Vermont Results First
Inventory and Benefit-Cost Analysis

Department of Health / Division of Alcohol and Drug Abuse Program's
Medication Assisted Treatment for Opioid Use Disorder
(Hub and Spoke Model)

Final Report

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Vermont Results First: Inventory and Benefit-Cost Analysis for The Department of Health / Division of Alcohol and Drug Abuse Program's Medication Assisted Treatment for Opioid Use Disorder (Hub and Spoke)

Introduction

A program inventory and benefit-cost analysis are intended to help policymakers at all levels of government identify evidence-based programs and make data-driven budget decisions. This Inventory and Benefit-Cost Analysis of the Vermont Hub and Spoke Medication Assisted Treatment (MAT) program for opioid use disorder differs from previous Results First reports produced by CRG in that it focuses on just one program, rather than assessing the evidence base of all programs operating in a policy area or agency.[1] Program inventories were completed for the Hubs but not Spokes, so additional program information is presented for Hubs. The Hub inventory assesses similarities and variations of MAT across multiple Hub providers. This report includes the financial benefits and costs to the state associated with operating both Hubs and Spokes.

Hub and Spoke Model / Care Alliance Model

In response to the rise in opioid addiction and overdose-related deaths in the state, Vermont established the Care Alliance for Opioid Addiction, a system of regional opioid treatment programs, also known as the "Hub" and "Spoke" system.[2] These programs treat individuals with opioid use disorder with a whole-patient approach, using medication (primarily methadone and buprenorphine,) combined with counseling and supportive services.

This program is unique in that both Hubs and Spokes provide health home services. The health home

Summary and Key Findings

Crime Research Group (CRG) serves as Vermont's criminal justice Statistical Analysis Center. The Results First initiative in Vermont is a project of CRG, Bureau of Justice Statistics, and Vermont's Joint Fiscal Office, with technical support from the Pew Charitable Trusts. As part of this initiative, CRG inventoried the VDH/ADAP Hubs and conducted a benefit-cost analysis of the VDH/ADAP's Hubs and Spokes.

Key findings are:

- MAT as delivered in the Hubs and Spokes is both evidence-based and cost effective. Although a financial investment for the state, it is an investment that pays subsequent dividends, not only financially but in quality of life.
- Five of seven Hub locations dispense both methadone and buprenorphine; one dispenses methadone only and one, buprenorphine only.
- The number of Hub methadone patients in FY16 ranged from 261-828; buprenorphine patients ranged from 33-330.
- Hubs follow the Substance Abuse and Mental Health Services Administration protocols for MAT and employ evidence-based therapies. Length of program is individualized.
- In SFY16, 86% of Hub services were paid by Medicaid and 7% of patients were uninsured. An estimated 68% of those in Spokes are on Medicaid. Uninsured individuals are served in Hubs.
- Health Home services are available to all Hub and Spoke patients.
- Hubs receive grant funds in addition to Medicaid. Grants pay for uncompensated care for those who are uninsured, on Medicare, or underinsured. It is also used for outreach and services not included in the Hub bundle.

[1]See for example Crime Research Group's Results First Inventory of Criminal Justice Programs: http://www.leg.state.vt.us/jfo/reports/VTResultsFirstProgramInventoryFinalDraftMarch2016.pdf

[2] http://www.healthvermont.gov/sites/default/files/documents/2016/12/ADAP_Treat_Opioids_Brief.pdf

services, of which patients must receive at least one each month, include comprehensive care management for the population, care coordination for individual patients, referral to community services and social supports, support for comprehensive transitions of care, support for patients and family members, and health promotion.[3] To pay for these services, the Department of Vermont Health Access was granted a Medicaid State Plan Amendment permissible through the Affordable Care Act.[4]

Each region has a "Hub," and associated "Spokes". Hubs are specialty substance abuse treatment facilities treating people with opioid use disorders with methadone or buprenorphine. Hubs are designed to treat clinically complex patients and patients new to treatment. Individuals receiving treatment with buprenorphine or a naltrexone product (Vivitrol®) in a Hub can transition to a Spoke once they are stable, individuals using methadone must remain at the Hubs due to federal law.[5] Spokes may transfer patients back to the Hub if they are not successful in the Spoke. All Hubs are overseen by the Vermont Department of Health Division of Alcohol and Drug Abuse Programs (ADAP).

