-in-difference approach that controls for Medicaid expansion across states

Evaluation Question 4: How do costs for SUD-related and non-SUD-related services change over the evaluation period?						
Evaluation Hypothesis: The demonstration will increase IMD SUD costs and outpatient SUD treatment costs and decrease SUD-related emergency room visit and inpatient stay costs						
	Total costs per-member per month (PMPM). Total and federal costs will be calculated	CMS SUD Evaluation Design Guidance, Appendix C	Total costs for members from claims data (inpatient, outpatient, pharmacy, long-term care, and capitated payments to managed care organizations); costs from Institutions for Mental Diseases (IMD); and administrative costs.	Total member months in quarter	Claims	Interrupted-time series analysis
	Total costs PMPM related to diagnosis and treatment for SUD	CMS SUD Evaluation Design Guidance, Appendix C	Total payments summed across all diagnosis and treatment-related claims in quarter. Total costs will be the sum of SUD-IMD costs, other SUD costs, and non-SUD costs.	Total member months in quarter	Claims	Interrupted-time series analysis
	Total costs PMPM for residential SUD treatment (IMD)	CMS SUD Evaluation Design Guidance, Appendix C	IMD costs reported by states with SUD diagnosis and/or procedure codes	Total member months in quarter	Claims	Interrupted-time series analysis
	Total costs PMPM for non-IMD SUD treatment	CMS SUD Evaluation Design Guidance, Appendix C	Costs with SUD diagnosis and/or procedure codes relating to	Total member months in quarter	Claims	Interrupted-time series analysis

Evaluation Question 4: How do costs for SUD-related and non-SUD-related services change over the evaluation period?						
Evaluation Hypothesis: The demonstration will increase IMD SUD costs and outpatient SUD treatment costs and decrease SUD-related emergency room visit and inpatient stay costs						
			outpatient treatment, inpatient treatment, pharmacy, and long-term care			
	Total non-SUD costs PMPM	CMS SUD Evaluation Design Guidance, Appendix C	Costs without SUD diagnosis and/or procedure codes relating to outpatient treatment, inpatient treatment, pharmacy, and long-term care	Total member months in quarter	Claims	Interrupted-time series analysis
	Source of treatment cost drivers – Total PMPM	CMS SUD Evaluation Design Guidance, Appendix C	Total source of treatment costs drivers include the sum of: non-ED outpatient costs, ED outpatient costs, inpatient costs, pharmacy costs, and long-term care costs.	Total member months in quarter	Claims	Interrupted-time series analysis
	Source of treatment cost drivers – *Non-ED outpatient* costs PMPM	CMS SUD Evaluation Design Guidance, Appendix C	Costs with or without SUD diagnosis and/or procedure codes relating to non-ED outpatient treatment	Total member months in quarter	Claims	Interrupted-time series analysis
	Source of treatment cost drivers –*ED outpatient* costs PMPM	CMS SUD Evaluation Design Guidance, Appendix C	Costs with or without SUD diagnosis and/or procedure codes relating to ED outpatient treatment	Total member months in quarter	Claims	Interrupted-time series analysis

Evaluation Question 4: How do costs for SUD-related and non-SUD-related services change over the evaluation period?						
Evaluation Hypothesis: The demonstration will increase IMD SUD costs and outpatient SUD treatment costs and decrease SUD-related emergency room visit and inpatient stay costs						
	Source of treatment cost drivers – *Inpatient* costs PMPM	CMS SUD Evaluation Design Guidance, Appendix C	Costs with or without SUD diagnosis and/or procedure codes relating to inpatient treatment	Total member months in quarter	Claims	Interrupted-time series analysis
	Source of treatment cost drivers – *Pharmacy* costs PMPM	CMS SUD Evaluation Design Guidance, Appendix C	Costs with or without SUD diagnosis and/or procedure codes relating to pharmacy utilization	Total member months in quarter	Claims	Interrupted-time series analysis
	Source of treatment cost drivers – *Long-term care* costs PMPM	CMS SUD Evaluation Design Guidance, Appendix C	Costs with or without SUD diagnosis and/or procedure codes relating to long-term care utilization	Total member months in quarter	Claims	Interrupted-time series analysis
	Total costs PMPM for SUD-related treatment services, by ASAM level of care	None	Total payments summed across claims stratified by ASAM level of care	Total member months in quarter	Claims	Interrupted-time series analysis
	Total costs PMPM for MOUD treatment	None	Total payments summed across claims for MOUD treatment services	Total member months in quarter	Claims	Interrupted-time series analysis
	Total costs PMPM for SUD-related acute inpatient and ED services	None	Total payments across claims for acute inpatient and ED services with a diagnosis of SUD	Total member months in quarter	Claims	Interrupted-time series analysis

3.0 METHODOLOGY

3.1 Overview of Design and Data Sources

As stated above, the evaluation of the ARTS demonstration renewal has three main goals: 1) to extend the evaluation of the ARTS demonstration beyond the first two years after implementation (April 2017 through March 2019) to include the years 2019-2024; 2) to strengthen conclusions about the impact of ARTS by comparing the trends before and after ARTS implementation to those of other states that did not implement similar programs; and 3) to examine the cumulative impact of ARTS and Medicaid expansion on addiction treatment services in Virginia. Below we summarize the approach to each of these goals and how they relate to the hypotheses and research questions described in Section 2.0. Section 3.2 describes in greater detail the analytical approaches that will be used to address each of the goals described below.

Goal 1: Examine the impact of ARTS beyond the first two years of the demonstration.

Under the original ARTS demonstration, our evaluation examined changes in measures of SUD treatment access, utilization, provider supply, and outcomes between the year prior to ARTS implementation (April 1, 2016 to March 30, 2017) and the two years following implementation of ARTS (April 1, 2017 through March 30, 2019). We will extend the post-implementation period of the evaluation to include the years 2019 through 2024 for selected measures. To simplify the analysis, and to also ensure consistency across measures and with other aspects of the evaluation described below, we will examine change based on a calendar year (that is, annual, semi-annual, or quarterly measures of utilization based on a calendar year) rather than based on the "ARTS year", which overlapped with two calendar years.

Most analyses during the first two years of the demonstration were based on an analysis of Virginia Medicaid claims data to observe trends in SUD treatment access, utilization, and outcomes. For measures in which it is difficult or infeasible to obtain within-state or cross-state comparison groups, we will use interrupted time-series analyses (described below) to examine changes between the ARTS pre-implementation period (2015 and 2016) and the post implementation period (2018 to 2023). This approach will be used primarily to assess the following components of the evaluation:

- Secondary Driver B (Expand coverage across the entire continuum of care): Number of providers billing for ARTS services at each ASAM level; member utilization by ASAM level of care.

