

Interventions to Promote Health and Increase Health Care Efficiency: *May 2017 Update*

The Washington State Legislature directed the Washington State Institute for Public Policy (WSIPP) to “calculate the return on investment to taxpayers from evidence-based prevention and intervention programs and policies.”¹ In 2015 WSIPP’s Board of Directors authorized WSIPP to work on a joint project with the MacArthur Foundation and the Pew Charitable Trusts, with additional support from the Robert Wood Johnson Foundation, to extend WSIPP’s benefit-cost analysis to certain health care topics.

In December 2016 we presented meta-analytic results for a variety of interventions to promote health and increase health care efficiency.² In this report, we present our benefit-cost findings for these interventions.

In [Section I](#) we describe our research approach. In [Section II](#) we discuss benefit-cost findings for interventions in four health care areas:

- 1) Interventions to promote healthy pregnancy and birth;
- 2) Therapies to treat opioid use disorder;
- 3) Collaborative primary care; and
- 4) Patient-centered medical homes.

Summary

WSIPP’s Board of Directors authorized WSIPP to work on a joint project with the MacArthur Foundation and the Pew Charitable Trusts, with additional support from the Robert Wood Johnson Foundation, to extend WSIPP’s benefit-cost analysis to certain health care topics.

We present new benefit-cost findings for interventions in four health care areas: 1) interventions to promote healthy pregnancy and birth; 2) therapies to treat opioid use disorder; 3) collaborative primary care; and 4) patient-centered medical homes.

These benefit-cost findings build on our meta-analytic results released in December 2016. As described in the December report, we gathered all credible evaluations we could locate for each intervention. We screened the evaluations for methodological rigor and computed the average effects of the interventions on specific outcomes. The Center for Evidence-based Policy (CEbP) at Oregon Health & Science University collaborated in this research. We found evidence that a majority of the reviewed interventions achieve at least some desired outcomes.

For this report, we calculated the per-participant benefits and costs for each intervention in the December 2016 report (when possible) and conducted a risk analysis to determine which interventions consistently have benefits that exceed costs.

We find that some approaches achieve benefits that consistently exceed costs but others do not. We describe these findings in this report and display them in [Exhibits 3-6](#).

¹ Engrossed Substitute House Bill 1244, Chapter 564, Laws of 2009.

² Bauer, J., Westley, E., Barch, M., Burley, M., Cramer, J., & Kay, N. (2016). *Interventions to promote health and increase health care efficiency: December 2016 update* (Doc. No. 16-12-3401). Olympia: Washington State Institute for Public Policy.

Research Methods

The Washington State Legislature often directs WSIPP to study the effectiveness and assess the potential benefits and costs of programs and policies that could be implemented in Washington State.

These studies are designed to provide policymakers with objective information about which programs or policy options (“programs”) work to achieve desired outcomes (e.g. reduced crime or improved health) and what the long-term economic consequences of these options are likely to be.

WSIPP implements a rigorous three-step research approach to undertake this type of study. Through these three steps we:

- 1) **Identify what works (and what does not).** We systematically review all rigorous research evidence and estimate the program’s effect on a desired outcome or set of outcomes. The evidence may indicate that a program worked (i.e. had a desirable effect on outcomes), caused harm (i.e. had an undesirable effect on outcomes), or had no detectable effect one way or the other.

- 2) **Assess the return on investment.** Given the estimated effect of a program from Step 1, we estimate—in dollars and cents—how much it would benefit people in Washington to implement the program, and how much it would cost the taxpayers to achieve this result. We use WSIPP’s benefit-cost model to develop standardized, comparable results that illustrate the expected return on investment. We present these results with a net present value for each program, on a per-participant basis. We also consider to whom monetary benefits accrue: program participants, taxpayers, and other people in society.
- 3) **Determine the risk of investment.** We assess the riskiness of our conclusions by calculating the probability that a program will at least “break even” if critical factors—like the actual cost to implement the program and the precise effect of the program—are lower or higher than our estimates.

We follow a set of standardized procedures (see [Exhibit 1](#)) for each of these steps. These standardized procedures support the rigor of our analysis and allow programs to be compared on an apples-to-apples basis.

For full detail on WSIPP’s methods, see WSIPP’s [Technical Documentation](#).³

³ Washington State Institute for Public Policy (May 2017). *Benefit-cost technical documentation*. Olympia, WA: Author.

Exhibit 1

WSIPP's Three-Step Approach

Step 1: Identify what works (and what does not)

We conduct a meta-analysis—a quantitative review of the research literature—to determine if the weight of the research evidence indicates whether desired outcomes are achieved, on average.

WSIPP follows several key protocols to ensure a rigorous analysis for each program examined. We:

- **Search for all studies on a topic**—We systematically review the national and international research literature and consider all available studies on a program, regardless of their findings. That is, we do not “cherry pick” studies to include in our analysis.
- **Screen studies for quality**—We only include rigorous studies in our analysis. We require that a study reasonably attempt to demonstrate causality using appropriate statistical techniques. For example, studies must include both treatment and comparison groups with an intent-to-treat analysis. Studies that do not meet our minimum standards are excluded from analysis.
- **Determine the average effect size**—We use a formal set of statistical procedures to calculate an average effect size for each outcome, which indicates the expected magnitude of change caused by the program (e.g., group prenatal care) for each outcome of interest (e.g., preterm birth).

