

3-2017

## Oregon's Medicaid Reform and Transition to Global Budgets Were Associated With Reductions in Expenditures

K. John McConnell

*Oregon Health and Science University*

Stephanie Renfro

*Oregon Health and Science University*

Neal T. Wallace

*OHSU-PSU School of Public Health*

Deborah J. Cohen

*Oregon Health and Science University*

Richard C. Lindrooth

*University of Colorado, Denver*

*See next page for additional authors*

Let us know how access to this document benefits you.

Follow this and additional works at: [https://pdxscholar.library.pdx.edu/sph\\_facpub](https://pdxscholar.library.pdx.edu/sph_facpub)

 Part of the [Health Policy Commons](#)

---

### Citation Details

McConnell K.J., Renfro S., Lindrooth R.C., Cohen D.J., Wallace N.T., Chernew M.E. 2017. Oregon's medicaid reform and transition to global budgets were associated with reductions in expenditures. *Health Affairs*, 36(3):451-459.

This Post-Print is brought to you for free and open access. It has been accepted for inclusion in OHSU-PSU School of Public Health Faculty Publications and Presentations by an authorized administrator of PDXScholar. For more information, please contact [pdxscholar@pdx.edu](mailto:pdxscholar@pdx.edu).

---

**Authors**

K. John McConnell, Stephanie Renfro, Neal T. Wallace, Deborah J. Cohen, Richard C. Lindrooth, and Michael E. Chernew

Published in final edited form as:

*Health Aff (Millwood)*. 2017 March 01; 36(3): 451–459. doi:10.1377/hlthaff.2016.1298.

## **Oregon’s Medicaid Reform And Transition To Global Budgets Were Associated With Reductions In Expenditures**

**KJ McConnell, S Renfro, N Wallace, D Cohen, RC Lindrooth, and ME Chernew**

### **Abstract**

In 2012 Oregon initiated an ambitious delivery system reform, moving the majority of its Medicaid enrollees into sixteen coordinated care organizations, a type of Medicaid accountable care organization. Using claims data, we assessed measures of access, appropriateness of care, utilization, and expenditures for five service areas (evaluation and management, imaging, procedures, tests, and inpatient facility care), comparing Oregon to the neighboring state of Washington. Overall, the transformation into coordinated care organizations was associated with a 7 percent relative reduction in expenditures across the sum of these services, attributable primarily to reductions in inpatient utilization. The change to coordinated care organizations also demonstrated reductions in avoidable emergency department visits and improvements in some measures of appropriateness of care, but also exhibited reductions in primary care visits, a potential area of concern. Oregon’s coordinated care organizations could provide lessons for controlling health care spending for other state Medicaid programs.

---

In 2012 Oregon initiated one of the nation’s most ambitious Medicaid delivery system reform efforts, creating sixteen coordinated care organizations (CCOs) to care for 90 percent of its Medicaid enrollees. CCOs can be considered a type of accountable care organization (ACO), acting as regional entities that are accountable for the health care quality and spending of a defined population.

However, Oregon’s CCO model differentiates itself from most ACO models in several dimensions.<sup>1</sup> First, although CCOs originated from a mix of health plans and provider organizations, their financing is closer to a Medicaid managed care organization than a traditional Medicare ACO. In particular, while Medicare ACOs consist primarily of providers, CCOs include an administrative layer that accepts payment from the state, manages claims, pays providers, and carries financial risk. CCOs also have unique governance structures that include health care providers, community members, and stakeholders in the local health systems. CCOs manage a broad range of services, including physical health, dental care, mental health, and addiction treatment, and are responsible for coordinating these health services as well as the broader social service needs of their Medicaid populations. Finally, CCOs face upside and downside risk through a global budget. CCO global budgets are risk-adjusted, prospective payments made by the state to the CCO. They are intended to cover total expected spending of the CCO’s patient population over a broad continuum of care for a defined period. Within the global budget, CCOs have flexibility on how they spend their dollars and are not confined to services narrowly defined as “medically necessary.” This flexibility creates opportunities for CCOs to invest in

services that may address social determinants of health in ways that could be more effective than the typical scope of care provided by physicians and hospitals.

CCOs have engaged in a variety of innovative efforts to change the delivery of care for their Medicaid patients. These strategies include incentives to enroll patients in primary care homes; the use of data in new ways to target high-risk patients; the integration of behavioral health services in primary care sites; care transition programs for emergency department (ED) patients or patients admitted to inpatient settings; increased training and employment of community health workers; pilot programs designed to test new ways to care for high-risk groups; and the use of flexible funds to support social services that are intended to improve health and reduce the use of the medical care system. A \$45 million State Innovation Model grant from the Center for Medicare and Medicaid Innovation supported the movement to coordinated care and facilitated the formation of a Transformation Center, a clearinghouse for sharing innovations and providing technical assistance and transformation funds for CCOs.

