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Evaluation of Oregon's Patient Centered Primary Care Homes on Expenditures and Utilization from 2011 to 2019

Final Report

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Evaluation of Oregon's Patient Centered Primary Care Homes on Expenditures and Utilization from 2011 to 2019

EXECUTIVE SUMMARY

The Oregon Health Authority (OHA) contracted with researchers from the OHSU-PSU School of Public Health in 2022 to investigate the impact of Patient Centered Primary Care Home (PCPCH) practices on the healthcare expenditures and utilization of Oregonians they serve through the first eight years of the PCPCH program (October 2011 through September 2019). This study builds on and extends prior work completed in 2016 that assessed PCPCH impact on expenditures and utilization through the first three years of the program. Similar to prior work, the study estimates the impact of the program on healthcare expenditures and utilization overall, on eight specific service categories, and across time in terms of the number of years of PCPCH designation. This study extends prior efforts by estimating PCPCH program impact by three age groups, five payor types, and across nine Oregon regions defined by the Oregon Office of Rural Health.

KEY FINDINGS

The study findings were broadly consistent with expectations for the program's impact on healthcare expenditures and utilization, while providing new information on their distribution by age, payor and region within Oregon. Specifically, the study found that among PCPCH practices:

- Total healthcare expenditures per person were reduced by 6.3% or approximately \$76 per person per quarter.
- Nearly \$12 in savings in other services were created, including emergency department and inpatient care, for every \$1 increase in primary care expenditures related to the PCPCH program
- At least \$1.3B in savings occurred over its first eight years, ranging from approximately \$68M in its first year to \$200M in its eighth year. This amount should increase as the program continues to expand.
- Children and youth (18 years or younger) had almost 1.5 times greater rates of expenditure reduction than for adults. The bulk of savings, however, come from adults as their expenditures are higher and they represent a larger portion of the population.
- The OHP program had almost 1.5 times higher rates of expenditure reduction than for private insurers or Medicare (Advantage). Savings to OHP over the first eight years were at least \$717M, while savings for private insurers were \$365M and Medicare \$195M.
- Southern and Eastern Oregon regions had the highest rates of expenditure reduction, while Portland (City), Valley Urban and Coastal regions had small to negligible changes.

METHODS

The study design compares pre- to post-PCPCH designation expenditure and utilization changes for individuals served in PCPCH practices to those found for like individuals served in non-PCPCH primary care practices. The difference in these pre-post changes is the estimated net effect of PCPCH designation on utilization and expenditures. The study used de-identified Oregon All Payer All Claims (APAC) data from January 2011 through September 2019. Oregonians with at least one primary care claim in a study year were attributed to PCPCH or non-PCPCH primary care practices. Matched cohorts of PCPCH and non-PCPCH primary care users were created for each study year reflecting the distribution of PCPCH patients in the last two years of the study. The outcomes measured, overall and by service type, included expenditures per person, likelihood of using any service in a period, and expenditures per service user. The study reflects the experience of 759 practices receiving PCPCH designation between October 1, 2011 and September 30, 2018, and 702,417 individuals identified as receiving services from those practices from January 1, 2011 through September 30, 2019.

CONCLUSIONS

The findings of this study indicate that the PCPCH program continues to achieve significant transformation in the provision of primary care. This care transformation has resulted in more cost-effective care within primary care that has yielded significant savings in the larger health care system. Continued support of the PCPCH program, and expansion of PCPCH designated primary care practices, should increase the extent of healthcare savings and care transformation that has been achieved so far. The benefits of this state sponsored program have accrued across both public and private insurance systems. Some of its largest benefits have also accrued to regions of the state that have often been identified as having geographic or other structural limitations to their healthcare systems.

Evaluation of Oregon’s Patient Centered Primary Care Homes on Expenditures and Utilization from 2011 to 2019

INTRODUCTION

The Oregon Health Authority (OHA) contracted with researchers from the OHSU-PSU School of Public Health in 2022 to investigate the impact of Patient Centered Primary Care Home (PCPCH) practices on the healthcare expenditures and utilization of Oregonians they serve through the first eight years of the PCPCH program (October 2011 through September 2019). This study builds on and extends prior work completed in 2016 that assessed PCPCH impact on expenditures and utilization through the first three years of the program. Similar to prior work, the study estimates the impact of the program on healthcare expenditures and utilization overall, on eight specific service categories, and across time in terms of the number of years of PCPCH designation. This study extends prior efforts by estimating PCPCH program impact by three age groups, five payor types, and across nine Oregon regions defined by the Oregon Office of Rural Health.

Following sections of the report include an overview of the PCPCH program and study methods, main findings, and a summary of results. Details of the study methods and study results are provided in Appendices A & B, respectively. The study was approved by the Portland State University Human Subjects Research Review Committee.

PCPCH PROGRAM OVERVIEW

The Oregon Health Authority (OHA) Patient Centered Primary Care Home (PCPCH) Program, which was established by the Oregon Legislature in 2009, is viewed as a key strategy in achieving the “Triple Aim” envisioned in health systems transformation—a healthier population, a better patient care experience, and more reasonable costs. Specifically, the PCPCH Program was established based on extensive research that demonstrates that the medical home model—clinical practices that provide comprehensive, coordinated care while taking into account family and community context—is uniquely positioned to provide care that is better coordinated and to advocate for patients’ needs more effectively.

The PCPCH Program is administratively housed within the Clinical Service Integration Workforce (CSIW) at OHA. The PCPCH Program was tasked with:

- (1) developing strategies to identify and qualify clinics for the PCPCH Program;
- (2) utilizing these same strategies to measure the quality of designated PCPCH clinics;
- (3) promoting the development of PCPCH clinics; and,
- (4) encouraging individuals who are covered by the Oregon Health Plan (OHP) to receive care in the PCPCH model.

Pursuant to the first two tasks, in 2009, the OHA appointed a 15-member advisory committee which was comprised of patients, clinicians, and health plan and purchasing representatives to develop the

standards that the PCPCH Program uses to describe the care delivered by PCPCH-designated clinics. The first set of standards developed by the committee was finalized and adopted in 2011; these were updated, and a revised set of standards was implemented in 2014. Subsequent Standard Advisory Committees were convened, and program and model revisions occurred in 2017 and 2020.

The standards were developed to reflect the six core attributes of the Oregon PCPCH Program and are intended to reflect the perspective of the patient. The 2020 core attributes and standards are:

1. Access to Care: “Health care team, be there when we need you.”
2. Accountability: “Take responsibility for making sure we receive the best possible health care.”
3. Comprehensive Whole Person Care: “Provide or help us get the health care, information, and services we need.”
4. Continuity: “Be our partner over time in caring for us.”
5. Coordination and Integration: “Help us navigate the health care system to get the care we need in a safe and timely way.”
6. Person and Family Centered Care: “Recognize that we are the most important part of the care team—and that we are ultimately responsible for our overall health and wellness.”

STUDY DESIGN OVERVIEW

The following section provides an overview of the study design. A detailed description of the study methods can be found in Appendix A. The intent of the study was to estimate the impact of Oregon’s PCPCH program on the expenditure and utilization patterns of Oregonians overall, as well as identifying differential impacts of the program by level and duration of PCPCH designation, regionally, by payor type, and age. The study estimates PCPCH program effects over its first seven years of operation using de-identified Oregon All Payer All Claims (APAC) data. The study reflects the experience of 759 practices receiving PCPCH designation between October 1, 2011 and September 30, 2018, as well as the experience of 702,417 individuals identified as receiving services from those practices from January 1, 2011 through September 30, 2019.