Step 2: Assess the return on investment

WSIPP has developed, and continues to refine, an economic model to provide internally consistent monetary valuations of the benefits and costs of each program on a per-participant basis.

Benefits to individuals and society may stem from multiple sources. For example, a program that reduces the need for government services decreases taxpayer costs. If that program also improves participants' educational outcomes, it will increase their expected labor market earnings. Finally, if a program reduces crime, it will also reduce expected costs to crime victims.

We also estimate the cost required to implement an intervention. If the program is operating in Washington State, our preferred method is to obtain the service delivery and administrative costs from state or local agencies. When this approach is not possible, we estimate costs using the research literature, using estimates provided by program developers, or using a variety of sources to construct our own cost estimate.

Step 3: Determine the risk of investment

Any tabulation of benefits and costs involves a degree of uncertainty about the inputs used in the analysis, as well as the bottom-line estimates. An assessment of risk is expected in any investment analysis, whether in the private or public sector.

To assess the riskiness of our conclusions, we look at thousands of different scenarios through a Monte Carlo simulation. In each scenario we vary a number of key factors in our calculations (e.g., expected effect sizes, program costs), using estimates of error around each factor. The purpose of this analysis is to determine the probability that a particular program or policy will produce benefits that are equal to or greater than costs if the real-world conditions are different than our baseline assumptions.

Interventions reviewed

In December 2016 WSIPP published meta-analytic findings for a variety of interventions intended to promote health and increase health care efficiency.⁴ The current report presents benefit-cost findings for the interventions described in the December 2016 report.⁵

These interventions fall into four topics areas:

- 1) Programs to promote healthy pregnancy and birth;
- 2) Therapies to treat opioid use disorder;
- 3) Collaborative primary care; and
- 4) Patient-centered medical homes.

Brief descriptions of each intervention can be found in [Section II](#). Complete meta-analytic results can be found on the WSIPP website.

⁴ Bauer et al. (2016).

⁵ We are unable to produce benefit-cost findings for interventions which do not report monetizable outcomes or which did not have sufficient information about program costs. These interventions include postpartum smoking relapse prevention; early initiation of methadone treatment; early initiation of buprenorphine treatment; telemedicine for treatment of posttraumatic stress disorder (PTSD) in primary care; telemedicine for treatment of depression in primary care; and patient-centered medical homes in integrated health systems. See our website for meta-analytic results for these interventions.

Outcomes examined

Evaluations of the health care interventions considered in this report often measure two broad types of outcomes: 1) those that reflect the health status of people (e.g., the rate of disease in a given population) and 2) those that reflect the use of health care resources and associated costs.⁶ Our approach captures both types of outcomes.

The primary economic benefits for the interventions reviewed are driven by the following: 1) changes in costs due to changes in the use of health care resources, 2) changes in the rate of certain health conditions, and 3) changes in total costs of care resulting from health care interventions.⁷

Many of the studies we reviewed report changes in the use of specific health care resources, such as emergency room visits, cesarean sections, and neonatal intensive care unit (NICU) admissions. We estimate the cost of these health care resources for the specific populations targeted by each intervention (e.g., pregnant women on Medicaid or chronically ill older adults).

Changes in the rate of certain health conditions can affect labor market earnings, health care costs, and the expected value of future statistical life years. For example, if a diabetes prevention program reduces the number of people who ultimately get diabetes, then a program participant would be expected to have greater labor market earnings; require fewer health care resources

⁶ Cost and utilization measures may or may not be an indication of health status or well-being.

⁷ See WSIPP's Technical Documentation for a thorough description of these methods.

(and therefore have lower total medical costs); and live longer, on average, than if they had not participated in the program. Our benefit-cost model monetizes all of these benefits.

Studies of some interventions also report changes in the total cost of care. For example, a study on a diabetes prevention program may report lower average medical costs for program participants over five years, compared to individuals who did not participate in the program. Our model captures these directly measured changes in medical costs.

The specific outcomes captured and monetized vary by intervention and are discussed more completely within each relevant section of this report.

Notably, we conducted a primary analysis of Washington State birth certificate and hospital discharge data to estimate the costs related to key birth indicators. This analysis is a new addition to WSIPP's benefit-cost model and is discussed comprehensively in the [Health Care Technical Appendix](#).⁸

In some cases, we examine outcomes that we cannot currently use for benefit-cost analysis. Some examples of health outcomes that we do not currently monetize include maternal hypertension, retention in treatment, and blood pressure measures. We report these outcomes for informational purposes in our meta-analytic results, which can be found on our website.

⁸ Westley, E. & He, L. (2017). *Estimating effects of birth indicators on health care utilizations costs and infant mortality: Technical appendix*. Olympia: Washington State Institute for Public Policy.

II. Research Findings

We present benefit-cost findings for interventions in four topic areas:

- 1) Programs to promote healthy pregnancy and birth;
- 2) Therapies to treat opioid use disorder;
- 3) Collaborative primary care; and
- 4) Patient-centered medical homes.

For each topic area, we present key considerations relevant to that area and an exhibit displaying our per-participant bottom-line estimates for each intervention.