The Centers for Medicare and Medicaid Services provided an additional \$1.9 billion to support the CCO model. In exchange, Oregon made a commitment to reduce its rate of annual spending growth from 5.4 percent to 3.4 percent within three years and to achieve these savings without diminishing the quality of care. A failure to meet these benchmarks would trigger financial penalties for the state.

To date, reports from the Oregon Health Authority about the CCOs have been positive, indicating lower expenditures, reductions in use, and improvements in quality associated with the adoption of the model.<sup>2,3</sup> A recent comparison of Oregon's and Colorado's Medicaid ACO initiatives identified positive trends for both programs, with similar performance across both states.<sup>4</sup> In this study we sought to more explicitly identify the effects of Oregon's CCO model on spending and quality two years after implementation through a comparison with the Medicaid population in Washington State, a state with similar demographics to Oregon and without expansive delivery system reforms during the study period.

## **Study Data And Methods**

### **Study Population**

The study population included people enrolled in Medicaid from January 2011 through December 2014, enrolled for at least three months within a twelve-month window. We selected a three-month window as it accommodates the enrollment and disenrollment patterns that are frequent among Medicaid members, while excluding very small enrollment periods that can exhibit a high degree of variability in health spending that is uncharacteristic of typical Medicaid utilization. Other enrollment periods were analyzed in our sensitivity analyses discussed below. We excluded people who were newly enrolled in 2014 as part of the Affordable Care Act's Medicaid expansion. We also excluded people who were dually eligible for both Medicare and Medicaid. In Oregon, we excluded Medicaid enrollees who were not enrolled in CCOs because of special health needs and enrollees from one CCO (Cascade Health Alliance) that did not launch until August 2013.

Data for two related CCOs (PacificSource Central and PacificSource Gorge) were combined, resulting in fourteen CCOs for study.

Medicaid enrollees in Washington State served as our comparison population. Washington's Medicaid program exhibited many similarities to Oregon's program. Like Oregon, the program was predominantly based on managed care arrangements and also engaged in a Medicaid expansion in 2014. Washington did not undergo major delivery system changes during the study period, but it did experiment with some reform efforts. The most prominent of these reforms included its Health Home initiative and its "ER is for Emergencies" program. The Health Home program was initiated in 2013, targeting high-risk Medicaid enrollees, to provide appointment assistance, identify gaps in care, and connect clients to a broad range of health and social services.<sup>5</sup> The program was implemented in select areas of the state and did not include any shared savings or downside risk components. Washington's "ER is for Emergencies" program was initiated in 2012 and focused on improved communication and integration among providers and hospitals, patient care plans for frequent users, and guidelines to reduce narcotic-seeking behavior.<sup>6</sup>

We obtained Medicaid physical health claims and enrollment information from the Oregon Health Authority and the Washington State Health Care Authority. In Washington, behavioral health claims are managed separately as part of the Department of Social and Health Services. Thus, we excluded behavioral health-related outcomes and risk factors in our analysis.

## Study Design

We used a difference-in-differences approach to isolate the effect of Oregon's CCO transformation, with data from 2011 serving as the preintervention period, 2012 serving as a transition year, and 2013 and 2014 serving as the postintervention period. We decomposed the average two-year effect on outcomes into year-one and year-two effects. Our analyses of expenditures assessed differences across patient types (adults or children; high-risk or low-risk patients) and CCO characteristics (rural or urban location; for-profit status; and CCOs with previous experience in managing risk-based contracts). We analyzed publicly available documents derived from the CCO certification process to identify CCOs with previous contracting relationships or with for-profit status.

## Variables

In Oregon's and Washington's managed care and CCO environments, capitation and other alternative payment mechanisms create "encounter" claims, which include information on diagnosis and procedure but record the amount paid as "zero." Estimates of expenditures based purely on "paid" amounts would undercount any services paid outside of a fee-for-service system, because the capitation payment is not captured in the data.

As a proxy for expenditures, we created measures of standardized expenditures for services that used a common set of procedure or service codes across both states. These services included inpatient facility care and four categories of service in the Berenson-Eggers Type of Service (BETOS) classification. BETOS categories have been used to categorize claims on the basis of clinically meaningful groupings of procedures and services. All procedure codes

are assigned to one of seven BETOS categories: evaluation and management, procedures, imaging, tests, durable medical equipment, other, and exceptions and unclassified.

To create a measure of standardized expenditures, we repriced claims in four BETOS areas (evaluation and management, imaging, tests, and procedures) by attaching Oregon 2014 Medicaid fee schedule rates to claims in both states according to procedure and site-of-service codes. We repriced inpatient facility services on a per diem basis. These “standardized expenditures” represent typical Medicaid expenditures for common services across both states. Our measure of standardized expenditures was confined to a set of services that accounted for approximately 38 percent of total spending on medical services (see online Appendix Exhibit 1).<sup>7</sup> We also assessed utilization in terms of ED visits, primary care visits, and acute inpatient days.