The study employed a subject matched generalized “difference-in-difference” design that accommodated the staggered designation of PCPCH practices to assess the net impact of PCPCHs on expenditure and utilization of all insurance covered services and nine specific service types. The design compares pre- to post-PCPCH designation expenditure and utilization changes for individuals served in PCPCH practices to those found for like individuals served in non-PCPCH primary care practices. The difference in these pre-post changes is the estimated net effect of PCPCH designation on utilization and expenditure.

The outcomes measured, overall and by service type, include expenditures per person, likelihood of using any service in a period, and expenditures per service user. The impact of the PCPCH program on expenditures and utilization is reported as the percentage change in these outcome measures. The overall impact of the PCPCH

program on expenditures is measured by its impact on the average level of expenditures per person. For example, if PCPCHs are found to reduce total expenditures per person by 5%, this is equivalent to saying the PCPCH program reduced overall expenditures by 5%.

The likelihood of using any service in a period and expenditures per service user are additional outcome measures that provide information on why or how expenditures per person are changing. Changes in the likelihood of any service use reflect changes in the proportion of individuals that are receiving any amount of that service in a period. Changes in expenditures per user reflect the amount or intensity of services used among those individuals who use any amount of a service in a period. These two (sub) measures combine to drive the change in expenditures per person *i.e.* did expenditures per person change because more or less individuals used the service, because those using had greater or lesser intensity of service use, or some combination of both.

RESULTS

Table 1 below provides an overview of the characteristics of the individuals served in PCPCH and non-PCPCH practices during the last two study years (October 2017 through September 2019) and for the study sample which was matched to the PCPCH practice characteristics overall in the final two study years. Differences between the PCPCH and non-PCPCH populations, and between the PCPCH population and the matched study sample are also provided.

The PCPCH population in the last two study years had more children and youth (15.8%) and less adults (4.1% for 18-64 years, 11.7% for 65 years and older). This was reflected in an average age that was 9.5 years lower for the PCPCH versus the non-PCPCH populations. Gender and rural/urban residence were very similar (+/- 0.7% and 0.5%, respectively). There are some modest regional differences, but most are within 1%. The PCPCH population has slightly fewer Portland Metro and Valley Rural residents (2.2% and 2.3%, respectively) and slightly more Valley Urban residents (2.3%). The PCPCH population was much less likely to have Medicare or commercial coverage (12% and 19%, respectively) and much more likely to be Medicaid covered (28.6%). Self-insured plan coverage was similar. The PCPCH population was more likely to have pharmacy coverage (3.1%) and have slightly lower physical risk (.04) and slightly higher behavioral health risk (.04). These differences likely stem from the emphasis on CCO member enrollment in PCPCH practices.

The study sample, given matching, closely mirrors the PCPCH population. Most differences are less than 1%. The study sample is slightly more urban (1.0%), has more Medicaid coverage (1.7%) and less self-insured plan coverage (1.9%), and has slightly lower physical and behavioral health risk scores (.07 and .02, respectively).

Table 1: Demographics of Matched and Unmatched Samples by PCPCH Attribution

Measure	Category	Unmatched Sample by Attribution			Matched Sample (PCPCH & non-PCPCH)	
		Non-PCPCH %/Mean	PCPCH %/Mean	Diff.	%/Mean	Diff.
Age Group	<18 years	25.7%	41.5%	15.8%	42.1%	0.6%
	18-64 years	48.7%	44.7%	-4.1%	44.4%	-0.3%
	65+ years	25.6%	13.9%	-11.7%	13.6%	-0.3%
Age		43.4	33.8	-9.5	33.1	-0.7
Gender	Female	54.4%	53.6%	-0.7%	53.9%	0.3%
	Male	45.6%	46.4%	0.7%	46.1%	-0.3%
Residence	Urban	65.5%	66.0%	0.5%	66.9%	1.0%
	East Urban	2.5%	2.0%	-0.5%	2.0%	0.1%
	Portland	14.7%	15.3%	0.6%	15.2%	-0.1%
	Portland Metro	26.2%	24.0%	-2.2%	24.7%	0.6%
	South Urban	3.4%	3.7%	0.2%	3.0%	-0.6%
	Valley Urban	18.6%	20.9%	2.3%	22.0%	1.0%
	Rural	34.5%	34.0%	-0.5%	33.1%	-1.0%
	Coast	4.3%	3.9%	-0.4%	3.9%	-0.1%
	East Rural	8.6%	9.6%	1.0%	9.4%	-0.2%
	South Rural	6.0%	7.2%	1.2%	6.4%	-0.8%
	Valley Rural	15.7%	13.4%	-2.3%	13.4%	0.1%
	Insurance	Medicare	24.0%	12.0%	-12.0%	11.8%
Medicaid		27.0%	55.6%	28.6%	57.3%	1.7%
Commercial		39.1%	20.1%	-19.0%	20.5%	0.4%
Self-Insured Plan		9.9%	12.3%	2.4%	10.4%	-1.9%
Pharmacy Coverage	No	5.8%	2.7%	-3.1%	2.3%	-0.4%
	Yes	94.2%	97.3%	3.1%	97.7%	0.4%
CDPS Risk Score	Physical	1.03	0.99	-0.04	0.92	-0.07
	Behavioral	0.16	0.20	0.04	0.17	-0.02

Figure 1 below provides estimates of the impact of the PCPCH program over its first eight years on quarterly total expenditures per person, as well as expenditures for the nine service types identified in the study. Estimates with a “*” are statistically significant at p<.05. The following discussion focuses on the percentage change from baseline, as it provides a comparable assessment across service types.

Table B.1 in Appendix 2 provides the estimated magnitude of change in dollars, as well as the baseline expenditure level used to calculate the percentage change.

The PCPCH program reduced total expenditures by 6.3%. Expenditures for Primary and Specialty office/clinic-based care increased by 9.6% and 8.3%, respectively. Expenditures for Emergency Department, Pharmacy, Mental Health and All Other services were reduced by 7.6%, 5.6%, 19.4% and 8.5%, respectively. Expenditures for Radiology and Inpatient care had large estimated reductions (13.7% and 8.1%, respectively) but did not meet statistical significance. Laboratory services were the only area relatively unchanged. While the proportional change within each service type allows comparison of effects, it does not highlight which service types contribute the most towards savings. As seen in Table B.1 in Appendix 2, the estimated dollar value of expenditure reductions per person is \$76.04 per quarter. The largest portions of this reduction are from pharmacy, inpatient and all other services (\$16.21, \$21.41, and \$32.08, respectively).