- Primary Driver 4 (Reduce readmissions to the same or higher level of care): 30 day readmission rates to same ASAM level 3 or higher

- Secondary Driver C (Facilitate transitions between different levels of treatment): Number of members discharged from ASAM 3 or ASAM 4 services who receive follow-up care within 30 days of discharge).

- Primary Driver 5 (Improve access to co-morbid physical health conditions): Use of primary or preventive for selected chronic conditions.

- Secondary Driver D (Improve care coordination): Number of members with a claim for care coordination or case management services.

As Virginia expanded eligibility for Medicaid coverage on January 1, 2019 to include adults with family incomes at 138 percent of poverty or less, our analysis will also account for the fact that the Virginia Medicaid population changed substantially in both size and composition in 2019. Our evaluation will track changes in the overall increase in the number of Medicaid members with a SUD diagnosis and the number utilizing various ARTS services resulting from Medicaid expansion in 2019.

More importantly, the evaluation will also account for the fact that members enrolled in Medicaid expansion could differ from other Medicaid members in ways that could affect estimates of the rate of Medicaid members receiving SUD treatment as well as other measures in Table 1. For example, analysis based on the first three months of Medicaid expansion in Virginia shows that Medicaid expansion members with SUD are more likely to be male, somewhat younger in age, and less likely to have physical or mental health co-morbidities compared to adult Medicaid members with SUD from other eligibility groups. Interrupted time-series analyses of the impact of ARTS on rates of access, utilization, and outcomes for the Medicaid population will account for potential changes in the characteristics of the Medicaid population resulting from expanded eligibility in 2019.

The current evaluation builds upon prior evaluation work by also incorporating cost information to understand whether the ARTS benefit increased SUD-related outpatient treatment costs and reduced SUD-related emergency room visit and inpatient stay costs. Following CMS SUD Evaluation Design, Appendix C, total costs, costs related to SUD diagnosis and treatment, and sources of treatment cost drivers for members in the target population will be analyzed. Generally, managed care organization paid amounts from Medicaid claims data will be used as the measure of costs for each type of service (e.g., inpatient, long-term care). For each of these services costs will include total payments for all claims related to the service.

Goal 2 – Strengthen conclusions about the causal impact of ARTS by comparing Medicaid members in Virginia to Medicaid members in other states.

Although prior evaluation results showed large increases in access to and utilization of addiction treatment services in the two years following implementation of ARTS, most of the analysis did not include the use of comparison groups – that is, individuals either within or outside of the state that are similar to Virginia Medicaid members with SUD, but who are unaffected by the ARTS reforms. The inclusion of such comparison groups can greatly strengthen conclusions about the impact of ARTS because they permit an estimate of the counterfactual, or how SUD treatment and access would have changed for Virginia Medicaid had ARTS not been implemented. Such comparisons are difficult because: 1) ARTS was implemented statewide and for all Medicaid members on April 1, 2017, thereby greatly limiting the use of within-state comparisons; 2) lack of available data on Medicaid members in other states with which to make comparisons on measures of SUD treatment access and utilization during the same time period; and 3) difficulty in identifying states that are similar to Virginia prior to ARTS implementation, but who remained static in terms of SUD policy throughout the ARTS evaluation period.

One exception was an analysis of the impact of ARTS on acute hospital emergency department and inpatient utilization, which utilized Virginia Medicaid members who did not

have SUD as a comparison group.[5] While our analysis showed that this was a reasonable comparison for this particular analysis, the non-SUD Medicaid population in Virginia is a limited comparison group that is unlikely to be useful for other analyses described in this evaluation plan.

Since the initial evaluation plan was developed in 2016, other data sources have become available that permit more informative comparisons with other states. For this evaluation, we will leverage Virginia's participation in the Medicaid Outcomes Distributed Research Network (MODRN) to compare changes on key measures of SUD treatment access, utilization, and quality of care for Virginia with Medicaid members in other states. MODRN is a multi-state collaborative effort consisting of 13 Medicaid state agencies and university partners to facilitate standardized measures based on state Medicaid claims data for facilitating cross-state comparisons of opioid-related research. In addition to Virginia, MODRN states include: Delaware, Kentucky, Maine, Maryland, Massachusetts, Michigan, North Carolina, Ohio, Pennsylvania, Tennessee, West Virginia, and Wisconsin. With the exception of Tennessee and North Carolina, all MODRN states have expanded Medicaid, with Virginia, expanding in 2019, the most recent to expand. Approximately one-in-four Medicaid members in the United States are enrolled in Medicaid programs participating in the MODRN collaborative with the 11 initial MODRN states accounting for 16.3 million (22%) Medicaid enrollees. MODRN states are largely contiguous and include 6/10 states ranking highest in overdose deaths in the country (e.g., Ohio, West Virginia). Moreover, most of states in the MODRN collaborative have SUD waivers approved or pending.

MODRN includes a number of common quality and performance metrics developed by the National Quality Forum and other sources that are being constructed for each year starting with 2014. The following measures being proposed for this evaluation will be based on MODRN:

- Initiation and engagement with treatment for alcohol, opioid, and other drug use dependence (Primary Driver #1).
- Utilization of emergency department and inpatient hospital settings for SUD (Primary Driver #2).
- Rates of Medications for Opioid Use Disorder (MOUD) use for members with OUD (Primary Driver #3).
- Continuity of pharmacotherapy (Primary Driver #3)
- Screening for HIV, HCV, HBV among members with OUD diagnosis (Primary Driver #5)
- Follow-up care within 7 and 30 days of an emergency department visit related to SUD (Secondary Driver C).

MODRN facilitates cross-state comparisons of these measures through a common data model that standardizes the definition and construction of these measures across states. Thus, MODRN permits comparisons of changes in these measures in Virginia before and after implementation of the ARTS demonstration with changes on the same measures in other states. These comparisons will allow for stronger conclusions about the impact of ARTS on SUD treatment access and quality. A more detailed discussion of the analysis conducted through the MODRN is provided below.

[5] Barnes et al., *op cit*

Goal 3. Examine the cumulative impact of ARTS and Medicaid expansion on addiction treatment services in Virginia.