We assessed two measures of access constructed from the Healthcare Effectiveness Data and Information Set (HEDIS):<sup>8</sup> children’s access to preventive or ambulatory health services (individuals ages 1–6 who had an ambulatory or preventive care visit during the year) and the percentage of adults ages 20–44 who had an ambulatory or preventive care visit during the year. We assessed changes in quality by estimating changes in “potentially avoidable” ED visits<sup>9</sup> and preventable hospitalizations as defined by the Agency for Healthcare Research and Quality’s Prevention Quality Indicators.<sup>10</sup> We also analyzed performance on five measures of appropriateness or “low-value” care (appropriate medications for people with asthma; testing for children with pharyngitis; imaging studies for low back pain; imaging for uncomplicated headache; and avoidance of unnecessary cervical cancer screening), hypothesizing that these services might be areas of focus for organizations seeking to reduce spending and improve quality.<sup>11,12</sup>

## Statistical Analysis

Our analysis was conducted at the member-quarter level. We analyzed utilization outcomes in terms of rates per thousand member-months and standardized expenditures as per member per month amounts. We used a multivariate linear model with propensity weights calculated using age, sex, Chronic Illness and Disability Payment System (CDPS) risk indicators, and rurality. Propensity weights were applied across the Oregon and Washington populations for all study periods, with each individual in each time period given a weight proportional to the probability of being in the Oregon Medicaid program in the fourth quarter of 2011, prior to the CCO intervention (see the Appendix Exhibit 3).<sup>7</sup> These weights were intended to adjust for observable differences between the Oregon and Washington populations, as well as changes in the composition of each population over time.<sup>13</sup>

Our model adjusted for sex, age, CDPS risk categories, rurality, quarter (to control for seasonality), and included an indicator for the postintervention period (2013–14) and the interaction between the Oregon population and postintervention indicators, which produced our estimates of the policy effects. Standard errors were adjusted for clustering at the primary care service area level.<sup>14,15</sup>

We tested the assumption of parallel trends for standardized expenditures in the treatment and comparison groups in the pre period.<sup>16,17</sup> Measures of access, quality, and low-value

care required one-year lookbacks and were restricted to continuously enrolled individuals with annual assessments in 2011, 2013, and 2014.

We conducted a number of sensitivity analyses. We tested the impacts of: excluding propensity score weights; restricting the population to individuals enrolled in both the preintervention and postintervention periods; restricting the study population to individuals with longer enrollment periods; using diagnosis related group–based pricing approaches (as opposed to per diem inpatient pricing approaches); and including the 2012 “transition” period as part of the analysis. (These are available in Appendix Exhibits 4–6.)<sup>7</sup> Analyses used Stata software, version 14.2, and R, version 3.1.2. The Institutional Review Boards of Oregon Health and Science University and Washington State approved this research.

## Limitations

Our study had a number of limitations. Our measure of standardized expenditures was confined to a relatively narrow set of services and excluded, for example, behavioral health services, durable medical equipment, nonemergency transport, and prescription drugs—all important areas for Medicaid enrollees. These services were excluded because differences in each state’s data systems did not allow for a straightforward comparison of use or spending. Although our measure of standardized expenditures captured many of the most common services—primary care, ED, and inpatient and outpatient hospital care—we estimate that they accounted for approximately 38 percent of total medical expenditures. It is possible that overall expenditure trends in Oregon and Washington differed from our measure of standardized expenditures. We excluded any consideration of expenditures for long-term care, which were not included as part of the CCO global budget.

Our measure of standardized expenditures, which used the Oregon 2014 Medicaid fee schedule, acted as a proxy for utilization but might have obscured changes in expenditures that were driven by higher or lower reimbursement rates. In addition, our estimates did not factor in additional payments to providers in the form of bonus payments for quality targets.

Our difference-in-differences estimates were based on a comparison of the Oregon program to trends in one other state. The prevalence of the Health Home and “ER is for Emergencies” reform efforts in Washington—both of which have reported success in reducing utilization<sup>5,6</sup>—suggests that our comparison group was not a strict “business as usual” comparison, and success in these programs might bias estimates of CCO reform impacts (relative to no intervention) toward zero.

Oregon has had a long history of experimenting with innovative approaches to constraining costs in its Medicaid program. The Oregon Health Plan, created in 1993, attempted to expand coverage to all Oregonians with incomes below 100 percent of the federal poverty level but constrain costs through a “prioritized list” of disease-treatment services that the Medicaid program would cover. The state has also worked to disseminate evidence-based practices as a mechanism of constraining costs, using its Health Evidence Review Commission to conduct systematic reviews and develop evidence-based practice guidelines for clinicians and serve as the basis for what will be covered under the benefit package for Medicaid enrollees.

Although the CCOs received bonus payments for meeting certain quality metrics,<sup>1</sup> we did not analyze performance on these metrics, because many rely on electronic health records or survey data for which there were no comparison measures in Washington. Finally, our measures of access, quality, and low-value care did not capture all aspects of quality or the patient experience.