A description of how to read the exhibits is provided in [Exhibit 2](#) below. Following each exhibit, we provide short descriptions of the interventions reviewed.

Exhibit 2

How to Interpret WSIPP's Benefit-Cost Results (Exhibits 3-6)

The numbered columns on [Exhibits 3-6](#) are described below.

- 1) [Program name](#) describes the name of the intervention analyzed. Some programs are general categories of a type of intervention, while others are specific name-brand programs. Descriptions of each program can be found following each exhibit, as well as on our website.[#]
- 2) [Total benefits](#) are the average benefits of the intervention, per-participant. This is the sum of the taxpayer and non-taxpayer benefits.
- 3) [Taxpayer benefits](#) are benefits that accrue to the taxpayers of the state of Washington through avoided publicly funded health care system costs and/or taxes participants would pay on their increased labor market earnings.
- 4) [Non-taxpayer benefits](#) include benefits that accrue directly to program participants; benefits to others, such as reduced costs to private health insurance providers; and indirect benefits, such as the value of a statistical life and the deadweight costs of taxation.
- 5) [Costs](#) are the estimated per-participant cost to implement the program in Washington, relative to the cost of treatment as usual. If the cost is positive, the intervention is estimated to be cheaper than the treatment as usual.
- 6) [Benefits minus costs](#) are the net benefits, or the difference between the total benefits and the cost to implement the program, per participant. If this number is positive, the expected benefits of the program exceed the estimated cost. If this number is negative, the program is estimated to cost more than the sum of the expected benefits.
- 7) [Benefit-to-cost ratios](#) represent the estimated value to Washington State for each dollar invested in the program. It is the total benefits divided by the cost of the program. If a program cost is positive, the benefit-to-cost ratio is designated as "n/a" – not applicable.
- 8) [Chances benefits will exceed costs](#) describes the risk of the investment. In our benefit-cost analysis, we account for uncertainty in our estimates by allowing key inputs to vary across thousands of scenarios. We run our benefit-cost model 10,000 times; this statistic shows the percentage of cases in which the total benefits were greater than the costs.

[#] The benefit-cost section of WSIPP's website presents our current findings for a variety of public policy topics. Items on these tables are updated periodically as new information becomes available. Interested readers can find more information by clicking each entry in the tables.

1) Interventions to promote healthy pregnancy and birth

We examined interventions that aim to support healthy pregnancy and birth, including:

- Interventions to promote smoking cessation during pregnancy;
- Interventions to prevent excessive gestational weight gain;
- Group prenatal care;
- Enhanced prenatal care; and
- Prenatal home visiting programs.

These types of interventions are typically intended for women with high-risk pregnancies due to their age, race, socio-economic status, health behaviors, or health conditions. Generally, interventions that promote healthy pregnancy and birth aim to improve outcomes for both the mother and the infant. We reviewed the research evidence on these interventions and their effects on mortality, pregnancy indicators, birth indicators, and health care utilization.

The primary drivers of the benefit-cost findings for these interventions are 1) changes in health care utilization costs for the mother and the infant (e.g., increased inpatient hospitalization costs related to a preterm birth) and 2) the value of future statistical life years associated with changes in infant mortality.⁹ Our model captures both direct and indirect costs associated with measured outcomes.

⁹ For interventions that do not directly measure effects on infant mortality, we use our primary data analysis to estimate the indirect effect of birth indicators on infant mortality. Our analysis links preterm, low birthweight, very low birthweight, and small for gestational age births to increased odds of infant mortality. See the Health Care Technical Appendix for details.

Outcomes that drive the benefit-cost results¹⁰ for these interventions are:

- Infant mortality;
- Preterm, low birthweight, very low birthweight, and small for gestational age births;
- Cesarean sections; and
- Neonatal intensive care unit (NICU) admissions.

[Exhibit 3](#) provides our benefit-cost findings for these interventions¹¹ and is followed by brief descriptions of each intervention. See our website for additional information on each intervention, including meta-analytic results and detailed benefit-cost findings.

¹⁰ For details on how we calculate the direct and indirect costs of these outcomes for both mothers and infants. See the Health Care Technical Appendix and WSIPP's Technical Document.

¹¹ In our meta-analysis, we also report pregnancy and birth outcomes including postpartum smoking, maternal hypertension, and adequate prenatal care. However, these outcomes are not currently monetized in our benefit-cost model. See our website for detailed meta-analytic findings.