Figure 1: PCPCH Impact on Quarterly Expenditures per Person

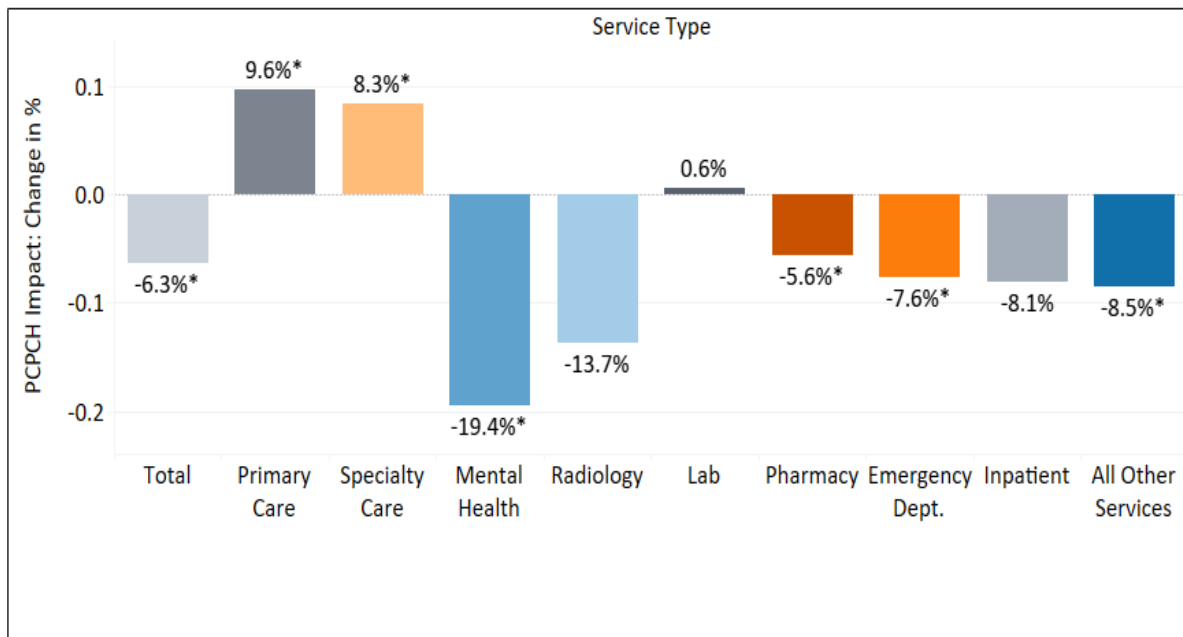
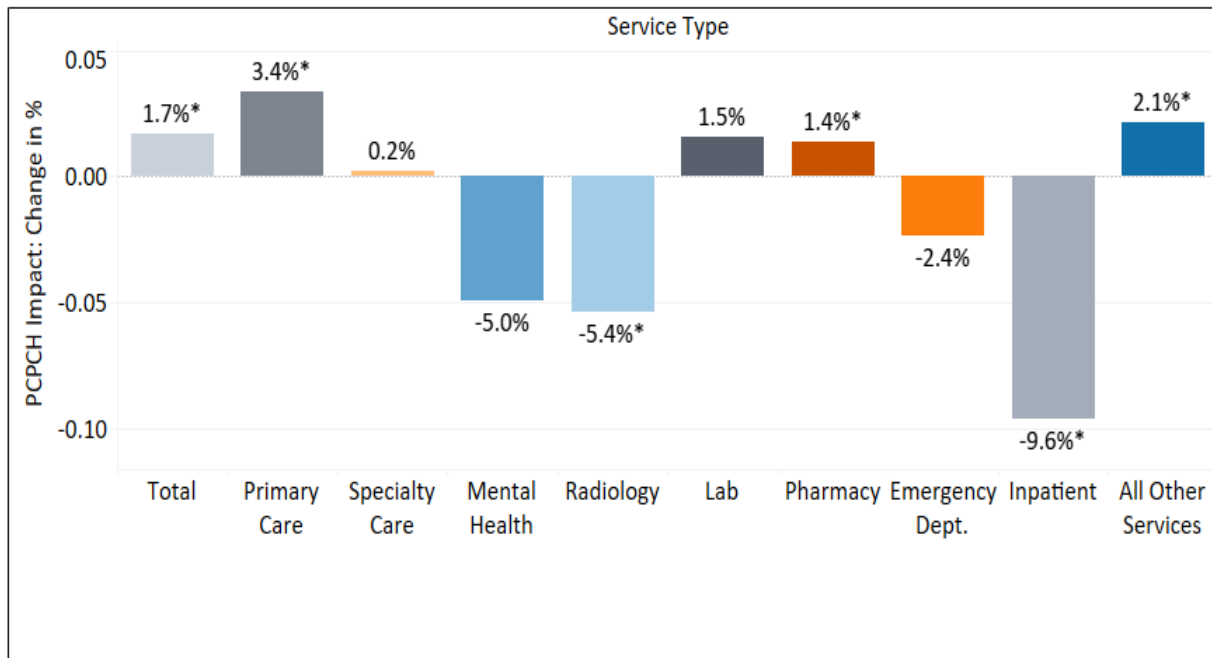


Figure 2 below provides estimates of the impact of the PCPCH program over its first eight years on quarterly likelihood of using any services, as well as the likelihood of using any of the nine service types identified in the study. The PCPCH impact is presented in terms of percentage point change and rate of change from baseline likelihood of use levels. The following discussion focuses on the rate of change from baseline, as it provides a comparable assessment across service types. Estimates with a “*” are statistically significant at $p < .05$. Table B.2 in Appendix 2 provides the estimated magnitude of change in percentage points, as well as the baseline percentage of use used to calculate the rate of change.

Figure 2: PCPCH Impact on Quarterly Use



The likelihood of an individual in the PCPCH program using any services in a quarter increased by 1.7% from baseline. This overall increase likely stemmed from increases in likelihood of using primary care, pharmacy and/or all other services which increased by 3.4%, 1.4% and 2.1%, respectively. Radiology and inpatient care use decreased by 5.4% and 9.6%, respectively. Mental health and emergency department had moderate to large estimated decreases but were not statistically significant. Lab and Specialty care use appeared largely unchanged.

Figure 3 below provides estimates of the impact of the PCPCH program over its first eight years on quarterly total expenditures per user, as well as expenditures per user for the nine service types identified in the study. The PCPCH impact is presented in dollar value and c percentage change from baseline expenditure level. Estimates with a “*” are statistically significant at $p < .05$. The following discussion focuses on the percentage change from baseline, as it provides a comparable assessment across service types. Expenditures per user are indicative of the intensity of resource use for those receiving services. Table B.3 in Appendix 2 provides the estimated magnitude of change in dollars, as well as the baseline expenditure level used to calculate the percentage change.

The PCPCH program reduced total expenditures per user by 6.3%. Expenditures per user for Primary and Specialty office/clinic-based care increased by 8.3% and 12.5%, respectively. Expenditures per user for Pharmacy and All Other services were reduced by 7.3% and 7.7%, respectively. Expenditures per user for Mental Health and Radiology had moderate to large estimated reductions (14.0% and 30.3%, respectively) but did not meet statistical significance. Laboratory and inpatient services had small to moderate increases (1.1% and 5.9%, respectively) but were also not statistically significant.