## Study Results

### Utilization And Standardized Expenditures In Years 1 And 2

Exhibit 1 describes characteristics of the CCO model in Oregon. There were 745,672 Oregon Medicaid enrollees and 1,759,555 Washington Medicaid enrollees in our analyses. After propensity score weighting, both populations exhibited similar clinical and demographic characteristics. (See Appendix Exhibit 3 eTable 2.)<sup>7</sup>

In the postintervention period, standardized expenditures across evaluation and management, imaging, procedures, tests, and inpatient care increased by \$1 per member per month in Oregon and \$7 per member per month in Washington (Exhibit 2). Overall, adjusted estimates indicated that the CCO intervention was associated with a \$6.65 ( $p = 0.004$ ) decrease in standardized expenditures per member per month, relative to what expenditures would have been without the intervention. This is equivalent to savings of 7 percent. Our tests for “parallel trends” in standardized expenditures did not indicate significant differences in trends in total expenditures prior to the intervention. (See Appendix Exhibit 3.)<sup>7</sup>

The reduction in spending was attributable largely to differential trends in the use of inpatient care in Oregon after the CCO intervention (a relative decrease of \$5.80,  $p = 0.002$ ). However, Oregon also exhibited relative decreases in standardized expenditures for evaluation and management visits (\$1.95,  $p = 0.03$ ).

Standardized expenditures for imaging, procedures, and tests declined or were flat in both states, although Oregon exhibited a small but significant relative decrease in standardized expenditures for tests (\$0.22,  $p = 0.04$ ) and small but significant relative increases in standardized expenditures for imaging (\$0.16,  $p = 0.04$ ) and procedures (\$1.17,  $p < 0.001$ ) relative to Washington. In general performance on standardized expenditures was similar across years 1 and 2.

Exhibit 2 also displays changes in ED visits, primary care visits, inpatient days, and the inpatient admission rate. ED visits—a focus for both states—decreased over time, with Oregon exhibiting a significantly larger decrease in year 2 but no difference in the overall two-year average. Primary care visits decreased in Oregon but increased in Washington, with adjusted estimates indicating a difference of 23.92 visits per thousand member-months ( $p < 0.001$ ), a relative decrease of approximately 8 percent. This decrease was larger in year 2 (31.25 visits per thousand member-months). Oregon also experienced a relative decrease in inpatient days after the CCO intervention (3.69 days per thousand member-months,  $p = 0.002$ ). The admission rate decreased in Oregon relative to Washington, but this decrease was statistically significant only in the second year.



Savings attributable to the CCO transformation were concentrated in adults and in patients with risk scores in the highest quartile (Exhibit 3). Reductions in standardized expenditures for children or for people with lower CDPS risk scores were not statistically significant.

There were no marked differences across CCO categories: CCOs serving urban areas exhibited similar performance to those serving rural areas, CCOs with previous experience in risk sharing performed similar to those that were new to these arrangements, and for-profit CCOs exhibited similar performance to not-for-profit CCOs (Exhibit 3).

### **Access, Quality, And Low-Value Care In Years 1 And 2**

Access to care, as measured by HEDIS metrics, decreased in Oregon (Exhibit 4). Adjusted estimates indicate that children's access to primary care declined by 1.1 percentage points ( $p = 0.005$ ) and adults' access to preventive ambulatory care declined by 3.0 percentage points ( $p < 0.001$ ). Measures of avoidable ED visits declined in both Oregon and Washington, with Oregon demonstrating a slightly larger decrease (0.7 visits per thousand member-months,  $p = 0.001$ ) in the two-year average across states. Overall preventable hospital admissions declined in Oregon, with a significant decrease in the first year of implementation (2.7 visits per thousand member-months,  $p = 0.04$ ), although the overall two-year decrease was not statistically significant.

Relative to Washington, Oregon's CCO transformation was associated with statistically significant improvements in two of five measures of low-value care (Exhibit 4). Avoidance of imaging for uncomplicated headache improved by 1.2 percentage points relative to Washington ( $p = 0.02$ ), and avoidance of unnecessary cervical cancer screening improved by 1.0 percentage point ( $p = 0.03$ ). Our sensitivity analyses supported our main results. (See Appendix Exhibits 4–6x.)<sup>7</sup>

### **Discussion**

Two years into its implementation, Oregon's coordinated care organization model was associated with reductions in standardized expenditures for evaluation and management, procedures, tests, and inpatient services relative to Washington State's Medicaid program. These reductions would be equivalent to savings of approximately 7 percentage points across the five service areas examined. The largest reductions were observed in the use of inpatient hospitalization. ED visits, which had been targeted through high-profile initiatives in each state, declined in both states, with no significant difference in the two-year average.