Virginia is unique among state Medicaid programs in that a comprehensive reform of addiction treatment services in 2017 was followed by expanded eligibility for Medicaid in 2019. The combination of expanded Medicaid coverage of addiction treatment services and expanded eligibility for Medicaid is expected to have substantial effects on population-level estimates of SUD treatment access, utilization, and outcomes for Virginia. Using Medicaid-only data sources (such as claims data) does not permit a complete assessment of the impact of Medicaid expansion on the Virginia population, since these data only reflect people enrolled in Medicaid before and after expansion. Data sources that are representative of the entire population – including uninsured people -- are necessary to assess the impact on SUD treatment when uninsured people gain coverage. Therefore, we will utilize national data sources to examine the combined impact of ARTS and Medicaid expansion on population-level estimates of supply of SUD providers, access to treatment, quality of treatment, and outcomes by comparing the changes in these measures for Virginia relative to other states and the overall U.S.

We will assess the combined impact of ARTS and Medicaid expansion on supply and capacity of buprenorphine prescribers (Secondary Driver A) through the Drug Enforcement Administration (DEA) database on providers who received waivers to prescribe buprenorphine through the 2000 Drug Addiction Treatment Act (DATA); we have obtained the complete DEA list of all providers that had waivers from 2002 (the beginning of the program) through 2020. These data include counts of waivered prescribers at different patient limits (30, 100, 275), license type (including nurse practitioners and physician assistants since 2017), and location. To assess changes in supply and capacity of waivered prescribers, we will construct state and county-level measures of the number of waivered prescribers relative to the population, as well as total patient capacity of waivered prescribers.

Secondary driver A will also be addressed with the National Survey of Substance Use Treatment Services (N-SSATS), an annual census of treatment providers conducted by the Substance Abuse and Mental Health Services Association (SAMHSA). Information is collected on the location, organization, structure, services, payers (including Medicaid) and utilization of substance abuse treatment facilities in the United States. State identifiers are included on public use files, permitting a comparison of trends in Virginia with other states and the overall U.S. We have already acquired data for 2015 through 2019, and will acquire data for 2020 when it becomes available (likely in Fall, 2021). To assess changes in the supply of treatment facilities we will construct state-level measures of the number of SUD treatment facilities of different types (e,g, residential, IOP, outpatient), the number of treatment facilities offering MOUD treatment, and the number of treatment facilities accepting Medicaid payment. NSSATS data in the odd years (2015, 2017, 2019) provide more detail on number of beds and use rates (number of patients in treatment / number of beds) which we will use to assess changes in treatment capacity.

The Treatment Episode Data Set (TEDS) will be used to examine the combined impact of ARTS and Medicaid expansion on quality of treatment services. Compiled by SAMHSA, TEDS summarizes information about the characteristics and outcomes of treatment for alcohol and/or drug use among clients aged 12 years and older in facilities that report to individual state administrative data systems. To address Primary Driver 3 (improve adherence to treatment for OUD and other SUDs), we will use the TEDS to assess the combined impact of ARTS and Medicaid expansion on changes in the length of treatment episodes and the rate at which

treatment is completed. Using data from the TEDS discharge file, we will construct state-level measures of the average length of stay, as well as the percent of discharges where the reason for treatment was "treatment completed", and a second indicator for "dropped out of treatment." The analysis will control for changes in other characteristics of treatment episodes using information from the TEDS admission and discharge files, such as patient characteristics, treatment setting, and other characteristics of treatment. Due to the lag in the availability of the TEDS data, it is anticipated that this analysis will be completed in 2023, when 2019 data become publicly available.

The combined impact of ARTS and Medicaid expansion on OUD-related inpatient use (Primary Driver 2) will be assessed using the "Fast Stats" online data tool from the Health Care Cost and Utilization Project (HCUP). This tool provides state-level estimates of the rates of inpatient utilization (per 100,000 people) since 2010 by quarter. Estimates include all inpatient stays (for all payers) as well as for specific types of inpatient stays, including those related to an OUD diagnosis. Using this tool, we will construct a database of state and quarter specific estimates of the rate of OUD-related inpatient stays between 2016-2019. We will also link state-level information from the American Community Survey (to control for changes in population characteristics), and state-level estimates of self-reported OUD prevalence from the National Survey of Drug Use and Health (to control for changes in prevalence) that are publicly available. Availability of state-level inpatient admissions data through the HCUP Fast Stats varies by state. As of this writing, data through the first quarter of 2019 are available for Virginia. We will begin analysis when Virginia and at least 10-15 other states (non-expansion as well as selected others) have data available through 2019, likely in late 2022 or early 2023.

Finally, we will assess the combined impact of ARTS and Medicaid expansion on rates of fatal drug overdoses in Virginia by obtaining data from National Vital Statistics System maintained by the Center for Disease Control and Prevention on numbers and rates of fatal drug overdoses by state and year. As geographic identifiers are not available on public use files, we will apply to the National Center for Health Statistics to the restricted use files for the multiple cause of death (MCOD) micro-data files. These will permit a comparison of quarterly changes in the rate of fatal drug overdoses for Virginia (and Virginia counties) with other comparison states. Data are currently available for 2016 through 2019. We will apply to obtain the restricted use files in 2021.

3.2 Analytic Approaches**

Goal 1*: *Interrupted Time Series Analyses. As described above, measures for which we have data only on Virginia Medicaid members, including claims-based measures of utilization and costs that are specific to Virginia Medicaid, will rely primarily on a summary-level interrupted time series analyses (ITS) with the unit of time measured in quarters to allow for sufficient variation in outcomes prior to ARTS implementation (~8 quarters) and post (~30 quarters). For these analyses, the unit of analysis is the summary measure (e.g. a ratio or percentage) at a given time period rather than individual's outcome at the given time period. Assume an outcome of interest Y, across $t = 0 \ldots, m$ time periods. Let Y_t represent the outcome at time t, T represents the time elapsed, and W_t represent an indicator variable specifying whether or not time T is part of the post-ARTS intervention period in Virginia. The interrupted time series model is given by:

$$Y_t = \beta_0 + \beta_1 T + \beta_2 W_t + \beta_3 W_t * T + \varepsilon_t$$

where β_0 and β_1 represent the pre-ARTS intercept and slope respectively, and β_2 and β_3 represent the change in the intercept and slope respectively during the post-intervention period.

The parameter ε_t represents random error in the time series at time *t*. The estimates β_2 and β_3 are the causal parameters of the interest in the model.