Exhibit 3

Benefit-Cost Results: Interventions to Promote Healthy Pregnancy and Birth

Program name (1)	Total benefits (2)	Taxpayer benefits (3)	Non-taxpayer benefits (4)	Costs (5)	Benefits minus costs (net present value) (6)	Benefit to cost ratio (7)	Chance benefits will exceed costs (8)
<i>Interventions to promote smoking cessation during pregnancy</i>							
Smoking cessation programs for pregnant women: Contingency management	\$9,972	\$970	\$9,002	(\$209)	\$9,763	\$47.61	98%
Smoking cessation programs for pregnant women: Nicotine replacement treatment	\$3,347	\$312	\$3,035	(\$116)	\$3,231	\$28.82	75%
Smoking cessation programs for pregnant women: Intensive behavioral interventions	\$2,262	\$204	\$2,058	(\$95)	\$2,168	\$23.90	89%
<i>Interventions to prevent excessive gestational weight gain</i>							
Interventions to prevent excessive gestational weight gain (population with obesity-related risk factors)	(\$751)	(\$212)	(\$538)	(\$202)	(\$953)	(\$3.71)	47%
Interventions to prevent excessive gestational weight gain (general population)	(\$928)	\$119	(\$1,047)	(\$184)	(\$1,112)	(\$5.03)	36%
<i>Group prenatal care</i>							
Group prenatal care (compared to standard prenatal care)	\$2,695	\$176	\$2,520	\$1,095	\$3,791	n/a*	94%
<i>Enhanced prenatal care</i>							
Enhanced prenatal care programs delivered through Medicaid	\$6,396	\$841	\$5,555	(\$415)	\$5,981	\$15.42	98%
Non-Medicaid enhanced prenatal care programs for African-American women	\$3,355	\$561	\$2,795	(\$592)	\$2,763	\$5.66	69%
Non-Medicaid enhanced prenatal care programs for adolescents	\$2,996	\$644	\$2,351	(\$513)	\$2,483	\$5.84	73%
<i>Prenatal home visiting programs</i>							
Other prenatal home visiting programs	\$11,625	\$748	\$10,878	(\$693)	\$10,932	\$16.77	100%
Resource Mothers Program	\$2,005	\$358	\$1,647	(\$716)	\$1,290	\$2.80	84%

Note:

*This program costs less than standard treatment, and therefore does not have a "cost." For programs like this, we cannot compute a benefit-cost ratio.

Intervention descriptions

Contingency management for smoking cessation during pregnancy. Contingency management is a supplement to counseling that rewards participants for attending treatment and/or abstaining from substance use. The interventions reviewed recruited women who were smoking during pregnancy and provided rewards contingent on quitting and remaining abstinent. Rewards were in the form of vouchers exchangeable for goods. Participants typically received vouchers worth \$400 to \$600.

Nicotine replacement treatment during pregnancy. We reviewed program evaluations where nicotine replacement (patches or gum) was provided along with behavioral counseling for pregnant women. Individuals in comparison groups received either no nicotine replacement or a placebo patch along with behavioral counseling for smoking cessation. Individuals received treatment between 6 and 12 weeks.

Intensive behavioral interventions for smoking cessation during pregnancy. We reviewed behavioral interventions that provided intensive face-to-face or phone counseling for smoking cessation during pregnancy.¹² These interventions are tailored to pregnant smokers, include more than a single brief counseling session, and offer self-help materials to encourage smoking cessation. Motivational interviewing is the most common type of counseling.

Interventions to prevent excessive gestational weight gain (population with obesity-related risk factors). A wide range of interventions aim to prevent excessive gestational weight gain in a population with obesity-related risk factors (based on their pre-pregnancy Body Mass Index [BMI]). We included interventions that offer an exercise class and interventions that offer counseling on recommended weight gain during pregnancy. Typically athletic trainers lead exercise programs in groups, and counseling is delivered one-on-one in a clinical setting by a health educator, midwife, psychologist, or obstetrician.

Interventions to prevent excessive gestational weight gain (general population). A wide range of interventions aim to prevent excessive gestational weight gain. We included interventions that offer an exercise class and interventions that offer counseling on recommended weight gain during pregnancy. Typically athletic trainers lead exercise programs in groups, and counseling is delivered one-on-one in a clinical setting by a health educator, midwife, or obstetrician. Counseling ranged from one to nine sessions.

Group prenatal care. Prenatal care visits are traditionally conducted by an obstetrician or midwife in a clinical setting. Group prenatal care is an alternative strategy to deliver prenatal education, clinical assessments, and testing in a non-clinical setting, such as a community center. Groups are typically led by an obstetrician or midwife and may also include a registered nurse or medical assistant as a second staff member.

Five out of six studies included in this analysis used the CenteringPregnancy model of prenatal care, which includes ten

¹² We excluded evaluations of programs that only included a single brief counseling session (< 15 minutes), that only provided self-help materials, and that did not use laboratory tests to confirm smoking status.

sessions of education and clinical assessments in a group setting. On average, sessions are two hours long with groups of six to twelve women. One study in this analysis provided prenatal education in groups of six to eight and taught pregnant teens to conduct routine clinical measurements on their peers.¹³ In this analysis, individuals received group prenatal care for about seven months. All women in the comparison groups received standard clinical prenatal care.

Enhanced prenatal care programs delivered through Medicaid. Since 1985, prenatal care coordination has been a part of the federal Medicaid program,¹⁴ providing enhanced prenatal care services to low-income women. These services are intended to be provided in addition to clinical prenatal care. Enhanced prenatal care programs delivered through Medicaid typically included risk assessment, case management, psychosocial support, and health education. Women are eligible for these programs at any time during their pregnancy and for the first 12 months postpartum.

Participants typically received the program for 3-16 months, including both prenatal and postpartum services. All women in treatment and comparison groups received clinical prenatal care (treatment as usual).

Non-Medicaid enhanced prenatal care programs for African-American women. Non-Medicaid enhanced prenatal care programs for African-American women provide psychosocial support and health

education regarding risk reduction. Some programs also include case management and nutritional counseling. Services are provided by paraprofessionals or nurses.