Spokes are general medical offices, often primary care. Other practice settings include specialty addictions programs, OB-GYN, and clinics treating pain. All Spoke settings are supported by Spoke staff (an RN and licensed addictions / mental health counselor) that work with the prescriber and provide health home services. Spoke physicians (and APRNs and PAs) prescribe buprenorphine or naltrexone (Vivitrol®). Together, the teams provide the full range of MAT services including: counseling, connection to community based resources, health services and psycho-social supports. The Spoke staffing ratios are 1 FTE RN and 1 FTE licensed counselor for every 100 active Medicaid beneficiaries. Some Spoke teams serve more than one physician's office depending on the number of patients per practice, with the team serving multiple sites for prescribers with fewer patients. The Spoke staff is embedded in the hosting practice. The teams of Spoke staff are organized through the Blueprint for Health's network of Patient-Centered Medical Homes and Community Health Teams. Regional Hubs provide consultation and support to Spokes.

Additional information, in the form of inventory survey results, is presented for the Hubs because they specialize in medication assisted treatment (MAT) for opioid use disorders, while Spokes typically provide primarily medical and primary care services.

Hub Inventory Findings

Hub directors were asked to complete a survey about the components of their program, such as types of medication and therapies provided, number of people served, and number of people waiting to be served. All directors participated. The Hubs are located in Burlington (Chittenden Clinic, operated by Howard Center), Berlin (Central Vermont Addiction Medicine or CVAM/BAART), Rutland (West Ridge Center), W. Lebanon NH (Habit-Opco), Brattleboro (Brattleboro Retreat Buprenorphine Clinic and Habit Opco), and the Northeast Kingdom (Newport and St. Johnsbury). A new Hub opened in St. Albans in June 2017 and is not included in this brief.[6] While MAT for opioid use disorder is established in the literature

[3] http://blueprintforhealth.vermont.gov/BlueprintPDF/OnpointSupportingDocumentationMATProfilesMay2017.pdf
[4] https://www.medicaid.gov/State-resource-center/Medicaid-State-Plan-Amendments/Downloads/VT/VT-13-001.pdf and https://www.medicaid.gov/State-resource-center/Medicaid-State-Plan-Amendments/Downloads/VT/VT-14-007.pdf
[5] https://store.samhsa.gov/shin/content/PEP15-FEDGUIDEOTP/PEP15-FEDGUIDEOTP.pdf
[6] http://www.healthvermont.gov/sites/default/files/documents/pdf/adap_CareAllianceOpioidAddiction.pdf

as effective and evidence based, the objective in collecting this information was to determine the variability in program implementation across Hub providers. Survey results, based on State Fiscal Year 2016 (SFY16) services provided, are shown in Table 1 (note that figures for Habit Opco-W. Lebanon, which borders New Hampshire, are for Vermont residents only). All but two Hubs dispense both methadone and buprenorphine. The Brattleboro Retreat dispenses buprenorphine only and Habit Opco-Brattleboro dispenses methadone only. Hubs have the capacity to dispense injectable naltrexone (Vivitrol®), and to date, the Chittenden Clinic, BAART, and West Ridge dispense naltrexone. However, relatively few patients receive it and it is not included in this analysis.

The number of patients who received methadone in FY16 ranged from 261 at BAART's Newport facility to 828 at Chittenden Clinic in Burlington. The total number of patients who received methadone at Hubs in FY2016 was 2,546 (excluding the BAART NEK site in St. Johnsbury for which data were not reported). The number of patients who received buprenorphine in FY16 ranged from 33 at Habit Opco-W. Lebanon to 330 at CVAM/BAART-Berlin (Chittenden Clinic reported 329). The total number of patients who received buprenorphine at Hubs in FY2016 was 1,357.

All Hubs provide individual and group therapy to complement medication treatment. This combination of behavioral therapy and pharmacotherapy is consistent with Substance Abuse and Mental Health Services Administration (SAMHSA)/professional guidelines for medication assisted treatment for opioid use disorder. Most survey respondents provided additional information about the types of therapy used. These include Cognitive Behavioral Therapy, Dialectic Behavioral Therapy, Motivational Interviewing, Anger Management, Matrix for Stimulant Use, and Journaling.

Asked to provide intended program length, most responded that this is individualized (dependent on a patient's progress), and is consistent with SAMHSA/professional guidelines. Time commitment on the part of patients also varies—largely dependent on stage in the program (more time is required initially), and whether individuals achieve the privilege of taking medication home.