As discussed above, Medicaid expansion (beginning in January 1, 2019) will likely affect rates of SUD treatment access and quality because expansion enrollees differ in important ways from members enrolled through traditional eligibility criteria. To account for this, the framework will be extended to examine changes in three time periods in Virginia to consider post-expansion effects (i.e., pre-ARTS, post-ARTS but pre-expansion, and post-ARTS and post-expansion). In this case, additional parameters for the change in intercept and slope in the third time period would also be estimated giving the model the following form:

$$Y_t = \beta_0 + \beta_1 T + \beta_2 W_{1t} + \beta_3 W_{1t}*T + \beta_4 W_2 t + \beta_5 W_2 t*T + \varepsilon_t$$

Where W_{1t} and W_{2t} are indicators of the second (post-ARTS but pre-expansion) and third (post-ARTS and post-expansion) time periods. The coefficients β_2 and β_3 represent the changes in the second time period relative to the first (post-ARTS but pre-expansion versus pre-ARTS) and β_4 and β_5 represent the changes in the third time period relative to the first (post-ARTS and post-expansion versus pre-ARTS). To account for autocorrelation, Newey-West standard errors will be used in ITS models [ref].[6]

Goal 1: Cross-sectional analyses of ARTS member survey data. An example of the cross-sectional analyses the evaluators will conduct from ARTS member survey data follows. To assess whether members receiving ARTS services report receiving care coordination, specifically help with other health and other social needs as the ARTS intervention progresses (Secondary Driver E, Table 1), responses from multiple waves of the ARTS member survey will be pooled (see below for more detailed description of ARTS member survey). To date, two survey periods have already been fielded (Wave 1 – January – March 2020; Wave 2 October 2020 – March 2021), and subsequent waves are expected to be fielded in 2022 and 2023. Each wave is a cross-section of members receiving ARTS services who are randomly sampled and then sent mail surveys. As there is no pre-intervention survey data, descriptive (non-experimental) analyses will be required. Examples of cross-sectional analyses that will be leveraged from these data include linear probability models/logistic regressions estimating the adjusted probability/likelihood of whether or not members receiving ARTS services also report receiving assistance with other health and social needs (outcomes; Y_{it}).

$$Y_{it} = \beta_1 X_{it} + YEAR_t + \varepsilon_{it}$$

These analyses will be adjusted for covariates (X_{it}) including member characteristics (sex, race/ethnicity, eligibility group, age), education, psychological distress, polysubstance use, employment, housing and food insecurity, and survey time period ($YEAR_t$). Importantly, the first wave of the ARTS member survey was fielded immediately prior to the outbreak of the COVID-19 pandemic, with the second wave fielded during the pandemic allowing for comparisons in care coordination for non-substance use services before and during the pandemic.

[6] Newey, W. K., & West, K. D. (1986). A simple, positive semi-definite, heteroskedasticity and autocorrelation consistent covariance matrix.

Goal 1: Difference-in-difference analysis comparing within state Medicaid overdose rate to non-Medicaid overdose rates. To evaluate whether the ARTS intervention shifted rates of opioid and non-opioid overdose deaths in Virginia, a difference-in-difference design will be used. Medicaid claims will be linked to Virginia Department of Health cause of death data to identify overdose deaths among members covered by Medicaid in the previous year creating a binary Medicaid coverage variable (covered by Medicaid in the past year; not covered by Medicaid in the past year). Data will be aggregated at the quarter level and differences in overdose deaths across Medicaid coverage vs. no Medicaid coverage, pre vs. post ARTs intervention period, and the interaction of the two will be estimated separately for opioid and non-opioid related overdose deaths. Control variables available on death certificates in Virginia include sex, age, race/ethnicity, and marital status. These and other potential confounders that can be included in the analyses will be adjusted for.

Our difference-in-difference approach to estimate reductions in overdose rates (Y_{it}) in the pre vs. post ARTS benefit period ($ARTS_t$) were higher among those with Medicaid coverage ($Medicaid_{it}$) than those without will take the following form where *i* denotes the individual and *t* denotes year:

$$Y_{it} = \beta_1 ARTS_t + \beta_2 Medicaid_{it} + \beta_3 ARTS_t * Medicaid_{it} \quad \beta_4 X_{it} + YEAR_t + \varepsilon_{it}$$

The coefficient β_3 is the difference-in-difference estimate of the mean difference in overdoses between those in Virginia Medicaid and those not covered by Mediciad in the post-ARTS period compared to the pre-ARTS period and X_{ist} denotes individual-level demographic characteristics described above.

Goal 2: Summary statistics using MODRN to compare Virginia with other states

Although a difference-in-differences analysis is the conventional approach to examining the impact of a state policy or program relative to that of a comparison group, this approach requires linkages of person-level data for both the intervention and comparison groups. The sharing of person-level data is not permitted in the MODRN collaborative as data use agreements among the states in MODRN permit only aggregate level comparisons across the participating states. Additionally, as noted above, 11 of the 13 MODRN states have expanded Medicaid and most of states in the MODRN collaborative have SUD waivers approved or pending, adding additional challenges beyond the inability to obtain person-level data, to using MODRN states as a counterfactual in a traditional difference-in-difference approach. Therefore, a summary statistics will be used to compare SUD/OUD service utilization and quality measures between Virginia and other MODRN states. These summary statistics can be adjusted in each MODRN state for treatment group, age group, gender, race ethnicity, rural, and eligibility category, among other covariates. A table detailing hypothetical state adjusted averages in the pre- vs. post-ARTS period in Virginia and two other states (State A, State B) in quarterly rates of OUD-related emergency department use is presented below. Rather than be used to generate causal estimates per se, the proposed analytic approach using MODRN data will help strengthen other causal models proposed in this evaluation (e.g., difference-in-difference approach controlling for Medicaid expansion) by allowing the evaluators to descriptively compare performance pre- and post-ARTS in Virginia to the average performance in these periods across all other MODRN states.

Table 1. Example of hypothetical results of pre- vs post-ARTS adjusted summary statistics.

State	Treatment	Quarterly rate of OUD-related ED Use	SE	p
Virginia	Pre-ARTS	Ref		
	Post-ARTS	-1.2900	-0.0561	0.0001
MODRN State A	Pre-ARTS	Ref		
	Post-ARTS	-0.1131	-0.0476	0.0051
MODRN State B	Pre-ARTS	Ref		
	Post-ARTS	-0.8519	-0.0435	0.0001

Goal 3. Using a difference-in-difference approach that controls for Medicaid expansion across states to estimate the combined impact of ARTS and Medicaid expansion on SUD treatment access and outcomes for the Virginia population.