Participants in the reviewed studies typically received the program for five months, including prenatal and postpartum services.¹⁵ All women in treatment and comparison groups received clinical prenatal care (treatment as usual).

Non-Medicaid enhanced prenatal care programs for adolescents. Non-Medicaid enhanced prenatal care programs for adolescents are tailored to meet the needs of pregnant women who are age 19 or under. These programs included intensive case management, group classes, or both, provided by either a paraprofessional or team of health service providers.

The programs reviewed focused exclusively on the prenatal period and did not include postpartum services. Participants could enroll at any time during their pregnancy and typically received the program for four months. All women in treatment and comparison groups received clinical prenatal care (treatment as usual).

Other prenatal home visiting programs. This broad grouping of interventions captures home visiting programs that focus on pregnant women.¹⁶ These programs are intended for women with high-risk pregnancies based on socioeconomic status, race, or other pregnancy risk factors. In these programs, nurses, social workers, or

¹³ The "routine measures" included fetal heart tones, fundal height measurement, weights, and blood pressure measures. Ford, et al. (2002).

¹⁴ In 1985 the Omnibus Budget Act directed Health Care Financing to PNCC programs, as part of a larger effort to address disparate birth outcomes and infant mortality rates.

¹⁵ Three of the four included programs required enrollment before the 3rd trimester of pregnancy. The fourth program allowed enrollment at any time during the pregnancy.

¹⁶ We exclude interventions that solely target adolescent women from this analysis.

trained paraprofessional providers make regular home visits to provide one or more non-clinical services that support maternal wellness and infant health during the prenatal period.¹⁷

Services may include case management, health education, risk assessment, psychosocial support, or nutritional counseling. Some program services continued for up to 12 months postpartum. All women in treatment and comparison groups received clinical prenatal care (treatment as usual).

Resource Mothers Program. The Resource Mothers Program is a prenatal home visiting program for pregnant adolescents ages 19 and under. Adolescent women are eligible for this program during their pregnancy and for 12 months postpartum. In this program, a paraprofessional provider called a “resource mother” makes monthly visits to the adolescents’ home to provide case management, risk assessments, psychosocial support, or health education. Resource mothers are supervised by a social worker.¹⁸ All women in treatment and comparison groups received clinical prenatal care.

¹⁷ We performed sensitivity analyses on provider type (paraprofessional versus nurses/social workers) and length of program. We found no difference in cost or effect size, so we included all provider types in this analysis.

¹⁸ Both of the Resource Mothers Program studies included were implemented in South Carolina and provided an average of 16 home visiting hours, 1 training hour, and 1 supervisory hour per participant.

2) Therapies to treat opioid use disorder

Comprehensive responses to opioid use disorder include prevention, treatment and harm reduction.¹⁹ This report focuses on treatment for opioid use disorder, including:

- Medication-assisted maintenance therapies and
- Nonpharmacological therapies for opioid use disorder.

Treatment for opioid use disorder typically includes detoxification, stabilization, and medication-assisted maintenance treatment with methadone or buprenorphine.²⁰ The medications are intended to prevent withdrawal symptoms and/or block the euphoric effects of opioids.

Nonpharmacological therapies (such as counseling) are typically provided alongside medication-assisted therapies.

¹⁹ See: Franklin, G., Sabel, J., Baumgartner, C., Jones, C.M., Mai, J., Banta-Green, C.J., . . . Tauben, D.J. (2015). A comprehensive approach to address the prescription opioid epidemic in Washington State: Milestones and lessons learned. *Am. J. Public Health American Journal of Public Health*, 105(3), 463-469; Compton, W., Boyle, M., & Wargo, E. (2015). Prescription opioid abuse: problems and responses. *Preventive Medicine*, 80, 5-9; Haegerich, T., Paulozzi, L., Manns, B. & Jones, C. (2014). What we know, and don't know, about the impact of state policy and systems-level interventions on prescription drug overdose. *Drug and Alcohol Dependence*, 145, 34-47; Kolodny, A., Courtwright, D., Hwang C., Kreiner, P., Eadie, J., Clark, T., & Alexander, G. (2015). The prescription opioid and heroin crisis: a public health approach to an epidemic of addiction. *Annual Review of Public Health*, 36, 559-74.

²⁰ Clausen T. (2015). Commentary on Evans et al. (2015): Coherent long-term treatment approaches—superior in treatment of opioid dependence. *Addiction* 110, 1006-1007; Mauger S., Fraser R., & Gill K. (2014). Utilizing buprenorphine-naloxone to treat illicit and prescription-opioid dependence. *Neuropsychiatric Disease and Treatment* 10, 587-598.

For these types of interventions, the primary drivers of our benefit-cost results are changes in labor market earnings and health care utilization costs associated with opioid use disorder.²¹

Exhibit 4 provides benefit-cost findings for these interventions and is followed by brief descriptions of each intervention. See our website for additional information on each intervention, including meta-analytic and detailed benefit-cost findings.

In addition, WSIPP recently published benefit-cost findings on long-acting medications²² for opioid use disorder, including:

- Injectable naltrexone,
- Injectable bromocriptine,
- Naltrexone implants, and
- Buprenorphine implants.