Figure 3: PCPCH Impact on Quarterly Expenditures per User

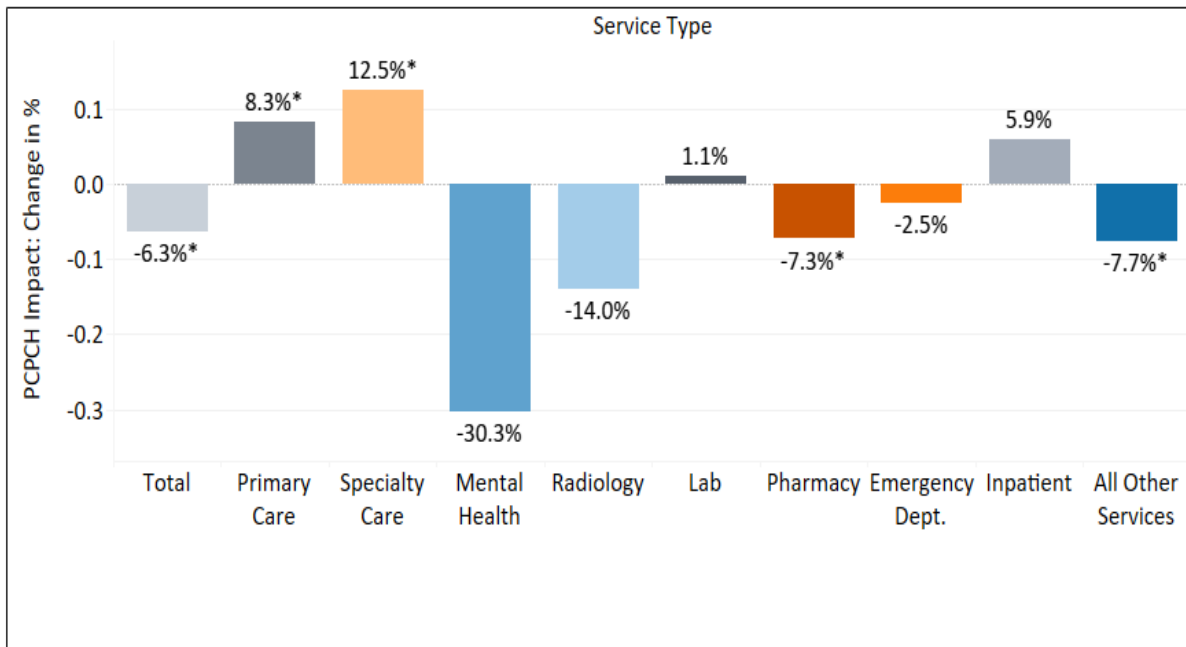
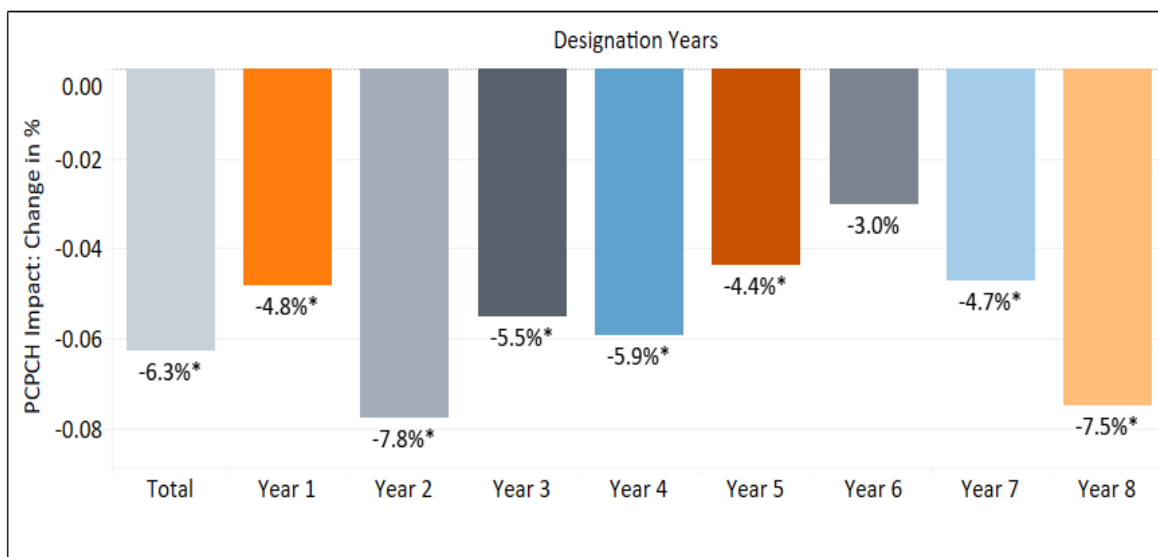


Figure 4 below provides estimates of the impact of the PCPCH program over its first eight years on quarterly total expenditures per person by years of PCPCH designation. Estimates with a “*” are statistically significant at $p < .05$. The following discussion focuses on the percentage change from

Figure 4: PCPCH Impact on Total Expenditures per Person by Years of PCPCH Designation

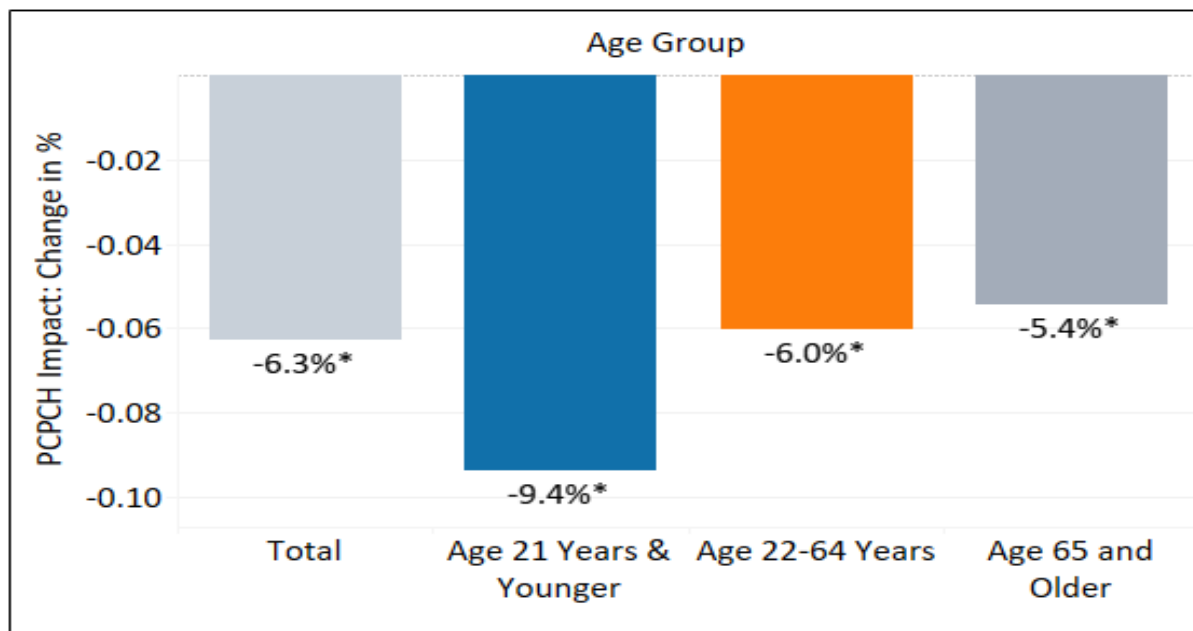


baseline, as it provides a comparable assessment across PCPCH program years. Table B.4 in Appendix 2 provides the estimated magnitude of yearly change in dollars, as well as the baseline expenditure level used to calculate the percentage change.

The estimates provided reflected the pooled effects of PCPCH practices during their first through eighth year of operation. Given the staggered implementation of the PCPCH program only those practices that were designated in the first quarter of the program (October-December 2011) are represented in eighth year of operation, while all PCPCH practices within the study are included in the first-year estimates. The estimated impact of the PCPCH program by years of PCPCH designation is fairly steady, ranging from a decrease of 3.0% in year 6 to 7.8% in year 2. Only the year 6 estimate did not meet statistical significance.

Figure 5 below provides estimates of the impact of the PCPCH program over its first eight years on quarterly total expenditures per person by age group. Estimates with a “*” are statistically significant at $p < .05$. The following discussion focuses on the percentage change from baseline, as it provides a comparable assessment across age groups. Table B.5 in Appendix 2 provides the estimated magnitude of yearly change in dollars, as well as the baseline expenditure level used to calculate the percentage change.

Figure 5: PCPCH Impact on Total Expenditures per Person by Age Group



The rate of reduction in quarterly total expenditures per person for individuals under 21 years of age (9.4%) is about 1.5 times larger than the overall average and the rates of expenditure reduction for the 22-64 years old and 65 years and older groups (6.0% and 5.4% respectively). Estimates for each of the age groups are statistically significant. Despite the much larger proportional reduction in expenditures for children, adolescents and young adults, the older age groups, with significantly higher average expenditure levels and representative proportions of the study population, likely contribute the bulk of the overall savings found.