We will use a difference-in-difference approach that controls for Medicaid expansion across states to assess the combined impact of ARTS and Medicaid expansion on access to addiction treatment services in Virginia. As described above, these analyses will be based on national data sources that include the entire population, and not just the population enrolled in Medicaid. Our primary empirical model will take the following form:

$$Y_{ist} = \beta_1 ARTS_{st} + \beta_2 Expansion_{st} + \beta_3 Expansion_{st} * ARTS_{st} + \beta_4 X_{ist} + STATE_s + YEAR_t + \varepsilon_{ist}$$

where *i* denotes the individual, *s* denotes the state, and *t* denotes year. In this model, $ARTS_{st}$ is an interaction represented as a binary variable equal to 1 if the individual lives in Virginia, the only state with the ARTS policy, and was observed in the data in 2017, when the policy was implemented, or later. Similarly, $Expansion_{st}$ is an interaction equal 1 if the individual was observed in state *s* that adopted the ACA's Medicaid expansion in year *t*. The variable $Expansion_{st} * ARTS_{st}$ indicates whether an individual lives in Virginia in 2019 or after. X_{ist} denotes individual-level demographic characteristics. State and year fixed effects are denoted by the terms $STATE_s$ and $YEAR_t$.

The estimated coefficient for β_1 represents the mean difference in outcomes between Virginia and other states in the post ARTS period compared to the pre ARTS period, adjusted for individual-level covariates and state and year fixed effects. The coefficients for β_2 provides the mean difference in outcomes between expansion and non-expansion states during the post-expansion period, as compared with the period before expansion. Finally, β_3 is a difference-in-difference coefficient that controls for Medicaid expansion across states and is an estimate of the mean difference in outcomes between Virginia in the post-ARTS, post-expansion period compared to the post-ARTS, pre-expansion period.

We will use linear regression models to facilitate a direct interpretation of the coefficients and estimated Huber–White robust standard errors clustered according to state. Based on these models, we will derive adjusted estimates for Virginia and other comparison groups. For example, an analysis treatment length and completion rates using the TEDS may result in the following table (Table 2) where average length of treatment increases 1.3 days in Virginia ($p<0.05$) after ARTS, relative to the pre ARTS period and compared to changes in other states during the same time. The difference-in-difference approach that controls for Medicaid expansion across states will also be able to test for differences in ARTS effects before versus after Medicaid expansion in Virginia. In the example table below, average length of treatment increases 0.5 days ($p<0.05$) after Virginia's expansion compared to the post ARTS, pre expansion period in Virginia. Across all states, Medicaid expansion, in this example, increases average length of treatment by 1.2 days ($p<0.05$), relative to non-expansion states. Examples using other outcomes (Average MOUD length of treatment, percent completed a treatment episode) available in TEDS are also presented in the table below.

Table 2. Example of estimates to be generated from the difference-in-difference approach that controls for Medicaid expansion across states of the combined impact of ARTS and Medicaid expansion on SUD quality of treatment.

	Average length of treatment (days)	Average length of MOUD treatment (days)	Percent completed an episode of treatment
ARTS	1.3*	2.0*	31%*
Expansion	1.2*	1.3*	23%*
*ARTS*Expansion*	0.5*	0.9*	8%*

*p<0.05. Source: Treatment Episode Data Set, 2015-2020

3.3. Primary Data Collection

Patient experience survey. We will complement the analysis of Medicaid claims and other secondary data with a survey of Medicaid members who use ARTS services. Such a survey is currently being conducted for 2020 and 2021 and includes a stratified random sample of Medicaid members who had a diagnosis for OUD. The main objectives of the ARTS member survey are to: (1) assess patient experiences with the treatment they are receiving, and to understand how these experiences differ by treatment setting (e.g. OBOT, OTP, other outpatient providers); (2) to understand how patient experience with treatment differs by patient factors, such as race/ethnicity, co-morbid mental health problems, and social factors such as food and housing insecurity, social support, and experience with the criminal justice system, and; (3) to better understand the reasons why some members receive a diagnosis of OUD, but do not utilize Medicaid-covered OUD treatment services. An additional goal of the survey that has emerged recently is to assess the impact of the COVID-19 pandemic on members' access to treatment services, and their experience with treatment services.

The current member survey is being fielded in two waves: (1) From January to March, 2020; and; (2) From October 2020 to March 2021. Each wave includes an initial sample of about 5,000 members, with an expected 1,000 completed interviews in each wave (about a 20 percent response rate). A stratified random sample was performed in order to obtain representative samples of members ages 21 and over with diagnosed OUD based on four types of

ARTS service utilization in the previous six months, as identified in the Medicaid claims data: (1) Members diagnosed with an OUD who had at least two claims related to the use of OBOT providers; (2) Members diagnosed with an OUD who did not use OBOT providers, but had at least two claims at OTP providers; (3) Members diagnosed with an OUD who did not use OBOT or OTP providers, but used other outpatient providers for ASAM 1 services; (4) Members who had any diagnosis for OUD in the previous year, but had no claims for any ARTS or other OUD treatment services in the past year. The sample is roughly equally split between the four sampling strata.

The survey questionnaire includes questions from the CAHPS Experience of Care and Health Outcomes (ECHO), which was developed specifically to identify experiences with behavioral health services provided by managed care organizations, as well as other questions designed to understand barriers to treatment, reasons for discontinuing treatment, and the benefits of treatment to member's personal, family, and employment circumstances. We also adapted questions from a survey conducted in Pennsylvania to assess Centers of Excellence providers. These questions assess how the treatment they received affected their ability to stay off drugs or alcohol, their ability to work, relationships with family and friends, social activities, and their ability to find stable housing. Other survey questions assessed their current level of psychiatric distress (using the Kessler 6 index), food and housing security, levels of social support, and experience with the criminal justice system in the previous 12 months.

In addition, since the second wave of the survey began after the onset of the COVID-19 pandemic, we included questions in the second wave that are designed to explicitly assess how the pandemic has affected their ability to get treatment services, including their utilization and access to telehealth services.

Postal addresses are the most consistently reported and accurate contact information in the enrollment data, while telephone numbers are either missing or considered inaccurate for the majority of members. Therefore, the survey is being conducted by mail. Respondents are provided with a $5 incentive in the survey packet that is mailed to them, as well as a stamped envelope with which to return the completed survey. Survey responses are entered into a REDcap database, and converted to SAS datafiles for the purpose of analysis.

The first wave of the survey achieved a response rate of slightly over 20 percent. Differences between survey respondents and nonrespondents on a range of member demographic and claims-based service utilization measures will be assessed to identify potential nonresponse bias. To at least partially correct for any nonresponse bias, survey weights will be constructed using the propensity cell weighting method.