Standardized expenditures for evaluation and management visits grew less in Oregon relative to Washington, a finding consistent with our analysis of primary care use. Primary care visits increased in Washington but declined in Oregon, even though Oregon's CCO model emphasized enrollment in a "primary care home" and other primary care access measures as part of the set of incentive metrics for which CCOs could be rewarded. This differential might reflect tightening primary care capacity in Oregon, potentially exacerbated by the 2014 Medicaid expansion. Between June 2011 and July 2014, Oregon increased its monthly enrollment by more than 450,000 people—an 84 percent increase.<sup>18</sup> In comparison, during the same time period, Washington increased monthly enrollment by approximately

466,000 people—a 43 percent increase. The relatively larger increase in Oregon may have crowded out access to primary care for its Medicaid enrollees. These changes are further reflected in the access measures of Exhibit 4. Furthermore, even though these access measures decreased in Oregon, overall rates remained higher than the comparison state in the postintervention period. Nonetheless, access to primary care should be monitored closely. In addition, the larger Medicaid expansion in Oregon might have affected access to other specialists, which might have affected our estimates of spending on a variety of BETOS services.

Although markers of access decreased in Oregon, the state also reduced inpatient days, ED visits (overall and avoidable), and preventable hospitalizations. There are several possible explanations for these changes. First, CCOs engaged in a variety of nontraditional support services and transition programs that may have accounted for the reduction in ED and inpatient services, even if primary care visits went down. For example, CCOs substantially increased their use of community health workers, social workers, and care coordinators to engage their Medicaid enrollees outside of the clinic setting. These programs typically targeted adults and patients with multiple comorbidities, consistent with our finding that savings were primarily attributable to these groups.

Second, the CCO model includes flexibility to spend on health-related services that are not part of the traditional “medically necessary” medical care system. Thus, CCOs may have identified mechanisms to improve care and reduce spending, even if office visits for primary care decreased. For example, a recent study of supportive housing initiated with the CCO reform found reductions in overall health care use and expenditures among homeless people enrolled in the program.<sup>19</sup> The decrease in standardized expenditures associated with the Oregon transformation suggests that the CCOs may have been effective in slowing health care spending relative to a neighboring state used as a control for this study.

The decrease in expenditures, attributable primarily to reductions in inpatient use, are similar to those observed in savings attributable to Medicare ACO models, in which savings were achieved in large part by reductions in expenditures related to hospitalizations.<sup>20–22</sup>

Evidence is now emerging on a variety of large-scale payment and delivery system reforms for Medicare patients.<sup>21–23</sup> Less is known about the best ways to create high-value Medicaid programs. Some states, including Indiana, Arkansas, and Michigan, have emphasized consumer-driven tools as a way of controlling Medicaid costs. These states have introduced premiums, copayments, deductibles, and health savings-type accounts, tools that have been common and generally effective in commercially insured populations but have a less-developed evidence base for the lower-income Medicaid population.<sup>24</sup>

Other states, like Oregon, have focused on changing the delivery systems through ACO-type models. In contrast to the Medicare program, Medicaid ACOs exhibit considerable heterogeneity. For example, Colorado’s Medicaid ACO program provides administrative support and per enrollee funding to seven Regional Care Collaborative Organizations to improve connections among Medicaid enrollees, providers, and community services, but the program does not formally incorporate upside or downside risk. New Jersey initiated a

program with three Medicaid ACOs with one-sided shared savings, with a goal of expanding the program and moving to two-sided, upside and downside risk-sharing arrangements later. An important task for state and federal policy makers will be to identify the relative effectiveness of consumer-based versus delivery system approaches in reforming state Medicaid programs.

## Conclusion

Medicaid's budgetary implications create an imperative to find new models that can control spending and improve the value of this public program. Estimating the impact of any one program is challenging because the comparison must be drawn from other states with their own unique features. Thus, assessing the effects of reforms will require multiple studies. With that caveat, our findings suggest that comprehensive system reforms can slow or reduce health care use in the early years of implementation for a Medicaid population. Oregon's model—characterized by a large federal investment, accountability for coordinating care, and a global budget that integrates financing streams and allows for flexibility in how funds are spent—could provide lessons on controlling health care spending for other state Medicaid programs.

## Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

## Acknowledgments

This research was funded by the National Institutes of Health Common Fund's Health Economics program (Grant No. 1R01MH100001) and the Silver Family Foundation. John McConnell acknowledges Benjamin Sun and Aaron Mendelson for their generous assistance and Thomas Meath for additional analytic support and statistical consultation in the development of this article.

## ENDNOTES

1. McConnell KJ, Chang AM, Cohen DJ, Wallace N, Chernew ME, Kautz G, et al. Oregon's Medicaid transformation: an innovative approach to holding a health system accountable for spending growth. *Healthc (Amst)*. 2014; 2(3):163–7. [PubMed: 25540719]
2. McConnell KJ. Oregon's Medicaid coordinated care organizations. *JAMA*. 2016; 315(9):869–70. [PubMed: 26847402]
3. Oregon Health Authority, Office of Health Analytics. Oregon's health system transformation: 2014 final report [Internet]. Salem (OR): OHA; 2015 Jun 24. [cited 2017 Jan 17]. Available from: <http://www.oregon.gov/oha/Metrics/Documents/2014%20Final%20Report%20-%20June%202015.pdf>
4. McConnell KJ, Renfro S, Chan B, Meath TH, Mendelson A, Waxmonsky J, et al. Early performance in Medicaid accountable care organizations: a comparison of Oregon to Colorado. *JAMA Intern Med*. 2017 Forthcoming.
5. Rice, S. Washington "health home" model saves Medicare \$21.6 million. *Modern Healthcare* [serial on the Internet]. 2016 Jan 22. [cited 2017 Jan 17]. Available from: <https://www.modernhealthcare.com/article/20160122/NEWS/160129951>
6. Pines, J., Schlicher, N., Presser, E., George, M., McClellan, M. Washington State Medicaid: implementation and impact of "ER is for Emergencies" program. Washington (DC): Brookings Institution; 2015 May 4.
7. To access the Appendix, click on the Appendix link in the box to the right of the article online.