All Hub directors indicated that the intended outcomes of their program included improved health/mental health, lifestyle and/or a reduction in emergency department visits. Additional intended outcomes were reduced criminal behavior (six of seven programs) and increased employment and housing services (five of seven programs).

Five of seven Hub directors provided information on the number/percentages of patients who received health home services during FY16 (shown in Table 1). The percentage of methadone patients who received health home services ranged from 89 percent (Chittenden Clinic and BARRT-NEK) to 100 percent (Habit Opco-W. Lebanon). The percentage of buprenorphine patients who received health home services ranged from 89 percent (BAART-NEK, Newport program) to 100 percent (Habit Opco-W. Lebanon).

Asked whether their program follows a national model, the five directors who responded to the question said that they follow SAMHSA protocols. Habit Opco-Bratteboro is also accredited by the Commission on Accreditation of Rehabilitation Facilities (CARF). Other Hubs may be CARF accredited as well, but did not indicate this. The State requires that Hubs be accredited by a nationally approved accrediting organization such as the CARF. Hubs may also have specialty treatment provider certification from the National Committee for Quality Assurance (NCQA), but did not report it in the inventory. The State added that Chittenden and West Ridge have completed and received NCQA Patient Centered Specialty Practice Recognition, three Hubs were involved in this process, and two were not currently pursuing it. Finally, the survey asked how Hubs used their FY16 Substance Abuse Prevention and

Treatment (SAPT) block grant. Most reported using the funds to provide services to uninsured patients. In SFY16, over 86% of Hub services were covered by Medicaid and an additional 7% were uninsured.[7]

Survey findings indicate that Vermont's regional opioid treatment centers/Hubs are more similar than different, and adhere to SAMSHA's evidence-based model. There is considerable variation in number of people served and length of waiting lists. Annual numbers aren't as accurate as point in time information for census and wait lists.

The most recent information can be found at: http://www.healthvermont.gov/sites/default/files/documents/pdf/ADAP_OpioidUseDisorderTreatmentCensusandWaitList.pdf

[7]Vermont Substance Abuse Treatment Information System (SATIS) reporting for SFY16. Note: Medicare beneficiaries are counted as uninsured by ADAP because Medicare will not reimburse an OTP.

Table 1: Characteristics of Vermont's Medication Assisted Therapy Opioid Treatment Programs (Hubs).

	Medication Administered				Outcomes Program is Intended to Address								
Facility Name	Methadone	# Clients FY2016	Buprenorphine	# Clients FY2016	Types of Therapy	Credentials of Those Delivering Program	Health/ Mental Health/ Lifestyle/ ER visits	Employment / Housing Services	Criminal Behavior/ Legal Status	Treatment Length	Estimated Participant Time Commitment	Able to Serve / Yr	Use of SAPT Grant, FY16
Brattleboro Retreat Buprenorphine Clinic	No	N/A	Yes	317	Group & Individual (generally weekly)	MD, RN, LPN, MS (will/have LADC, LICSW, and/or LCMHC)	X	X		Individualized (may take 6+ months to move to Spoke)	Varies (daily medication unless taken home weekly); weekly group; other counseling, case mgmt. & MD as needed	200 (outpatient)	N/A (was subcontractor of Habit Opco during FY16)
West Ridge Center (Rutland)	Yes	380	Yes	218	CBT, Motivational Interviewing, Individual & Group (min. 1x/month; 45 minutes)	RN, LPN, LDAC	X		X	More than 52 weeks	5 hrs./wk.	420	Making connections with community resources; staff education
Habit Opco-W. Lebanon	Yes	293	Yes	33	Group (min. weekly) & individual (min. monthly)	MD,RN,LPN,JD,MA, BA,BS	X	X	X	Individualized	Varies, but estimated average 1.5 hrs./wk.	350	Uninsured
BAART NEK Programs (Newport only)	Yes	261	Yes	130	Motivational Interviewing, CBT/DBT (8 weeks), Anger Mgmt. Matrix for Stimulant Use (32 wks.; 2 months neg. UDS); Journaling; Brief Intervention	LPN, RN, NP, MD, AAP, rostered, LADC, LCMHC	X	X	X	Individualized	Daisy dosing; minimum 50 min./month counseling (depends on needs)	600 (region)	Medical intake/annual physicals, med monitoring, prenatal, case mgmt. counseling, dispense meds
Chittenden Clinic (Burlington)	Yes	828	Yes	329	CBT, Integrated Combined Therapy	MD, NP, RN, Masters level clinicians have/will have license, BA case managers with apprentice ADC+	X	X	X	More than 52 weeks	Acute phase, daily dosing, min weekly, clinician or case manager contact, ind./group therapy. Supportive care, take home med, min monthly; Maintenance, once/month, clinical & case mgmt.	1,000	Uninsured
Central Vermont Addiction Medicine / BAART Berlin	Yes	403	Yes	330	MAT, Group & Individual (typically 1 hr.); CBT/DBT, Motivational Interviewing	MD, LCMHC, LADC, RN, LPN, MS, BS	X	X	X	Less than 4 weeks	Varies by patient, some 15 min per day; some an hour or more per week	500	Uninsured
Habit Opco-Brattleboro	Yes	381	No	N/A	Group & Individual; freq. varies	MD, RN, LPN, LADC, LCMHC, MA, BS, AAP	X		X	Individualized	8+ hours first month (daily); could reduce to < 1 hr/month (1-2 visits/month)	Unlimited	Underinsured and uninsured
TOTAL		**2,546**		**1,357**									