Results for these topics can be found on our website and are detailed in a separate report.²³

Exhibit 4

Benefit-Cost Results: Therapies to Treat Opioid Use Disorder

Program name (1)	Total benefits (2)	Taxpayer benefits (3)	Non-taxpayer benefits (4)	Costs (5)	Benefits minus costs (net present value) (6)	Benefit to cost ratio (7)	Chance benefits will exceed costs (8)
Contingency management (lower cost) for opioid use disorder	\$8,305	\$955	\$7,350	(\$356)	\$7,949	\$23.35	100%
Methadone maintenance for opioid use disorder	\$8,257	\$1,140	\$7,117	(\$3,769)	\$4,488	\$2.19	88%
Buprenorphine (or buprenorphine/naloxone) maintenance treatment for opioid use disorder	\$8,092	\$1,161	\$6,931	(\$4,633)	\$3,458	\$1.75	86%
Cognitive-behavioral coping-skills therapy for opioid use disorder	(\$535)	(\$34)	(\$501)	(\$538)	(\$1,073)	(\$0.99)	42%

²¹ See WSIPP’s Technical Documentation for details on how we calculate the direct and indirect costs of this outcome. Note that WSIPP does not currently monetize the “opportunity costs” to the participant for these programs (i.e., the costs of need to attend a clinic every day to receive methadone medication).

²² Patients treated with methadone or buprenorphine may struggle with adherence, as their doses are taken daily or several times a week. In the case of methadone maintenance treatment, patients must receive the daily medication in specialized clinics. Long-acting injectable medications for substance use disorders were developed in part to improve treatment adherence. Because these medications are administered as monthly injections, patients do not have to travel to a clinic for treatment every day. We also reviewed the evidence for more recently developed implantable medications that last for six months.

²³ Nafziger, M. (2016). *Long-acting injectable medications for alcohol and opiate dependence: Benefit-cost findings* (Document Number 16-12-3901). Olympia: Washington State Institute for Public Policy. See our website for findings.

Intervention descriptions

Contingency management (lower cost) for opioid use disorder. Contingency management is a supplement to counseling treatment that rewards participants for attending treatment and/or abstaining from substance use.

The interventions reviewed here focused on those with opioid use disorders who were also receiving medicated-assisted drug treatment and counseling. Contingencies were provided for remaining abstinent. Two methods of contingency management were reviewed: 1) A voucher system where abstinence was rewarded with vouchers exchangeable for goods provided by the clinic or counseling center and 2) a prize or raffle system where clients who remained abstinent could draw from a prize bowl.

Treatment in the included studies lasted between one and six months with reward opportunities occurring two to three times per week, on average. The value of contingencies in the programs reviewed ranged from \$59-\$253 per participant, with an average of \$168 (in 2016 dollars).²⁴

Methadone maintenance treatment for opioid use disorder. Methadone is an opiate substitution treatment used to treat opioid dependence. It is a synthetic opioid that blocks the effects of opiates, reduces withdrawal symptoms, and relieves cravings. Methadone is a daily medication dispensed in outpatient clinics that specialize in methadone treatment and is often used in

conjunction with behavioral counseling approaches.

The studies included in our analysis evaluated methadone maintenance rather than short-term detoxification or stabilization. We excluded studies with treatment dosages below standard guidance (< 50 mg/day).

Buprenorphine (or buprenorphine/naloxone) maintenance treatment for opioid use disorder. Buprenorphine is an opiate substitution treatment for opioid dependence. Buprenorphine can be used to treat both heroin and prescription opioid users.²⁵ It is a daily medication generally provided in addition to counseling therapies.

Buprenorphine (or buprenorphine/naloxone) is a partial agonist that suppresses withdrawal symptoms and blocks the effects of opioids. Two versions of buprenorphine are used in the treatment of opioid dependence. Subutex consists of buprenorphine only while Suboxone is a version of buprenorphine that combines buprenorphine and naloxone.²⁶ Suboxone is generally given during the maintenance phase and many clinics will only provide take-home doses of Suboxone.

²⁵ Potter, J., Marino, E., Hillhouse, M., Nielsen, S., Wiest, K., Canamar, C., Martin, J., Ang, A., Baker, R., Saxon, A., & Ling, W. (2013). Buprenorphine/naloxone and methadone maintenance treatment outcomes for opioid analgesic, heroin, and combined users: findings from starting treatment with agonist replacement therapies (START). *Journal of Studies on Alcohol and Drugs*, 74(4), 605-13; McHugh, R., Nielson, S., & Weiss, R. (2015). Prescription drug abuse: from epidemiology to public policy. *Journal of Substance Abuse Treatment*, 48(1), 1-7; Moore, B., Fiellin, D., Barry, D., Sullivan, L., Chawarski, M., O'Connor, P., & Schottenfied., R. (2007). Primary care office-based buprenorphine treatment: comparison of heroin and prescription opioid dependent patients. *Journal of General Internal Medicine*, 22(4), 527-530.

²⁶ The addition of naloxone reduces the probability of overdose and reduces misuse by producing severe withdrawal effects if taken any way except sublingually.

²⁴ Based on a statistical analysis of contingency management studies, we determined that programs with a maximum value of vouchers or prizes less than or equal to \$500 (in 2012 dollars) represent lower-cost contingency management.

Buprenorphine and buprenorphine/naloxone are alternatives to methadone treatments and, unlike methadone, can be prescribed in office-based settings by physicians that have completed a special training.