8. National Committee for Quality Assurance. HEDIS 2014: volume 2: technical specifications [Internet]. Washington (DC): NCQA; 2013. [cited 2017 Jan 17]. Available for download from: <http://www.ncqa.org/hedis-quality-measurement/hedis-measures/hedis-2014>
9. California Department of Health Care Services, Medi-Cal Managed Care Division. Statewide collaborative quality improvement project: reducing avoidable emergency room visits: final remeasurement report: January 1, 2010–December 31, 2010 [Internet]. Sacramento (CA): DHCS; 2012 Jun. [cited 2017 Jan 17]. Available from: [http://www.dhcs.ca.gov/dataandstats/reports/Documents/MMCD\\_Qual\\_Rpts/EQRO\\_QIPs/CA2011-12\\_QIP\\_Coll\\_ER\\_Remeasure\\_Report.pdf](http://www.dhcs.ca.gov/dataandstats/reports/Documents/MMCD_Qual_Rpts/EQRO_QIPs/CA2011-12_QIP_Coll_ER_Remeasure_Report.pdf)
10. Agency for Healthcare Research and Quality. Prevention Quality Indicators overview [Internet]. Rockville (MD): AHRQ; [cited 2017 Jan 17]. Available from: [http://www.qualityindicators.ahrq.gov/modules/pqi\\_overview.aspx](http://www.qualityindicators.ahrq.gov/modules/pqi_overview.aspx)
11. Schwartz AL, Chernew ME, Landon BE, McWilliams J. Changes in low-value services in year 1 of the Medicare Pioneer Accountable Care Organization Program. *JAMA Intern Med.* 2015; 175(11):1815–25. [PubMed: 26390323]
12. Charlesworth CJ, Meath TA, Schwartz AL, McConnell K. Comparison of low-value care in Medicaid vs commercially insured populations. *JAMA Intern Med.* 2016; 176(7):998–1004. [PubMed: 27244044]
13. Stuart EA, Huskamp HA, Duckworth K, Simmons J, Song Z, Chernew ME, et al. Using propensity scores in difference-in-differences models to estimate the effects of a policy change. *Health Serv Outcomes Res Methodol.* 2014; 14(4):166–82. [PubMed: 25530705]
14. Bertrand M, Duflo E, Mullainathan S. How much should we trust differences-in-differences estimates? *Q J Econ.* 2004; 119(1):249–75.
15. Dartmouth Atlas of Health Care. PCSA data download—2010 (census tract basis) [Internet]. Lebanon (NH): Dartmouth Atlas Project; [cited 2017 Jan 17]. Available from: <http://www.dartmouthatlas.org/tools/downloads.aspx?tab=42>
16. Angrist, JD., Pischke, J-S. Mostly harmless econometrics: an empiricist’s companion. Princeton (NJ): Princeton University Press; 2008.
17. Ryan AM, Burgess JF Jr, Dimick JB. Why we should not be indifferent to specification choices for difference-in-differences. *Health Serv Res.* 2015; 50(4):1211–35. [PubMed: 25495529]
18. Henry J. Kaiser Family Foundation. Total monthly Medicaid and CHIP enrollment [Internet]. Menlo Park (CA): KFF; 2016 Oct. [cited 2017 Jan 17]. Available from: <http://kff.org/health-reform/state-indicator/total-monthly-medicaid-and-chip-enrollment/>
19. Wright BJ, Vartanian KB, Li H-F, Royal N, Matson JK. Formerly homeless people had lower overall health care expenditures after moving into supportive housing. *Health Aff (Millwood).* 2016; 35(1):20–7. [PubMed: 26733697]
20. Colla CH, Wennberg DE, Meara E, Skinner JS, Gottlieb D, Lewis VA, et al. Spending differences associated with the Medicare Physician Group Practice Demonstration. *JAMA.* 2012; 308(10):1015–23. [PubMed: 22968890]
21. McWilliams JM, Chernew ME, Landon BE, Schwartz AL. Performance differences in year 1 of Pioneer accountable care organizations. *N Engl J Med.* 2015; 372(20):1927–36. [PubMed: 25875195]
22. McWilliams JM, Hatfield LA, Chernew ME, Landon BE, Schwartz AL. Early performance of accountable care organizations in Medicare. *N Engl J Med.* 2016; 374(24):2357–66. [PubMed: 27075832]
23. Dale SB, Ghosh A, Peikes DN, Day TJ, Yoon FB, Taylor EF, et al. Two-year costs and quality in the comprehensive primary care initiative. *N Engl J Med.* 2016; 374(24):2345–56. [PubMed: 27074035]
24. Wallace NT, McConnell KJ, Gallia CA, Smith JA. How effective are copayments in reducing expenditures for low-income adult Medicaid beneficiaries? Experience from the Oregon health plan. *Health Serv Res.* 2008; 43(2):515–30. [PubMed: 18248405]

## Biographies

**K. John McConnell** (mcconnjo@ohsu.edu) is director of the Center for Health Systems Effectiveness and a professor in the Department of Emergency Medicine, both at Oregon Health & Science University, in Portland.