Office-Based Opioid Treatment (Spokes)

The Vermont Blueprint team indicated that there are approximately 77 Spokes, which all use the same MAT services model for opioid use disorder treatment. As of September 2016, 187 physicians were actively treating Medicaid beneficiaries with MAT (either buprenorphine or Vivitrol®).[8] Medicaid pays for approximately 68% of individuals receiving Spoke services.

Benefit-Cost Analysis of the Hub and Spoke Model for Medication Assisted Treatment for Opioid Use Disorders

In addition to conducting a Hub inventory, CRG analyzed the benefits and costs to taxpayers, participants, and others[9] of the Hubs and Spokes. The Benefit Cost Analysis was completed using the Pew-MacArthur Results First Model. The Results First Initiative, a project of the John D. and Catherine T. MacArthur Foundation and the Pew Charitable Trusts, works with states to implement an innovative benefit-cost analysis approach that helps states invest in policies and programs that are proven to work and are cost effective. The model uses the best available research to predict the outcomes of each program, based on the state's unique population characteristics. It calculates the cost to produce these outcomes including separate projections for benefits that would accrue to taxpayers, participants, and others when opioid use disorder is treated.

Because the model uses existing research, new models for which there is no existing research, such as adding health home services to opioid use disorder treatment with methadone and buprenorphine in the Hub and Spoke model, result in costs without associated research-based cost offsets.

The benefit-cost analysis produces a net present value representing the lifetime benefits from the program minus the program's costs. The model also reports a benefit-cost ratio representing the value of benefits from each program dollar invested. The analysis includes a risk estimate showing the percent of time that the benefits exceed the costs when simulated 10,000 times with random variation in costs and benefits. For MAT programs the duration of benefits is estimated for one year only.

Costs for the benefit-cost analysis were taken from Vermont's Blueprint for Health's study of Medicaid expenditures for Hub and Spoke patients[10] with additional supporting documentation from Medicaid claims and ADAP Hub data from the Substance Abuse Treatment Information System. Hubs and Spokes may provide services other than MAT to their patients, although only those services/costs related to MAT are modeled here. In addition to Medicaid expenditures, ADAP provides grant funding to Hubs to pay for services for uninsured, Medicaid, and underinsured individuals. These additional costs are reflected in the calculations below.

Annual Hub Costs per Person

Most Hubs provided MAT using both methadone and buprenorphine. This study looked at the cost differentials associated with providing each medication. Costs were calculated per person per year.

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[8] http://blueprintforhealth.vermont.gov/sites/blueprint/files/BlueprintPDF/AnnualReports/Blueprint2016AnnualReport12.29.16.pdf

[9] "Others" includes benefits to people other than taxpayers and participants. Depending on the program, it could include reductions in crime victimization, the economic benefits from a more educated workforce, and the benefits from employer-paid health insurance.

[10] http://blueprintforhealth.vermont.gov/BlueprintPDF/MATBlueprintPracticeProfilesMAT6132017.pdf

Hub services were paid via a service bundle based on a staffing model and the cost to provide treatment services. The Hub bundled payment includes health home services, assessment, counseling, and most urinalysis testing, as well as the methadone itself, which is relatively inexpensive for patients for whom methadone was appropriate. The current monthly rate of payment for methadone with health home services is $504 per month. Buprenorphine is more expensive than methadone, so buprenorphine dispensed by Hubs is paid outside of the bundled payment. The buprenorphine cost was an annual estimate based on SFY17 Medicaid claims. All other costs were the same. The State may also incur costs in addition to the bundled rate when an individual needed a more intensive level of care than was included in the Hub model, such as residential or intensive outpatient or when urinalysis tests must be sent to an outside lab for validation. The total of these costs associated with the Hub patients were averaged and included in the model.