Figure 6: PCPCH Impact on Total Expenditures per Person by Insurance Type

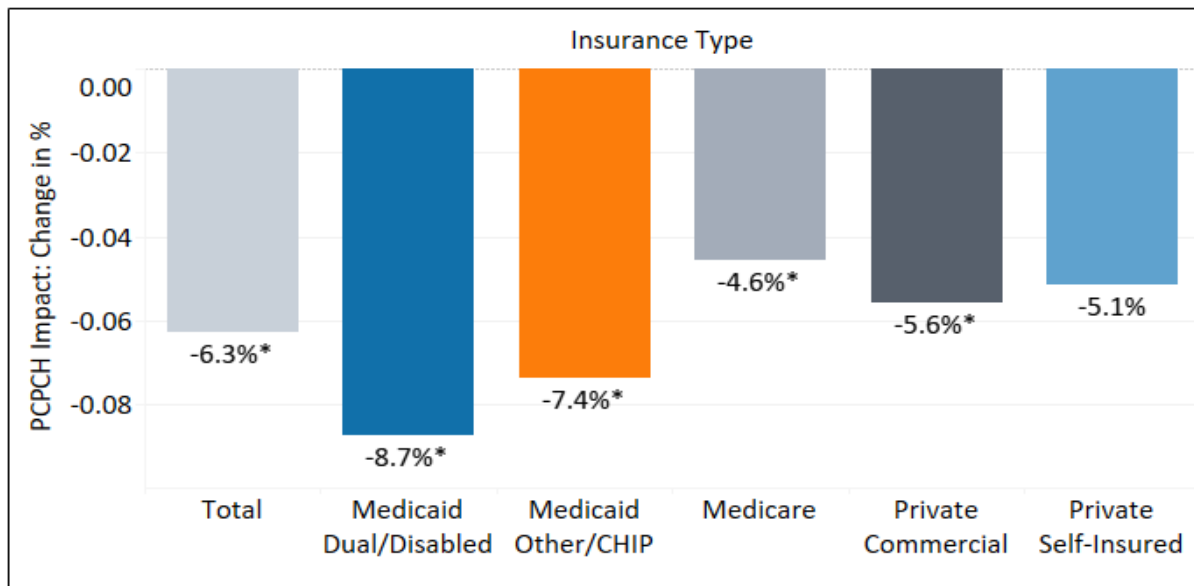


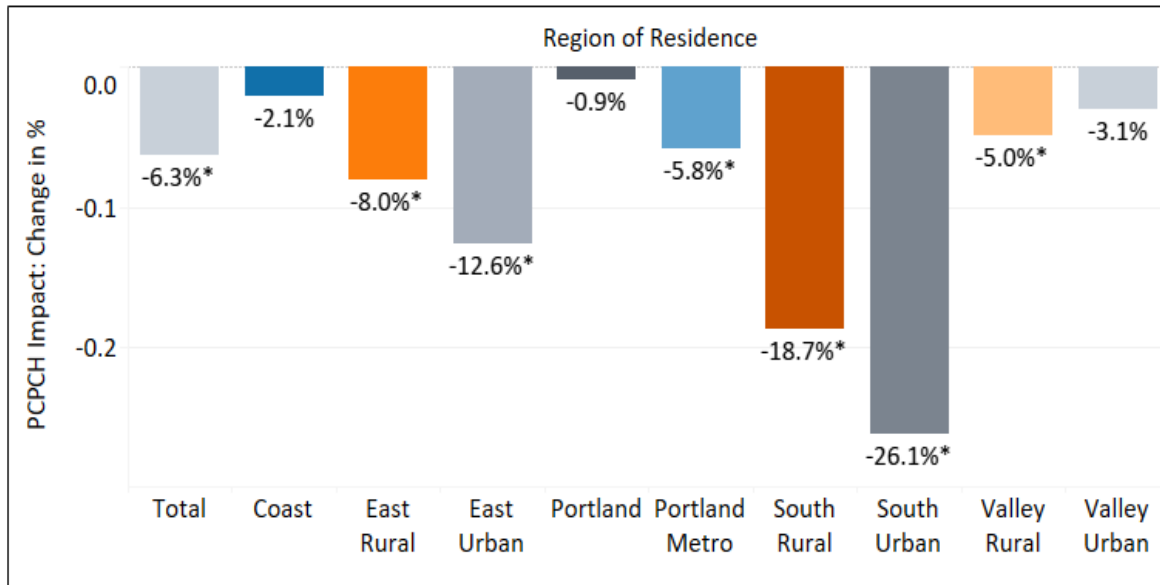
Figure 6 above provides estimates of the impact of the PCPCH program over its first eight years on quarterly total expenditures per person by insurance type. Estimates with a “*” are statistically significant at $p < .05$. The following discussion focuses on the percentage change from baseline, as it provides a comparable assessment across insurance types. Table B.6 in Appendix 2 provides the estimated magnitude of yearly change in dollars, as well as the baseline expenditure level used to calculate the percentage change.

The Medicaid related insurance groups (Dual/Disabled and Other/CHIP) had the largest estimated reductions in expenditures at 8.7% and 7.4%, respectively. Commercially insured individuals (PPO, POS and HMO) had slightly smaller estimated reductions of 5.6%, followed by 4.6% reduction for Medicare (primarily PPO and HMO Medicare Advantage) recipients. Individuals enrolled in self-insured insurance plans (PPO, HMO) had estimated reductions similar to commercial at 5.1%, but it was not statistically significant. As with age groups, the largest dollar magnitude changes came from the groups with the highest underlying expenditure levels (Medicaid Dual/Disabled and Medicare, in order).

Figure 7 below provides estimates of the impact of the PCPCH program over its first eight years on quarterly total expenditures per person by region of residence. Estimates with a “*” are statistically significant at $p < .05$. The following discussion focuses on the percentage change from baseline, as it provides a comparable assessment across regions. Table B.7 in Appendix 2 provides the estimated magnitude of yearly change in dollars, as well as the baseline expenditure level used to calculate the percentage change.

The PCPCH program had large impacts on expenditures in both rural and urban areas of southern and eastern Oregon region. The Southern Region of Oregon had estimated expenditure reductions in rural and urban areas of 18.7% and 26.1%, respectively. The Eastern Region of Oregon had estimated

Figure 7: PCPCH Impact on Total Expenditures per Person by Region of Residence



expenditure reductions in rural and urban areas of 8.0% and 12.6%, respectively. Portland Metro and Valley Rural areas had estimated reductions of 5.8% and 5.0%, respectively, slightly lower than the overall average. Coast, Portland (city) and Valley Urban regions had small and statistically non-significant estimated changes ranging from -0.9% to -3.1%.

SUMMARY OF STUDY RESULTS

Overall, the PCPCH program was found to reduce total expenditures by 6.3% on average over its first eight years of operation. This overall reduction in expenditures per person occurred despite increases in expenditures for primary care services (9.6%), as well as office and clinic-based specialty care visits (8.3%). Reductions in expenditures were found among most other service types including mental health, emergency department, pharmacy and all other services (19.4%, 7.6%, 5.6% and 8.5%, respectively). Despite the estimated reduction in expenditures, individuals in the PCPCH program were estimated to increase the overall likelihood of using any services by 1.7%. This was primarily driven by increased use of primary care by 3.4%; Pharmacy and all other services use also increased (1.4% and 2.1%, respectively). At the same time the likelihood of using inpatient services was reduced by 9.6%; radiation services use also decreased by 5.4%. Increases in expenditures per user were found for both primary and ambulatory specialty services (8.3% and 12.5%, respectively), signaling more intensive service use in those areas, but were offset by reductions in expenditures per user in several other areas including pharmacy (7.3%) and all other services (7.5%). The estimated rates of expenditure reduction by years of PCPCH designation (ranging from 1 to 8 years in this study), were fairly consistent.