We reviewed studies that evaluated the effectiveness of buprenorphine maintenance therapy.²⁷ We excluded studies with treatment dosages below current guidance (< 8 mg/day).

Cognitive-behavioral coping-skills therapy for opioid use disorder. Cognitive-behavioral coping-skills therapy is a manualized, standalone treatment for alcohol and/or drug use disorder. This intervention emphasizes identifying high-risk situations that could lead to relapse and developing associated coping skills. Clients engage in problem solving, role playing, and homework practice. The intervention is often provided in an individual therapy format but can also be conducted in groups.

Studies used in this analysis evaluated the program in a population of opioid users receiving methadone or buprenorphine maintenance treatment. Treatment in the included studies occurred over an average of three months.

²⁷ These studies compared outcomes for subjects receiving buprenorphine maintenance treatment with those receiving no medication-assisted therapy. Note that many recent studies, excluded from our analysis, compared the efficacy of methadone versus buprenorphine treatment.

3) Collaborative primary care

We examined collaborative primary care as an intervention that aims to improve treatment for patients with behavioral health diagnoses.²⁸ We analyzed the effect of collaborative primary care for several separate²⁹ populations, including:

- Adults with anxiety,
- Adults with depression,
- Older adults with depression,
- Adults with depression and comorbid medical conditions, and
- Older adults with depression and comorbid medical conditions.

Collaborative primary care models include care management, a team of at least two care providers, and individualized and measurement-based treatment plans.³⁰ Primary care providers initially screen patients for behavioral health conditions and provide an assessment. Care managers, usually located in a primary care setting, then develop an individualized and measurement-based treatment plan and coordinate with

²⁸ WSIPP previously investigated the use of telemedicine for behavioral health in primary care. There is insufficient data on program costs to conduct a benefit-cost analysis at this time. We report meta-analytic findings on this intervention on our website.

²⁹ For topics 1) collaborative primary care for depression and 2) collaborative primary care for depression and comorbid medical conditions, general adult and older adult populations were mutually exclusive. That is, studies that focused on adult populations (18 years and older) were included in the "general adult" meta-analysis. Some older adults were included in these studies, but collaborative care was not specifically targeted to older adult populations. Studies that focused on older adult populations were included in the "older adult" meta-analysis. See program descriptions for specific populations analyzed.

³⁰ Shippee et al. (2013) and American Psychiatric Association and the Academy of Psychosomatic Medicine. (2016). *Dissemination of integrated care within adult primary care settings: The Collaborative Care Model*. Retrieved from <https://www.psychiatry.org/psychiatrists/practice/professional-interests/integrated-care/collaborative-care-model>.

Exhibit 5

Benefit-Cost Results: Collaborative Primary Care

Program name (1)	Total benefits (2)	Taxpayer benefits (3)	Non-taxpayer benefits (4)	Costs (5)	Benefits minus costs (net present value) (6)	Benefit to cost ratio (7)	Chance benefits will exceed costs (8)
Collaborative primary care for anxiety (general adult population)	\$12,301	\$3,985	\$8,316	(\$834)	\$11,467	\$14.76	90%
Collaborative primary care for depression (general adult population)	\$10,471	\$3,371	\$7,100	(\$834)	\$9,637	\$12.56	98%
Collaborative primary care for depression with comorbid medical conditions (general adult population)	\$6,877	\$2,275	\$4,602	(\$937)	\$5,939	\$7.34	100%
Collaborative primary care for depression with comorbid medical conditions (older adult population)	\$1,968	\$692	\$1,276	(\$575)	\$1,392	\$3.42	82%
Collaborative primary care for depression (older adult population)	\$1,275	\$481	\$794	(\$577)	\$698	\$2.21	78%

primary care and behavioral health care providers to administer care and regularly follow up with patients.

We reviewed evidence of the effect of collaborative primary care on anxiety, depression, total medical costs, and other quantifiable health outcomes related to comorbid medical conditions.³¹ For this intervention, benefits are valued through health care utilization and labor market earnings associated with changes in the incidence of anxiety and depression³².

For these interventions, the primary drivers of our benefit-cost results are changes in labor market earnings and health care utilization costs associated with changes in depression and anxiety.

Exhibit 5 provides our benefit-cost findings for the five populations analyzed and is followed by brief descriptions of the intervention for each population. See our website for additional information, including detailed benefit-cost findings.

³¹ We report meta-analytic results for total medical costs (reported as percentage changes), suicidal ideation, and outcomes associated with comorbidity (e.g., HbA1c [blood sugar] and LDL cholesterol). However, these outcomes were not monetized in our benefit-cost model.

³² See WSIPP's Technical Documentation for details on how we calculate the direct and indirect costs of these outcomes.

Intervention descriptions

Collaborative primary care for anxiety (general adult population). We examined the impact of collaborative primary care in reducing anxiety symptoms among adults ages 18 and older diagnosed with panic disorder, generalized anxiety disorder, or social anxiety disorder.³³ In these programs, patients received treatment for 6 to 12 months.

Collaborative primary care for depression (general adult population). This review focused on collaborative primary care programs for adults ages 18 and older with depressive disorders, including major or minor depression, dysthymia, or subthreshold depression.³⁴ In the included evaluations, patients received collaborative care for 3 to 36 months.