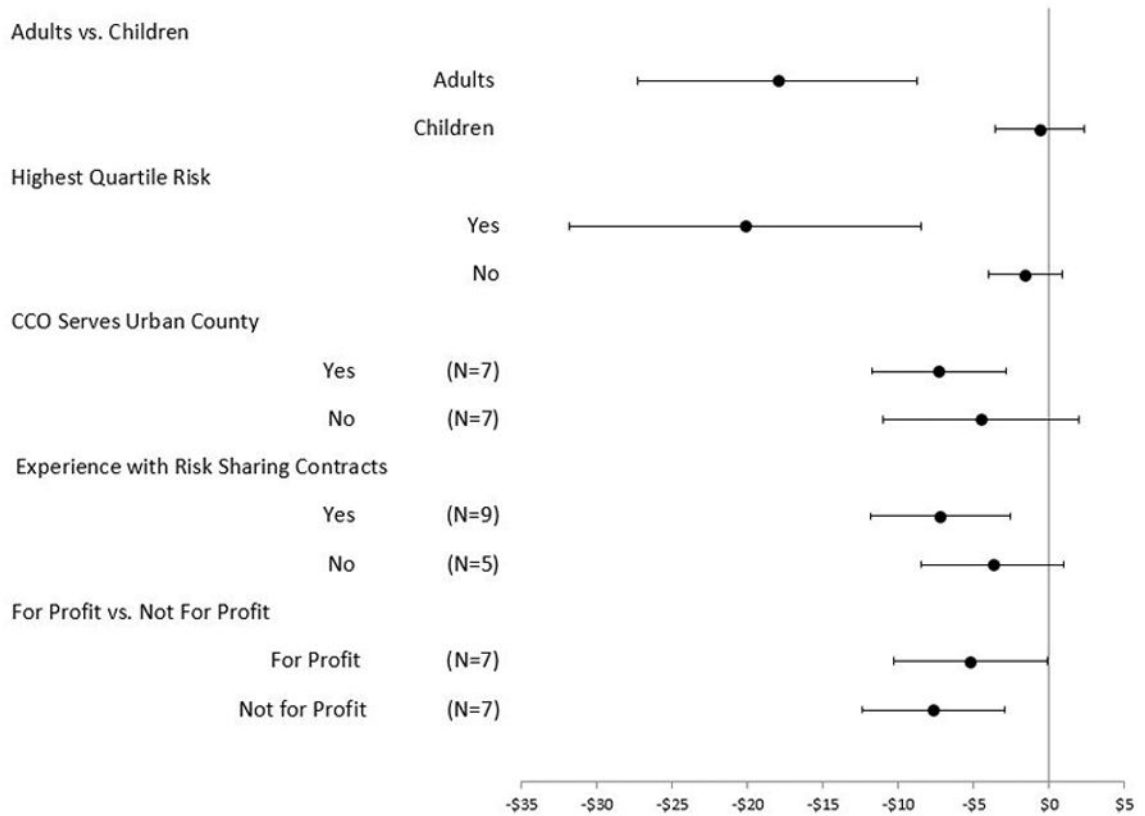
**Stephanie Renfro** is a senior research associate in Center for Health Systems Effectiveness, Oregon Health & Science University.

**Richard C. Lindrooth** is a professor in the Department of Health Systems, Management, and Policy at the Colorado School of Public Health, University of Colorado, Denver.

**Deborah J. Cohen** is an associate professor in the Department of Family Medicine, Oregon Health & Science University.

**Neal T. Wallace** is a professor in the Oregon Health & Science University-Portland State University School of Public Health, in Portland.

**Michael E. Chernew** is the Leonard D. Schaeffer Professor of Health Care Policy in the Department of Health Care Policy at Harvard Medical School, in Boston, Massachusetts.



**Exhibit 3.**

Performance differences across population and coordinated care organization (CCO) characteristics, relative to Washington state comparison group.

**Source/Notes:** SOURCE Authors’ analysis of 2011–14 Medicaid claims data from Oregon and Washington State. NOTES The exhibit shows difference-in-differences estimates for different CCO groups and patient populations on standardized expenditures for four categories of service in the Berenson-Eggers Type of Service classification and inpatient facility services, per member per month. Error bars represent 95% confidence intervals. Risk-sharing contracts are arrangements between a payer and provider in which the provider assumes some or all of the financial risk associated with the patient and their health care utilization, as exemplified in capitation or subcapitation arrangements.