A similar design will be used to field a third wave of the member survey in late 2022 and early 2023, approximately two years after the second wave of the survey is completed. The primary purpose of the third wave of the survey is to assess changes in patient experiences with treatment services since 2020-21, at the height of the COVID-19 pandemic. Of particular interest is whether any changes in member-reported problems with access to care, dis-satisfaction with providers and treatment, psychological distress, and food and housing security experienced during the COVID-19 pandemic have been restored to their pre-pandemic levels (the first wave in early 2020). We will also assess whether disparities in patient experience by treatment setting, race/ethnicity, and other patient factors have narrowed or increased since the first and second waves. We will also consider additional questions on pandemic-related changes to treatment services that are maintained after the end of the pandemic, such as the use of telehealth.

To maximize the ability to assess changes in patient experiences with previous waves, we will use similar sampling and data collection methods as described above, including a mail-based survey with at least 1,000 completed interviews among members with an OUD diagnosis. Although we will allow for some changes to the survey questionnaire to address new areas of interest, the overall structure and length of the questionnaire will be similar to the first two waves in order to minimize the potential that changes in survey responses from previous waves are due to changes in survey design.

Semi-structured interviews with MCO care coordinators. As mentioned above, the ARTS demonstration included a change from a "carve-out" to a "carve-in" model of care for behavioral health services in order to increase coordination between behavioral and physical health services. To facilitate this coordination, the six MCOs employ licensed care coordinators to assist members with identifying addiction treatment services, encouraging follow-up after discharge from acute hospital and residential treatment facilities, and coordinating other physical and social needs of members. To understand the processes and mechanisms by which MCOs managing and coordinating SUD treatment services for Medicaid members, we will conduct a series of semi-structured interviews with licensed care coordinators who are employed by the MCOs. We will interview the care coordinators who are tasked specifically with connecting members to SUD treatment services and facilitating transitions between different levels of treatment. The interviews will focus on four areas: (1) transitions between different levels of ASAM treatment, (2) retaining members in treatment once initiated; (3) coordination of SUD with other behavioral, physical health, and social needs; (4) how care coordination from the MCOs complements, conflicts with, or overlaps with care coordination services provided by many treatment providers, such as Preferred OBOTs.

Semi-structured interviews will be conducted due to the relatively small number of MCO care coordinators that have been identified by DMAS (n=23). We will interview a minimum of 3-4 care coordinators from each of the six MCOs, for a total of 18-20 interviews. Contact information for the care coordinators will be provided by DMAS. In addition, we will interview about 10-12 treatment providers to understand their perspectives on the role of MCO care coordinators in the treatment process, as well as their views on the effectiveness of these roles. We will identify providers likely to have had substantial interactions with MCO care coordinators, such as high volume OBOTs and residential treatment facilities.

All interviews will be recorded and transcribed. Using qualitative research software, transcriptions will be coded by topic, question, MCO, respondent type, geographic area, and other information important for the analysis, and entered into a database. The coding of responses will facilitate analysis by allowing us to query the database to identify responses based on question, topic, and stratified by key respondent characteristics.

3.3 Target and Comparison Populations.

The use of comparison states is being proposed for Goals 2 and 3 of the evaluation. Identifying "ideal" comparison states is difficult because most states have been active throughout the evaluation period in using Medicaid programs to address the opioid epidemic, including changes in benefits and covered services, increasing the supply and capacity of treatment providers, and modifying regulations regarding MOUD treatment. In addition, an increasing number of states have used Section 1115 demonstration waivers for SUD to allow federal Medicaid payments for residential treatment centers that have 16 or more beds, which otherwise

is prohibited under the Institution for Mental Disease (IMD) exclusion. The activity of state Medicaid programs in this area makes it difficult to select an ideal comparison group to represent the "counterfactual", that is, what would have happened in Virginia if the ARTS demonstration had not been implemented.

At the same time, Virginia's ARTS program is unique in that a comprehensive reform and expansion of addiction treatment services for Medicaid members was combined with a Section 1115 waiver, making all Medicaid members eligible April 1, 2017. While other states have implemented similar reforms, they have generally done so over much longer time periods, or prior to the evaluation period for this project. We are not aware of any other states that have combined a Section 1115 Demonstration Waiver for SUD with a comprehension reform of services that was implemented simultaneously and that covered the entire Medicaid population throughout the state.

Use of the MODRN allows us to compare Virginia with other states who differ from Virginia on a number of domains, such as the timing of Section 1115 waiver adoption and implementation, changes made to covered SUD benefits, regulation of MOUD treatment (e.g. use of prior authorization for buprenorphine), as well as changes to other policies related to SUD.

As part of the MODRN project, a detailed inventory of Medicaid policies relating to SUD treatment and outcomes has been conducted for each of the participating states, which will facilitate identification of states in MODRN that are most optimal as comparison groups. For example, while most states in MODRN have adopted SUD demonstration waivers, Virginia was one of the early adopters (implemented in April, 2017), while most other states did not implement their waivers until late 2018 or early 2019. In sum, instead of using a single state that would likely be an imperfect comparison to Virginia, we will use a number of states in MODRN that did not implement reforms on the same timing and scale of ARTS, but may have implemented a number of smaller scale reforms over a longer time period or prior to the evaluation period.

The expansion of Medicaid eligibility less than 2 years after ARTS implementation further distinguishes Virginia from all other states. For the analysis of the combined impact of ARTS and Medicaid expansion, we will have a broader group of states with which to select comparison groups, as the data for this analysis is based on national data sources. As with the analysis of MODRN, we will try to limit comparison states to those that have not implemented large-scale reforms of their Medicaid addiction treatment systems during the evaluation period.

3.4. Assessing the impact of COVID-19

The COVID-19 pandemic has likely had major impacts on Medicaid enrollment, the number of Medicaid members with diagnosed SUD, and utilization of treatment services and outcomes. It is important to assess COVID-19 effects, not only to understand how the pandemic has affected Medicaid members with SUD, but also to understand how COVID-19 affected the demonstration and the ability of this evaluation to assess the impact of the demonstration and Medicaid expansion. We will assess the impact of COVID-19 in several ways/

First, we will split the post-Medicaid expansion period into roughly three periods: (1) 2019, the first year of Medicaid expansion and before the start of the pandemic; (2) 2020-2021, the years of the COVID-19 pandemic at its height, and; (3) 2022-2024, the expected post-pandemic time period. These time periods will be adjusted based on further evidence of when COVID-19 began to affect utilization (e.g. the first quarter of 2020), and when the pandemic is

considered to have largely ended. To assess the cumulative impact of ARTS and Medicaid expansion as described in Section 3.2 above, we will initially limit the post-expansion period to 2019 (and possibly the first quarter of 2020) in order to avoid the confounding effects of COVID-19.