Collaborative primary care for depression with comorbid medical conditions (general adult population). In this analysis, collaborative primary care programs focused on adult patients ages 18 and older with depression and comorbid medical conditions including diabetes, heart disease, acute coronary syndrome, hypertension, or stroke.³⁵ In the included programs, patients received treatment for 3 to 12 months.

Collaborative primary care for depression with comorbid medical conditions (older adult population). In this analysis, we included collaborative primary care programs focused on older adults ages 50 and older diagnosed with depression and

comorbid medical conditions, including diabetes and hypertension.³⁶ Patients received treatment for 1 to 12 months.

Collaborative primary care for depression (older adult population). Collaborative primary care programs for older adults with depression have a similar structure to collaborative care programs for adults, but care management and treatment approaches are tailored for patients ages 60 and older.³⁷ This approach can include screening patients using the Geriatric Depression Scale³⁸ and adhering to treatment guidelines for older adult populations. In the included studies, patients received collaborative care for 3 to 12 months.

³³ Among the included studies, the average age of participants was 44.

³⁴ Among the included studies, the average age of participants was 46.

³⁵ Among the included studies, the average age of participants was 57.

³⁶ Among the included studies, "older adults" was defined as adults ages 50 and older. The average age of participants was 67.

³⁷ Among the included studies, "older adults" was defined as adults ages 60 and over. The average age of participants was 72.

³⁸The Geriatric Depression Scale is a 30-item self-assessment used to screen for depression among older adults.

4) Patient-centered medical homes

The patient-centered medical home (PCMH) model attempts to make health care more efficient by implementing a set of changes to primary care. PCMHs are designed to provide comprehensive care, treating both acute needs and promoting population health. The PCMH model emphasizes care coordination across providers, patient engagement, evidence-based care, use of health information technology, and enhanced patient access. Our analysis includes studies which evaluate “full” implementation of the PCMH model.³⁹

All PCMH models share several features in common. Providers typically receive a per-member per-month care management payment, in addition to traditional fee-for-service payments, for establishing medical homes. Payers (private health insurers, Medicaid, and Medicare) may also provide pay-for-performance bonuses, usually for meeting certain quality of care measures. The PCMHs reviewed are implemented in physician-led practices that 1) serve either a general or high-risk population and 2) do or do not receive incentives to reduce utilization and costs.⁴⁰

For these types of interventions, changes in health care utilization costs are the primary drivers of our benefit-cost results. The measured outcomes that drive these benefit-cost results include:

- Emergency department visits,
- Hospitalizations, and
- Total medical costs.

[Exhibit 6](#) displays our benefit-cost findings for these PCMH models and is followed by brief descriptions of each intervention. See our website for additional information on each intervention, including meta-analytic and detailed benefit-cost findings.

³⁹ “Full” implementations are identified by National Committee for Quality Assurance (NCQA) recognition or by the inclusion of several of the criteria underlying this recognition (e.g., team-based care, comprehensive care, care coordination, system-based approaches to quality, patient-centered care, and enhanced access). We exclude studies that focus exclusively on care management or disease management.

⁴⁰ We also reviewed evidence on the effectiveness of patient-centered medical homes implemented in integrated health delivery systems but did not have sufficient cost information to conduct a benefit-cost analysis on this type of implementation. We provide meta-analytic findings on our website.

Exhibit 6

Benefit-Cost Results: Patient-Centered Medical Homes

Program name (1)	Total benefits (2)	Taxpayer benefits (3)	Non-taxpayer benefits (4)	Costs (5)	Benefits minus costs (net present value) (6)	Benefit to cost ratio (7)	Chance benefits will exceed costs (8)
Patient-centered medical homes in physician-led practices without explicit utilization or cost incentives (high-risk population)	\$149	\$75	\$75	(\$83)	\$66	\$1.80	45%
Patient-centered medical homes in physician-led practices without explicit utilization or cost incentives (general population)	\$32	\$29	\$3	(\$83)	(\$51)	\$0.39	34%
Patient-centered medical homes in physician-led practices with utilization or cost incentives (high-risk population)	\$89	\$65	\$24	(\$155)	(\$66)	\$0.57	35%
Patient-centered medical homes in physician-led practices with utilization or cost incentives (general population)	\$36	\$44	(\$9)	(\$155)	(\$119)	\$0.23	31%

Intervention descriptions

PCMHs in physician-led practices without explicit utilization or cost incentives (high-risk population). This category includes PCMH programs that were implemented in physician-led practices but had no explicit incentives regarding cost or utilization. These results are for chronically ill or older adults.

PCMHs in physician-led practices without explicit utilization or cost incentives (general population). This category includes PCMH programs that were implemented in physician-led practices but had no explicit incentives regarding cost or utilization.

PCMHs in physician-led practices with utilization or cost incentives (high-risk population). This category includes PCMH programs that were implemented in physician-led practices where providers were offered financial incentives to reduce utilization and costs, such as shared cost savings. These results are for chronically ill or older adults.

PCMHs in physician-led practices with utilization or cost incentives (general population). This category includes PCMH programs that were implemented in physician-led practices where providers were offered financial incentives to reduce utilization and costs, such as shared cost savings.

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