These results largely mirror those found in the 2016 evaluation of the first three years of the PCPCH program (<https://www.oregon.gov/oha/HPA/dsi-pcpch/Documents/PCPCH-Program-Implementation-Report-Sept2016.pdf>). The PCPCH program's impact on service expenditures and use over its first eight years strongly suggests that it has continued to be successful in its goal of transforming primary care in Oregon consistent with the Triple Aim. Expenditure reductions were achieved while increasing rates of

service use overall. Investments in enhanced “upstream” primary care services resulted in reductions in expensive “downstream” services, such as emergency department and inpatient care. Overall, for each \$1 increase in expenditures in primary care services under the PCPCH program, over \$11 was estimated to be saved (\$11.78). Applying the estimated amount of savings per quarter to the population of PCPCH primary care users this study represents yields an estimated total savings of \$1.3B across the eight study years, ranging from \$68M in the first year (2011-12) of the program to \$200M in the eighth year (2018-19). These estimates of total savings form a minimum level for the period as it excludes PCPCH practices designated in the last year of the study as well as many individuals with partial year insurance coverage, changes in insurance type during a year, or received some but not all of their primary care services from a PCPCH designated practice.

While the results of this study and the original are qualitatively consistent, there were some notable differences in the details of the findings. In this study, specialty care office visits were found to increase where they were found to decrease in the early study. Pharmacy expenditures were found to decrease in this study, while found to increase in the original. Also, there was no gradient or increase in the expenditure reduction level over time found in this study, as there was in the original. Similarly, the absolute amount and rate of expenditure decrease are much higher in this study (\$76.04 and 6.3% versus \$40.73 and 4.2%, respectively), while the estimated savings return for each \$1 increase in primary care spending is slightly lower (\$11.78 versus \$13.23). Differences in measurement, sampling, or simply the different timeframes covered may explain these differences. The current analyses sought to improve reduction of bias across the PCPCH and non-PCPCH samples using propensity score matching, so it may be more accurate in some details than the original.

The current study extended analysis to look at the distributed effects of the PCPCH program across age groups, insurance types, and regional areas. Notable differences were found in the rate of savings across these different groups of PCPCH participants. Children and youth less than 21 years old had about 1.5 times the rate of reduction in expenditures per person (9.4%) than adults 22-64 years old (6.0%) or 65 years and older (5.4%). The bulk of overall savings, however, likely come from the adult population as the average expenditures for children and youth are much lower than for adults.

Medicaid covered individuals, whether dual/disabled or low income/CHP, had the highest expenditure reductions at 8.7% and 7.4%, respectively, or about 50% higher than privately or Medicare insured individuals where reductions ranged around 5%. Estimates of the annual savings during the last study year (2018-19) by most general insurance groupings are \$195M for Medicare, \$717M for Medicaid, and \$365M for private insurance.

There were also large regional variations in expenditure reductions with the highest rates found in both urban and rural areas of eastern and southern Oregon, ranging from 8.0% to 26.1%. At the same time, areas such as Portland (city), Valley Urban, and Coastal regions appeared to have no measurable change. These may reflect large regional differences in “status quo” primary care, where PCPCH designation may result in more significant improvement over existing care. Some urban areas (e.g., Portland, Valley Urban) may have existing (non-PCPCH) primary care or other health system infrastructure that limit the net impact of the PCPCH program.

Appendix A

Methodological Details

The following appendix provides a detailed review of the study design, sampling criteria, PCPCH attribution, sample matching, outcome and subject characteristic measures, and analytic methods applied in the study.

STUDY DESIGN

The intent of the study was to estimate the impact of Oregon’s PCPCH program on the expenditures and utilization patterns of Oregonians overall, as well as identifying differential impacts of the program by level and duration of PCPCH designation, regionally, by payor type, age group and among primary care service areas with higher proportions of impacted by Social Determinants of Health (SDOH). To estimate the PCPCH effects, the study employed a propensity score matched generalized “difference-in-difference” design that accommodates the staggered designation of PCPCH practices to assess the net impact of PCPCHs on expenditure and use of all insurance covered services and seven specific service types. The design compares pre- to post-PCPCH designation expenditure and utilization changes for individuals served in PCPCH practices to those found for individuals served in non-PCPCH primary care practices. The difference in these pre-post changes is the estimated net effect of PCPCH designation on utilization and expenditure.

DATA

The main data sources for the study were the Oregon All Payer All Claims (APAC) database and the PCPCH designation database, both provided by the Oregon Health Authority (OHA). Service utilization and expenditure data are derived from the APAC medical claims for 2011Q1 through 2019Q3. APAC eligibility files were used to identify Oregon residents and determine spans of insurance coverage, insurance coverage type, and individual demographic characteristics. PCPCH practices were identified from the PCPCH designation database covering designation from initial program implementation in October 2011 through July 2021. This database includes a variety of practice identifying information including practice and parent organizational National Provider Identifiers (NPIs). PCPCH NPIs were checked against the CMS NEPPES registry to corroborate, correct or augment NPI data for the PCPCH practices. The APAC provider file was used to crosswalk PCPCH NPIs with APAC billing NPIs to identify PCPCH related individuals and their service claims.

STUDY POPULATION

Study Period and PCPCH Practice Cohort

The study period for the PCPCH analysis encompassed nine study years over the period January 1, 2011 through September 30, 2019. The October 2011 through September 2019 period reflects the first eight years of the PCPCH program after the earliest PCPCH practice designation date of October 1, 2011. The study data was organized into study years based on the initial PCPCH designation date of October 1, 2011. The first study “year” encompassed data from January 1 to September 30, 2011. Each of the eight subsequent study years cover data from October 1 through September 30. Thus, the available APAC data provided three quarters of “pre-PCPCH” data for PCPCH practices designated from October 1

through December 31, 2011. A full year of “pre-PCPCH” data was used for all practices designated after December 31, 2011. To assure PCPCH practices identified in the study had at least one year of post-designation data, all observations for individuals attributed to practices designated after September 30, 2018 were excluded from the study data. The study included 759 PCPCH practices designated between October 1, 2001 and September 30, 2018.

Attribution of Individuals to PCPCH vs. non-PCPCH Primary Care Status

A crucial part of the analysis was empirically attributing Oregon residents to a primary care provider during each study year. Primary care visit claims were identified using nationally recognized definitions based on selected Evaluation and Management related CPT and HCPCS procedure codes provided in an office or clinic-based setting by rendering providers with primary provider taxonomy codes consistent with primary care provision. The specific criteria applied are available upon request. Individuals were then empirically attributed to a specific billing provider in each study year based on a majority of visits or latest visit in case of a tie between billing providers. Billing provider NPIs were matched with the OHA provided list of PCPCH NPIs to identify attribution to practices that were ever designated as PCPCH from October 1, 2011 through July 30, 2021. In addition, the proportion of primary claims attributed to a PCPCH practice was identified for each individual with at least one primary care visit in a study year. This process yielded 3,983,958 attributed individuals across the nine years of study data, with 1,606,244 individuals attributed to a practice identified from the OHA provided list of PCPCH designated providers and 2,377,714 individuals attributed to non-PCPCH designated providers.

USE AND EXPENDITURE MEASURES

The main outcome measures for the study were the percentage of subjects using service, average expenditures per service user, and average expenditures per subject in a quarter. At the individual level, quarterly service use was measured as binary variable coded 1 if any service expenditures were present. Expenditures per user were measured as the sum of insurance and individual (out of pocket) payments that were greater than 0, with zero expenditure observations coded as missing. Expenditures per subject were measured as the sum of insurance and individual (out of pocket) payments that were 0 or greater. These outcome measures were applied to all covered medical services in the APAC data and nine specific service types relevant to PCPCH performance: primary care office visits, specialty office visits, outpatient mental health services, radiation, lab, pharmacy, emergency department and inpatient, and all other services.