Hub Costs – Methadone and Buprenorphine Patients

Services	**Methadone with Health Home Services**	**Buprenorphine with Health Home Services**
Hub Bundled Payment	$6,480	$6,480
Additional ADAP Payments	$411	$411
Buprenorphine		$4,191
Professional / Opioid Use Disorder	$814	$814
Urinalysis[11]	$414	$414
Total Cost per Person Annually	**$8,119**	**$12,310**

Spoke Costs - Buprenorphine Patients Only

Services	Cost
Buprenorphine dispensed by pharmacies	$3,540
Professional / Opioid Use Disorder	$2,327
Urinalysis	$3,472[12]
Spoke Staff Costs	$1,163
Total Cost per Person Annually	**$11,345**

Costs for Spokes are structured differently than costs for Hubs. The "Professional/Opioid Use Disorder" category included physician billing as well as substance abuse counseling, residential treatment, or intensive outpatient care provided to those served in Spokes. Physicians wrote prescriptions for buprenorphine that were dispensed by pharmacies and sent urine samples to outside labs for testing. Total Spoke staff costs were divided by the number of Medicaid recipients served to estimate per person costs.

Providing buprenorphine in the Spokes was slightly more cost effective than in the Hubs, in part because Hubs were designed to serve people who were more clinically complex, so the higher cost was expected.

[11] Hubs send urinalysis samples to private labs for testing when an internal test must be validated. One lab settled with the State of Vermont for overbilling. The costs shown are based on claims that have not been adjusted so likely overestimate the cost.

[12] Spoke doctors send urinalysis samples to private labs for testing. One lab settled with the State of Vermont for overbilling. The costs shown are based on claims that have not been adjusted so likely overestimate the cost.

Analysis

Methadone in the Hubs

Providing methadone with health home services in the Hubs had an 88% chance of being cost effective, with a benefit-cost ratio of $1.66. This means that for every $1 the state spent on the program, the state saw a return of $1.66.

Benefits from Primary Participant					
Source of Benefits	**Benefits To Participant**	**Benefits To Taxpayers**	**Benefits To Others[13]**	**Other Indirect Benefits[14]**	**Total Benefits**
Crime	$0	$1	$4	$0	$5
Employment Earnings: DSM Opioid Drug Disorder	$1,584	$719	$0	$9,732	$12,035
Health Care Costs: DSM Opioid Drug Disorder	$145	$489	$584	$0	$1,218
Total per Person	**$1,729**	**$1,209**	**$588**	**$9,732**	**$13,258**

The benefits to the participant and the taxpayers included the increase in employment earnings and payment of taxes, respectively. The benefits to participants and taxpayers in health care were associated with the cost of opioid drug abuse or dependence.

Since the model did not account for benefits resulting from health home services, the actual benefits may be higher. See Discussion Note #1 for more information from the benefits of health home services. With other chronic conditions, health care costs were generally less when both evidence-based care and care coordination were provided.

The Results First Model uses general population rather than offender population for its analysis, resulting in a lack of benefits or reductions in crime/recidivism. This reason for this is that not all individuals on MAT were offenders. If the analysis were done for the offender subset of the general population, the benefits under crime would increase. See more in Discussion Note #3.

Methadone treatment has been shown to reduce sexually transmitted infection and related costs as well as costs associated with alcohol use, those costs were not monetized here, and so actual benefits may be higher.[15]

[13] "Others" includes benefits to people other than taxpayers and participants. Depending on the program, it could include reductions in crime victimization, the economic benefits from a more educated workforce, and the benefits from employer-paid health insurance.

[14] "Indirect benefits" includes estimates of the net changes in the value of a statistical life. See discussion below.

[15] Wilson, M.E., Schwartz, R.P., O'Grady, K.E., & Jaffe, J.H. (2010). Impact of interim methadone maintenance on HIV risk behaviors. *Journal of Urban Health: Bulletin of the New York Academy of Medicine, 87*(4), 586-591. http://wsipp.wa.gov/BenefitCost/Program/694

Buprenorphine[16] in the Hubs

Buprenorphine with health home services was cost effective 63% of the time, and the benefit-cost ratio was $1.12, meaning that for every $1 spent, the state receives a return of $1.12.