To understand how COVID-19 affected Medicaid members and the demonstration, we will assess changes in the number of Medicaid members, the diagnosed prevalence of SUD and OUD, characteristics of Medicaid members with SUD and OUD, indicators of treatment utilization, quality, and outcomes between the pre-pandemic period (2019), the COVID-19 period (2020-2021), and the post-COVID-19 period (2022-2024). While these analyses will mostly be cross-sectional in nature, we will also examine a cohort of Medicaid members who initiated treatment in late 2019 or early 2020 (prior to the start of the pandemic) to examine the impact of the COVID-19 pandemic on their treatment utilization and outcomes, relative to a cohort of Medicaid members who initiated treatment in 2018 and completed at least one year of treatment prior to the start of COVID-19. Comparing cohorts that received treatment before and during COVID-19 should allow for strong conclusions about how access to and treatment for SUD changed during the pandemic. We

As described above, the three waves of the ARTS member survey are timed (coincidentally) to assess changes in the patient experience with treatment, specifically the pre-pandemic period (January – March 2020), the pandemic period (October 2020 – March 2021) and post-pandemic period (likely late 2022 and early 2023). In addition to changes in measures of patient satisfaction, social and personal outcomes of treatment, and access to services, the survey will also allow us to assess changes in (and control for) indicators of mental health, food and housing insecurity, social support, experience with the criminal justice system, and other patient characteristics among members who use ARTS services.

3.5 Evaluation Period

Our analysis will be organized around three key dates: April 1, 2017 when the ARTS demonstration was first implemented, January 1, 2019 when Medicaid eligibility was expanded to include adults up to ages 138% of the federal poverty level, and December 31, 2024 when the evaluation period ends under the current waiver. Our evaluation will cover roughly two time periods:

- 2015-2016 (pre-ARTS period) to 2017-18 (the post-ARTS period but before Medicaid expansion)
- 2017-2018 (the post-ARTS period prior to expansion) to 2019-2024 (the post-ARTS, post-Medicaid expansion period.
- As described above, the 2019-2024 period will be subdivided into 2019, 2020-2021, and 2022-2024 to address the potential effects of COVID-19.

3.6 Subgroup Analyses

We will conduct analysis of subgroups that are high priority to the Commonwealth of Virginia, including differences by region, urban/rural residence, racial and ethnic disparities, pregnant women, and different age groups. We will also explore how results differ by measures of community well-being using Virginia's Health Opportunity Index, a novel method that

quantifies community well-being and social determinants of health at the census tract level along dimensions of access to care, economic, educational, and environmental factors.[7]

4.0 METHODOLOGICAL LIMITATIONS

There are two major methodological limitations to this evaluation. First, the ARTS demonstration waiver along with the entire package of reforms contained within the program was implemented statewide on April 1, 2017, including expanded coverage of services, increases in reimbursement rates, and the switch to a "carve-in" model for behavioral health services. It will be difficult to test the impact of these specific components on outcomes, such as SUD-related hospital use and fatal drug overdoses. Although the evaluation will assess changes in the supply of providers, access to and utilization of services, and coordination with physical and mental health services that are addressed by specific provisions of ARTS, major conclusions will be based on the overall impact of the ARTS demonstration, rather than specific provisions.

As mentioned above, we do not believe it is possible to identify ideal comparison groups or states with which to serve as a true counterfactual to Virginia Medicaid during the evaluation period, especially an evaluation period that extends from 2015 through 2023. However, because the ARTS demonstration combined with Medicaid expansion is unique among states, we can restrict comparison states to those that did not implement reforms on the same scale and timeframe as the ARTS demonstration. While not ideal, using MODRN and national data sources to identify comparison groups greatly strengthens the evaluation design (relative to using only Virginia data), and will permit stronger conclusions about the impact of ARTS.

[7] Viriginia Department of Health. *Virginia Health Opportunity Index*. Available at: https://apps.vdh.virginia.gov/omhhe/hoi/.

5.0 EVALUATION OF FORMER FOSTER CARE YOUTH WHO AGED OUT OF FOSTER CARE IN ANOTHER STATE

5.1 Background.

As mentioned above, a September 2017 amendment to the demonstration added coverage for former foster care youth (FFCY) who aged out of foster care under the responsibility of another state and are now applying for Medicaid in the Commonwealth of Virginia. The Affordable Care Act included provisions to allow youth to maintain coverage under their parents' or guardian's health insurance plan until age 26, as well as for youth in foster care who have Medicaid coverage to continue with Medicaid coverage up to age 26.

A final rule published by CMS on November 21, 2016 allows Medicaid coverage of former foster care youth only in the state for which they received Medicaid coverage while in foster care. However, section 1115 demonstration authority allows states the option of providing coverage to youth who were in foster care and Medicaid in a different state. The September, 2017 amendment to the demonstration – now called the "Building and Transforming Coverage, Services, and Supports for a Healthier Virginia" – is intended for this purpose. As required by the section 1115 demonstration authority, the state must conduct a separate evaluation of the FFCY provision, and provide regular and annual monitoring reports to CMS to inform policy decisions.

5.2 Demonstration goals regarding former foster care youth age aged out of foster care in another state.

1) Ensure access to Medicaid services for former foster care youth between the ages of 18 and 26, who previously resided in another state and are now covered through Virginia Medicaid through the former foster care youth eligibility group.

2) Improve or maintain health outcomes for the demonstration population.

5.3 Evaluation Questions and Hypotheses.

A summary of the demonstration's core evaluation questions, hypotheses, data sources, and analytical approaches are provided in the table below.

Summary of Key Evaluation Questions, Hypotheses, Data Sources, and Analytic Approaches

Demonstration Goal 1: Expand access to Medicaid for former foster care youth who were in foster care and Medicaid in another state and are now applying for Medicaid in the state in which they live.					
Evaluation Component	**Evaluation Question**	**Evaluation Hypotheses**	**Measure [Reported for each Demonstration Year]**	**Recommended Data Source**	**Analytic Approach**
Process	Does the demonstration provide continuous health insurance coverage?	Beneficiaries will be continuously enrolled for 12 months.	Number of beneficiaries continuously enrolled/ total number of enrollees	Administrative data – enrollment data	Descriptive statistics (frequency and percentage)
	How did beneficiaries utilize health services?	Beneficiaries will access health services.	Number of beneficiaries who had an ambulatory care visit/ Total number of beneficiaries	Administrative data – Medicaid claims	Descriptive statistics (frequencies and percentages)
			Number of beneficiaries who had an emergency department visit/ Total number of beneficiaries		
			Number of beneficiaries who had an inpatient visit/ Total number of beneficiaries		
			Number of beneficiaries who had a behavioral health encounter /Total number of beneficiaries		