SUBJECT CLINICAL AND DEMOGRAPHIC MEASURES

A variety of subject characteristics were derived from the APAC claims and eligibility data for each individual by study year to use in final study population selection, the subsequent propensity score matching and regression analyses. These included subjects:

- Age (highest during study year)
- Three age groups corresponding with the application of the Chronic Disability Payment System (CDPS) risk adjustor (0-20 years, 21-64 years, and 65+ years)
- Recorded gender (Male/Female)

- Zip code based regional residence based on the Oregon Office of Rural Health’s nine Oregon regional designations (Coast, East Rural, East Urban, Portland, Portland Metro, South Rural, South Urban, Valley Rural, Valley Urban)
- Months of medical and pharmacy insurance eligibility
- Ten specific insurance groupings (Medicare Advantage PPO, Medicare Advantage HMO, Special Needs Plan, Medicaid Dual and Disabled, Other Medicaid/CHP, Commercial PPO, Commercial POS, Commercial PPO, Commercial HMO, Self-Insured POS, Self-Insured PPO)
- Five general insurance types (Medicare, Medicaid Dual/Disabled, Other Medicaid/CHP, Commercial, Self-Insured)
- Prospective CDPS risk scores for physical and behavioral health conditions.

SELECTION OF PCPCH AND NON-PCPCH ATTRIBUTED STUDY SUBJECTS

Several individual and attributed practice-based criteria were applied to assure that the designation of PCPCH and non-PCPCH attributed study subjects was distinct and could be effectively matched at the study year level. Individual study year inclusion criteria included: 1) Oregon residence; 2) full monthly medical coverage; 3) consistent coverage within the five general insurance types; 4) either 100% attributable to a PCPCH or non-PCPCH practice (i.e. an individual’s primary care claims in a year were either all attributable to PCPCH or non-PCPCH practices); 5) if non-PCPCH attributed, never PCPCH attributed in a prior or subsequent study year; and, 6) if PCPCH attributed, only during study years including at least one quarter from the year prior to the PCPCH attributed practice starting quarter or later. This yielded a set of individual-year observations that were always Oregon residents who were consistently insured, either PCPCH attributed or never PCPCH attributed, and represented non-PCPCH attributed individuals throughout the study period and PCPCH attributed individuals within one year prior to each PCPCH’s year and quarter of designation.

Selection criteria were also applied to PCPCH and non-PCPCH attributed subjects based on attributed practice characteristics. Individuals attributed to practices designated as a PCPCH after September 30, 2018 in any study year were excluded entirely from the study population. Observations from a study year were excluded if the individual was attributed to: 1) a non-PCPCH practice that had fewer than approximately 250 cumulative person-years over the entire (non-PCPCH) attributed population, or 2) the (non-PCPCH) practice organizational name indicated non-primary care activity (e.g. cardiology, sports medicine, orthopedics, pain medicine). This yielded a set of individual observations that were based on practices that were either clearly active as PCPCH’s prior to September 30, 2018 or clearly non-PCPCH, primary care oriented and of a similar practice volume to PCPCH designated practices.

PROPENSITY SCORE MATCHING AND FINAL STUDY COHORT SELECTION

Propensity score matching was employed to create comparable cohorts of PCPCH and non-PCPCH attributed individuals over time and within PCPCH practices grouped by the year and quarter of their PCPCH designation date. First, cohorts of individuals served in PCPCH practices during the last two study years (October 2018 through September, 2020) were identified as the “target” match across all study years, i.e. the set of individual characteristics that each PCPCH and non-PCPCH study year cohort would

be matched to. Non-PCPCH cohorts were then constructed to match the study years covered for each PCPCH quarterly designation group (i.e. only the same study years as contained each PCPCH designation group) and assigned starting year and quarter of the designation group. Given the very large size of the sample, a 20% random sample was drawn to apply the propensity score matching and use for subsequent analyses. Propensity score matching was then conducted to match each set of PCPCH and non-PCPCH PCPCH attributed individuals by study year within a PCPCH designation group to their respective “target” matching sample.

Block propensity score matching was applied. Exact matching (blocking) was stipulated for each of the following individual characteristics: age group, gender, pharmacy coverage, specific insurance type (10 categories), region of residence, and pharmacy benefit coverage. Caliper based propensity score matching with replacement (with up to 25 matches per target individual) was used on these blocks of subjects to match on age, a prospective CDPS physical condition risk score and a prospective CDPS behavioral health condition risk score. The matching process generated a weighted subject pool of 1,314,131, with 774,638 PCPCH attributed subjects and 539,493 non-PCPCH attributed subjects. Converting this study year level cohort to quarterly observations and eliminating any observations more than one year prior to each PCPCH quarterly designation group’s starting year and quarter yielded 7,704,371 weighted quarterly observations, with 3,800,100 PCPCH attributed and 3,904,271 non-PCPCH attributed observations.

OUTCOME MEASURES AND DOMAINS

The main outcome measures for the study were the percentage of subjects using service, average expenditures per service user, and average expenditures per subject in a quarter. At the individual level, quarterly service use was measured as binary variable coded 1 if any service expenditures were present. Expenditures per user were measured as the sum of insurance and individual (out of pocket) payments that were greater than 0. Expenditures per subject were measured as the sum of insurance and individual (out of pocket) payments that were 0 or greater. For services and expenditures that potentially spanned quarterly periods (i.e. inpatient or ED stays), days of service were distributed across quarters and total claim expenditures distributed across quarters proportional to days of service in a quarter. In addition to the three main outcome measures above, counts of quarterly service visits or days were calculated where feasible (i.e. inpatient, emergency department, primary care, specialty care and mental health services).

These outcome measures were applied to all covered medical services in the APAC data and eight specific service types relevant to PCPCH performance: primary care office visits, specialty office visits, outpatient mental health services, radiation, lab, pharmacy, emergency department, inpatient, and all other. Service categories were primarily developed based on presence of a DRG code (inpatient) and/or groupings of CPT and HCPCS procedure codes. In addition to analyses by service category, PCPCH effects on total expenditures per person were assessed by the number of years a provider group had been designated (i.e. a measure of effect for each year after designation), as well as by age group, insurance type (5 general categories), region of residence, and groupings of subjects by their combined prospective CDPS risk score (physical plus behavioral risk score).

STATISTICAL ANALYSIS

The study analyses used a staggered difference-in-difference design. Each set of PCPCH and non-PCPCH attributed observations representing practices grouped by year and quarter of PCPCH designation allows for a comparison in the change in outcome measure for PCPCH attributed individuals from pre- to post-PCPCH designation relative to any contemporaneous change among non-PCPCH attributed individuals. This “difference-in-difference” represents the estimated effect of PCPCH program. This empirical design was estimated using weighted fixed effects OLS regression, with time (quarterly by general insurance type) and quarterly designation group by PCPCH vs. non-PCPCH fixed effects, and subject weights from the propensity score matching. All matching covariates (e.g. age, gender) were also included in the regressions. A variable reflecting post-PCPCH designation observations among PCPCH attributed individuals provides the “difference-in-difference” estimate of the PCPCH program effects. Standard errors were adjusted to account for repeated measures across individuals over time and generalized heteroscedasticity.

The estimated effects from the regression analyses reflect the absolute magnitude of change attributable to the PCPCH program for each outcome (e.g. percentage points probability of any service use or dollars of expenditure). To provide an additional, relative measure of PCPCH program effects that can be compared across service types, we divided the absolute effects by the appropriate total marginal estimates of the quarterly outcome values to obtain an estimated percentage rate of change. These (total) marginal estimates reflect the average expected value of the outcomes for all relevant study observations as if they were served in a PCPCH practice prior to PCPCH designation.

LIMITATIONS

There are a number of potential limitations inherent in the study design that should be considered. First, identification of primary care visits from claims data is inexact. The study applies one commonly accepted identification rubric based on place of service, procedure code and primary taxonomy of rendering provider but others, albeit similar, exist. Inspection of the practices associated with some of the claims identified sports medicine, pain, orthopedic and other non-primary care practices and were excluded despite meeting the primary identification rubric. Differences in primary care visit identification could change yearly attribution or the population of individuals identified as receiving any primary care.