Benefits from Primary Participant					
Source of Benefits	**Benefits To Participant**	**Benefits To Taxpayers**	**Benefits To Others**	**Other Indirect Benefits**	**Total Benefits**
Crime	$0	$0	$1	$0	$1
Employment Earnings: DSM Opioid Drug Disorder	$1,648	$748	$0	$10,021	$12,417
Health Care Costs: DSM Opioid Drug Disorder	$149	$502	$602	$0	$1,253
Total per Person	**$1,797**	**$1,250**	**$603**	**$10,021**	**$13,671**

As above, the benefits to the participant and the taxpayers included the increase in employment earnings and payment of taxes, respectively. The benefits to participants and taxpayers in health care were associated with the cost of opioid drug abuse or dependence. Benefits to others include benefits to those other than taxpayers and participants. Depending on the program, it could include reductions in crime victimization, the economic benefits from a more educated workforce, and the benefits from employer-paid health insurance. Indirect benefits include estimates of the net changes in the value of a statistical life explained in more detail in Discussion Note #4.

Buprenorphine in the Spokes

Spokes are cost effective 70% of the time, with a benefit-cost ratio of $1.18. This means that for every $1 spent, there's a return of $1.18.

Benefits from Primary Participant					
Source of Benefits	**Benefits To Participant**	**Benefits To Taxpayers**	**Benefits To Others**	**Other Indirect Benefits**	**Total Benefits**
Crime	$0	$0	$1	$0	$1
Earnings: DSM Opioid Drug Disorder	$1,658	$753	$0	$9,990	$12,400
Health Care Costs: DSM Opioid Drug Disorder	$150	$506	$605	$0	$1,261
Total per Person	**$1,808**	**$1,259**	**$606**	**$9,90**	**$13,662**

For both the Hubs and Spoke, the benefits from a reduction in crime/recidivism is not realized because buprenorphine has not yet been evaluated for reductions in crime, but is associated with a reduction in psychiatric symptoms.

[16] Buprenorphine has been shown to reduce psychiatric symptoms, but those costs are not monetized here.

Discussion

There are a few factors that affect the benefit-cost analysis for the Hubs and Spokes. The following should be taken into consideration when reviewing this report:

1. Hubs and Spokes provide health services beyond MAT and the benefits of those other health services provided to patients were not captured here. However, preliminary analyses of Washington State health home data found a $21.6 million cost savings (or at least six percent) to the Medicare program during an 18 month period, compared to a control group.[17] A study of Vermont Medicaid recipients with OUD and a risk-adjusted control group found that the cost of providing MAT services was offset by savings on healthcare expenses. In other words, the OUD treatment program was cost-neutral.[18] The model also doesn't reflect any savings that may be associated with decreases in involvement with the Department of Children and Families, total costs of medical care and other potential savings. If there was no existing peer-reviewed research for the model, there was no associated cost offset.

2. A recently released case study in the Journal of Substance Abuse Treatment reviewed the experiences of Maryland, Rhode Island, and Vermont in implementing the Medicaid health home model to address opioid use disorder. This is the first study to retrospectively examine the Medicaid opioid health homes' development and implementation. The study concluded that the OHH model (Hubs and Spokes in Vermont) appears to have the potential to effectively address the complex needs of individuals with opioid use disorder by providing whole-person care that integrates medical care, behavioral health, and social services and supports. The experiences of Maryland, Rhode Island, and Vermont can guide development and implementation of similar OHH initiatives in other states.[19]

3. A new study, currently underway, compares pre- and post-MAT expansion through the Hub and Spoke, using a difference in differences (DID) model. The study includes Medicaid and Medicare recipients, as well as commercially-insured patients. Preliminary findings show lower health care costs and similar costs overall including the costs of MAT treatment (Spoke staff, pharmacy, urinalysis, etc.) for the MAT group between the pre and post compared to the control group.[20]

4. The benefits that would be gained from a reduction in crime are modeled on the expected percentage of the general population that will engage in criminal activity. Methadone has been evaluated specifically for reducing crime and has been found to be effective. A recent study analyzed 17 years of population data for all adults in British Columbia who had a criminal conviction and were also treated with methadone during the time period. The researchers compared criminal activity during periods in which individuals were treated with methadone to periods when they were not. They found that violent crime was 33 percent lower, and non-violent crime, 35 percent lower during the first two