5.4 Methdology

a) Evaluation design: The evaluation will use a post-only assessment, as it is expected that less than 500 members will be enrolled in Medicaid through the demonstration (see below). The timeframe for the post-only period will begin when the demonstration begins, and ends when the demonstration ends.

b) Data collection and sources: The former foster care youth demonstration population will be identified through Medicaid enrollment files. Monthly enrollment by eligibility group is tracked for all Medicaid members, and there are specific eligibility codes for those enrolled through the former foster care youth program. The enrollment files do not specifically identify whether enrollees were in foster care and Medicaid in a different state before they enrolled in Virginia Medicaid. To identify the demonstration population, we will identify those enrolled in Medicaid through the former foster care youth program who were not continuously enrolled in Medicaid in the year prior to their 18th birthday. The evaluation team will extract enrollment and claims data for the demonstration population annually. All data will be collected retrospectively through administrative data.

c) Data Analysis Strategy. Quantitative methods based on descriptive analyses will be used to analyze the data.

5.5 Justification for Excluding Comparison Groups and Baseline Data

In 2019, there were an estimated 65 Medicaid enrollees covered under the demonstration. This falls well short of the criteria for having at least 500 potential enrollees needed to include a comparison group in the evaluation, based on CMS' Modified Evaluation Design for the Section 1115 Demonstration on Former Foster Care Youth Who Were in Foster Care and Medicaid in a Different State.

Also, the state does not have information on Medicaid enrollment of the demonstration population before they enrolled in Virginia Medicaid, and therefore is lacking baseline data on the demonstration population (that is, Medicaid enrollment before the demonstration began). However, the evaluators will be able to track Medicaid enrollment and utilization on a monthly basis since their enrollment began, beginning with the start of the demonstration in September, 2017.

ATTACHMENTS

A. Independent Evaluator

This demonstration waiver will be evaluated by an independent party. The Department of Health Behavior of Policy (HBP) is part of the Virginia Commonwealth University School of Medicine and is a separate entity from DMAS. The HBP department is comprised of 16 faculty from multiple disciplines including health economics, social epidemiology, sociology, and health psychology. HBP addresses the behavioral, social, organizational, and policy factors affecting the health of individuals and populations using rigorous quantitative and qualitative methods. The department includes two doctoral programs – one in Health Care Policy and Research, and a second Ph.D. program in Social and Behavioral Sciences.

Along with the Department of Biostatistics and Division of Epidemiology in the Department of Family Medicine, HBP is one of the core public health departments within the VCU School of Medicine. HBP faculty actively collaborate with faculty in other departments and centers within both the School of Medicine and other VCU departments, including the Department of Health Administration, the Department of Family Medicine and Population Health, the Massey Cancer Center, the Wright Center for Clinical and Translational Research, the Institute for Drug and Alcohol Studies, and the Center for the Study of Tobacco Products.

Drs. Peter Cunningham and Andrew Barnes (Principal Investigator and Co-Principal Investigators for this project, respectively) have been leading the evaluation of the ARTS demonstration since it began in 2017, which is part of a broader partnership they have established with DMAS. In addition to the evaluation of ARTS, Drs. Barnes and Cunningham are the university partners for Virginia for the Medicaid Outcomes Distributed Research Network. They have also partnered with DMAS on a needs assessment for Virginia's SUPPORT Act grant, and are leading two other state-funded evaluations of Medicaid programs. Through their partnership with DMAS, they have access to Medicaid enrollment and claims data that are necessary to complete the evaluation work. As part of the VCU School of Medicine, they are able to draw on the clinical and research expertise related to substance use disorders of other faculty and researchers within VCU. Dr. Cunningham has over 30 years of experience in health services and health policy research, including 19 years at Mathematica Policy Research, Inc., 7 years at the Agency for Healthcare Research and Quality, and 7 years at VCU. Dr. Barnes is a health policy researcher and health economist with 10 years of experience on faculty at VCU. He also serves on advisory roles with AcademyHealth's State Research and Policy Interest Group and AcademyHealth's State-University Partnership Learning Network.

B. Conflict of interest statement

HBP agrees that no agency, employment, joint venture, or partnership has been or will be created between DMAS and HBP. HBP further agrees that as an independent entity, it assumes all responsibility for any federal, state, municipal or other tax liabilities along with workers compensation, unemployment compensation, and insurance premiums that may accrue as a result of funds received pursuant to this work. HBP agrees that it is an independent entity for all purposes including, but not limited to, the application of the Fair Labor Standards Act, the Social Security Act, the Federal Unemployment Tax Act, the Federal Insurance Contribution Act, provisions of the Internal Revenue Code, Virginia tax law, Workers Compensation law, and Unemployment Insurance law.

HBP will maintain communication with DMAS staff throughout the evaluation period to better understand policy and program implementation, and to obtain DMAS' assistance with access to administrative data. HBP will make independent decisions about the evaluation itself, including methodology, analytical strategy, analysis of evaluation data, and presentation of results.

C. Timeline and Major Milestones

Milestone	Date
Completion of first interim report under demonstration renewal, submitted to DMAS	12/2020
Revised evaluation plan submitted to CMS	2/2021
Completion of ARTS member survey, wave 2	4/2021
Ongoing analysis of claims and survey data	1/2021 to 12/2021
Analysis of cumulative impact of ARTS and Medicaid expansion on provider supply using DEA waivered prescriber data and N-SSATS	5/2021 to 12/2021
Completion of second interim report under demonstration renewal, including separate report on FFCY who aged out of foster care in another state	12/2021
Ongoing analysis of claims and survey data	1/2022 to 12/2022
Semi-structured interviews with MCO care coordinators	3/2022 to 9/2022
ARTS member survey, wave 3	10/2022 to 3/2023
Analysis of cumulative impact of ARTS and Medicaid expansion on SUD-related hospital inpatient admissions	5/2022 to 12/2022
Completion of third interim report under demonstration renewal, including separate report on FFCY who aged out of foster care in another state.	12/2022
Ongoing analysis of claims and survey data	1/2023 to 12/2023
Analysis of cumulative impact of ARTS and Medicaid expansion on access to and quality of treatment services for the Virginia population (based on analysis of TEDS)	7/2023 to 6/2024
Completion of fourth interim report under demonstration renewal, including separate report on FFCY who aged out of foster care in another state	12/2023
Ongoing analysis of claims, completion of all analytical tasks	1/2024 to 12/2024
Completion of final report	12/2024