By focusing on individuals who had to be receiving some primary care to be included in the study, the study design does not provide any information on overall levels of access to primary care services related to the PCPCH program. Similarly, while the study associates the PCPCH program with a variety of changes in treatment expenditure and utilization patterns, some of which are generally associated with positive treatment outcomes (e.g. decreases in emergency department and inpatient), it does not identify whether any particular treatment pattern change reflects increases or decreases in treatment quality. Reductions in mental health services and pharmacy, for example, could reflect either positive or negative patterns of care.

Practices in large organizations or with multiple sites often use a single central provider identifier, in whole or in part. Thus, for these PCPCH practices, some or all individuals may not be attributable to a specific practice site. Practice sites across an organization may have received PCPCH designation at different times. Where centralized (organization level) practice identifiers are used, the earliest PCPCH designation date is applied. While this creates some inaccuracy in assigning observations to pre- versus post-PCPCH designation periods, to the extent it exists it would bias results away from the actual PCPCH impact.

By selecting only individuals with consistent, full (study) year coverage, the results also do not reflect individuals with partial year coverage or changes in coverage type. As the outcomes are measured in the same (annual) periods of measured primary care use, the study design also cannot determine the effect of prior primary care or PCPCH use on future treatment patterns. The strength of this design is in looking at primary care clinic patterns, given some annual primary care use, and their relationship to quarterly service patterns during the same annual observation periods.

In addition, both PCPCH practices and attributed patients look different than their non-PCPCH counterparts. While non-PCPCH practice billing units were limited to those that were approximately at or above minimum patient volume as the PCPCH practices, many of the PCPCH clinics are some of the largest clinics or are part of the largest health provider systems in the state. The PCPCH patient population was found to significantly younger and much more likely to be Medicaid (or SCHIP) covered. As the study samples were matched in each study year to the profile of PCPCH attributed patients in the last two study years, the results of the analysis reflect the mean of that sample and not necessarily the entire Oregon primary care population. Last, nearly 40% of all PCPCH clinics included in this study were designated in the first year of the program and over half by the end of the second year. As these were often larger provider organizations also, the results of the study largely reflect the experience of these earlier adopters.

**Appendix B:
Tables of Study Results**

The following appendix provides tables of study results that underlie the graphical presentations in the body of the report. The proportional (percent) change in outcomes attributable to PCPCH implementation presented in these tables are reflected in the graphical presentations in the body of the report. These tables additionally provide the estimated magnitude of change in outcome units (e.g. dollar value change in expenditures per person) as well as the estimated magnitude of base level from which the estimated change occurs. The estimated magnitude of change and base level of outcomes were used to calculate the proportional change reported.

Table B.1: PCPCH Impact on Quarterly Expenditures per Person

Service Type	Pre-PCPCH	PCPCH Impact	
	Baseline Expend. Per Person	Change in: \$	%
Total	\$1,210.15	-\$76.04	-6.3%
Primary Care	\$73.18	\$7.05	9.6%
Specialty Care	\$32.55	\$2.70	8.3%
Mental Health	\$22.25	-\$4.32	-19.4%
Radiology	\$46.18	-\$6.33	-13.7%
Lab	\$30.82	\$0.18	0.6%
Pharmacy	\$288.19	-\$16.21	-5.6%
Emergency Department	\$73.77	-\$5.61	-7.6%
Inpatient	\$264.21	-\$21.41	-8.1%
All Other Services	\$378.98	-\$32.08	-8.5%

Table B.2: PCPCH Impact on Quarterly Use

Service Type	Pre-PCPCH Baseline Expend. Per Person	PCPCH Impact Change in:	
		%	Rate
Total	73.5%	1.2%	1.7%
Primary Care	42.7%	1.4%	3.4%
Specialty Care	17.6%	0.0%	0.2%
Mental Health	3.5%	-0.2%	-5.0%
Radiology	13.0%	-0.7%	-5.4%
Lab	25.4%	0.4%	1.5%
Pharmacy	53.2%	0.7%	1.4%
Emergency Department	8.3%	-0.2%	-2.4%
Inpatient	1.9%	-0.2%	-9.6%
All Other Services	43.4%	0.9%	2.1%

Table B.3: PCPCH Impact on Quarterly Expenditures per User

Service Type	Pre-PCPCH	PCPCH Impact	
	Baseline Expend. Per Person	Change in: \$	%
Total	\$1,637.21	-\$103.35	-6.3%
Primary Care	\$169.29	\$14.13	8.3%
Specialty Care	\$179.06	\$22.34	12.5%
Mental Health	\$346.01	-\$104.75	-30.3%
Radiology	\$120.07	-\$16.77	-14.0%
Lab	\$119.50	\$1.29	1.1%
Pharmacy	\$554.68	-\$40.54	-7.3%
Emergency Department	\$889.62	-\$21.99	-2.5%
Inpatient	\$11,521.24	\$684.64	5.9%
All Other Services	\$864.52	-\$66.50	-7.7%

**Table B.4: PCPCH Impact on Total Expenditures per Person
by Years of PCPCH Designation**

Designation Years	Pre-PCPCH Baseline Expend. Per Person	PCPCH Impact	
		Change in: \$	%
Total	\$1,210.15	-\$76.04	-6.3%
Year 1	\$1,210.15	-\$58.44	-4.8%
Year 2	\$1,210.15	-\$93.92	-7.8%
Year 3	\$1,210.15	-\$66.81	-5.5%
Year 4	\$1,210.15	-\$71.61	-5.9%
Year 5	\$1,210.15	-\$52.83	-4.4%
Year 6	\$1,210.15	-\$36.46	-3.0%
Year 7	\$1,210.15	-\$56.93	-4.7%
Year 8	\$1,210.15	-\$90.47	-7.5%

**Table B.5: PCPCH Impact on Total Expenditures per Person
by Age Group**

Age Group	Pre-PCPCH Baseline Expend. Per Person	PCPCH Impact Change in:	
		\$	%
Total	\$1,210.15	-\$76.04	-6.3%
Age 21 Years & Younger	\$402.98	-\$37.71	-9.4%
Age 22-64 Years	\$1,543.01	-\$92.77	-6.0%
Age 65 and Older	\$2,623.34	-\$142.24	-5.4%

**Table B.6: PCPCH Impact on Total Expenditures per Person
by Insurance Type**

Insurance Type	Pre-PCPCH Baseline Expend. Per Person	PCPCH Impact Change in:	
		\$	%
Total	\$1,210.15	-\$76.04	-6.3%
Medicare	\$2,721.40	-\$124.52	-4.6%
Medicaid Dual/Disabled	\$3,276.00	-\$285.77	-8.7%
Medicaid Other/CHIP	\$585.86	-\$43.15	-7.4%
Private Commercial	\$1,164.43	-\$64.85	-5.6%
Private Self-Insured	\$1,138.22	-\$58.45	-5.1%

**Table B.7: PCPCH Impact on Total Expenditures per Person
by Region of Residence**

Region of Residence	Pre-PCPCH	PCPCH Impact	
	Baseline Expend. Per Person	Change in: \$	%
Total	\$1,210.15	-\$76.04	-6.3%
Coast	\$1,508.07	-\$31.04	-2.1%
East Rural	\$1,140.37	-\$91.31	-8.0%
East Urban	\$883.25	-\$111.37	-12.6%
Portland	\$1,286.01	-\$11.37	-0.9%
Portland Metro	\$1,238.18	-\$72.35	-5.8%
South Rural	\$1,060.48	-\$198.29	-18.7%
South Urban	\$1,043.57	-\$272.86	-26.1%
Valley Rural	\$1,246.19	-\$61.75	-5.0%
Valley Urban	\$1,147.68	-\$35.28	-3.1%