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[17] https://innovation.cms.gov/Files/reports/fai-wa-prelimppone.pdf (Pg. 36, Table 9)

[18] Mary Kate Mohlman, Beth Tanzman, Karl Finison, Melanie Pinette, Craig Jones. 2016. "Impact of Medication-AssistedTreatment for Opioid Addiction on Medicaid Expenditures and HealthServices Utilization Rates in Vermont." *Journal of Substance Abuse Treatment*, August, vol. 67: 9-14. DOI: http://dx.doi.org/10.1016/j.jsat.2016.05.002

[19] http://www.journalofsubstanceabusetreatment.com/article/S0740-5472(17)30195-2/fulltext

[20] http://blueprintforhealth.vermont.gov/sites/blueprint/files/BlueprintPDF/AnnualReports/Blueprint2016AnnualReport12.29.16.pdf (pg. 53) and conversations with ADAP staff.

years of treatment.[21] The lack of benefits (or reductions) in crime was because the model used the general population rather than an offender population for this analysis. Not all those on MAT were offenders. If the analysis were done for the offender subset of the general population, the benefits under crime would increase.

5. The earnings calculated in the tables above include labor market earnings, benefits of an individual obtaining employment and paying taxes, and includes the overall "value of a statistical life." The "value of a statistical life" is an actuarial term used to measure the monetary worth of the risk of an earlier-than-expected death. It represents the monetary value that people place on their lives (or how much people would be willing to pay or accept) for changes in mortality risk.[22]

6. Relapse is represented in the rate of cost effectiveness. Here, effectiveness is defined as "stays clean and avoids death." Using Vermont's population, the analysis indicates that 88% of those in the Hubs/methadone program, 63% of those in the Hubs/buprenorphine program, and 70% in the Spoke/buprenorphine program will eventually stay clean. The benefit-cost analysis presumes that the program is delivered with fidelity; and that a person participates for a year in all the services provided by the program, obtains employment, and avoids non-opiate-related death.

7. The health care costs in the tables above include hospital discharge data from Vermont, the cost of opioid related treatment and the national average for hospitalization costs. Vermont has an average of $25,365 [23] with a standard deviation of $32,100 meaning there is a lot of variability in these costs. Consequently, Vermont doesn't see as much benefit as other states with higher hospitalization costs.

Conclusion

MAT as delivered in the Hubs and Spokes is both evidence-based and cost effective. Although a financial investment for the state, it is exactly that—an investment that pays subsequent dividends, not only financially but in improved quality of life not only for those who become addicted to opioids, but also to their families, communities and the larger society.

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[21] Russolillo, Angela, Akm Moniruzzaman, Lawrence C. McCandless, Michelle Patterson, Julian M. Somers. Forthcoming, "Associations between Methadone Maintenance Treatment and Crime: A 17-year Longitudinal Cohort study of Canadian Provincial Offenders." https://www.ncbi.nlm.nih.gov/pubmed/28987068

[22] WSIPP follows the method for calculating what it calls "revealed preferences" whereby economists determine the risks that people are voluntarily willing to take and how much they need to be paid to take them. WSIPP estimates a distribution of wage differences by age and risk level from the academic literature, and then subtracts the avoided costs of health care, Social Security income, human capital benefits, and household production. http://wsipp.wa.gov/TechnicalDocumentation/WsippBenefitCostTechnicalDocumentation.pdf

[23] 2014 Vermont Hospital Discharge Data for opioid-related disorders/Vermont Department of Health; Emergency Department Costs based on the National Average; and http://wsipp.wa.gov/TechnicalDocumentation/WsippBenefitCostTechnicalDocumentation.pdf

The Results First Approach:
The Pew-MacArthur Results First Initiative, a project of The Pew Charitable Trusts and the John D. and Catherine T. MacArthur Foundation, works with states and localities to develop the tools policymakers need to identify and fund effective programs that yield high returns on investment. Using innovative and customizable methods, Results First partners learn to:

- Create an inventory of currently funded programs;
- Review which programs work;
- Conduct benefit-cost analysis to compare programs' likely return on investment; and
- Use evidence to inform spending and policy decisions.

Taken together, these efforts have helped leaders make more informed decisions, and ensure that resources are directed toward effective, cost-beneficial approaches.