**Exhibit 1**

Characteristics of Oregon’s coordinated care organizations (CCOs)

<b>CCO feature</b>	<b>Intended goal</b>	<b>Supporting programs</b>
Global budget	Incentivize preventive care and efficient use of resources	Programs designed to target high users, increased use of hospital-to- home transition programs, and ED navigators to link patients with primary care Alternative payment models designed to move away from fee-for- service and decrease incentives for high-volume, high-intensity care Flexibility to spend funds on health-related services that are not confined to those deemed “medically necessary”
Incentive metrics	Pay for health outcomes instead of volume and ensure access to care; insure that quality improvement accompanies focus on reduced expenditures	“Incentive pool” based on withhold (2% in 2013; 3% in 2014) used to reward CCOs whose performance hits targets on seventeen incentive metrics
Governing boards include payers, providers, and consumers	Foster stakeholder input at all levels to craft program designed for needs of Medicaid beneficiaries Board provides structure to coordinate systems and stakeholders with previously fragmented and competing incentives	State certification of CCOs includes documentation of stakeholder representation in governing boards CCOs required to submit board-approved transformation plans to state
Community based	Match delivery system changes with local context	Flexibility to develop and conduct programs tailored to CCOs’ specific populations and geographies and are culturally and linguistically appropriate Community health workers link patients and local health care services
Integration of physical, behavioral, and oral health	Disseminate evidence-based models of integrated care; improve coordination by breaking down silos	Co-location of behavioral health specialists in primary care Supporting, training, and coaching providers to improve coordination between primary care providers and behavioral health specialists Training of primary care providers to provide basic screening and preventive oral health care

SOURCE Author’s document review of Oregon Health Authority’s Medicaid waiver and coordinated care organization annual reviews, 2012–2013.

**Exhibit 2**

**Change in use in the Oregon and Washington Medicaid populations**

Expenditure and utilization measures	Oregon Medicaid beneficiaries (N = 745,672)			Washington Medicaid beneficiaries (N = 1,759,555)			Changes in Oregon Medicaid compared to changes in Washington Medicaid		
	2011	2013-14	Change	2011	2013-14	Change	Average two-year effect (2013)	Year 1 effect (2013)	Year 2 effect (2014)
Standardized expenditures per member per month									
<b>BETOS code</b>									
Evaluation and management	\$33	\$37	\$4	\$35	\$41	\$6	-\$1.95**	-\$1.61	-\$2.35**
Imaging	7	7	0	8	8	0	0.16**	0.08	0.24***
Procedures	15	15	0	18	16	-2	1.17***	1.23***	1.06***
Tests	7	7	0	7	8	1	-0.22**	-0.10	-0.34**
Inpatient per diem	33	31	-2	27	30	3	-5.80***	-6.20***	-5.46**
Sum of expenditures across BETOS and inpatient per diem	95	96	1	96	103	7	-6.65***	-6.61***	-6.84**
<b>Utilization</b>									
ED visits <sup>a</sup>	57	54	-3	63	61	-2	-1.46	0.32	-3.30***
Primary care visits <sup>a</sup>	305	298	-7	258	272	14	-23.92***	-17.37***	-31.25***
Inpatient days <sup>a</sup>	21	19	-2	17	19	2	-3.69***	-3.94***	-3.47**
Inpatient admission rate	16%	15%	-1%	13%	13%	0%	-1.27	-0.99	-1.64**

SOURCE: Authors' analysis of 2011-14 Medicaid claims data from Oregon and Washington State. NOTES: BETOS is Berenson-Eggers Type of Service. ED is emergency department.

<sup>a</sup>Per 1,000 member-months.

\*\*  $p < 0.05$

\*\*\*  $p < 0.01$

\*\*\*\*  $p < 0.001$



**Exhibit 4**

Changes in performance on measures of access, preventable hospitalizations, and low-value care in Oregon and Washington State Medicaid populations

		Trends				Difference-in-differences Changes in Oregon Medicaid compared to changes in Washington State Medicaid			
		Oregon Medicaid		Washington Medicaid		in Washington State Medicaid			
Metric	2011	2013-14	Change	2011	2013-14	Change	Average 2-year effect	Year 1 effect (2013)	Year 2 effect (2014)
Access metrics									
Child access to primary care physician, 1-6 years	87.70%	87.10%	-0.60%	77.70%	78.20%	0.50%	-1.1%***	-1.0%**	-1.2%***
Adult access to preventive ambulatory care, ages 20-44	82.20	79.40	-2.80	78.20	79.30	1.10	-3.0****	-2.0****	-4.0****
Outcomes (rates per thousand member-months)									
Avoidable ED visits	9.7	8.5	-1.2	10.3	9.8	-0.5	-0.7****	0.2	-1.2****
PQI overall	8.0	7.5	-0.5	9.8	10.8	1.0	-1.9	-2.7**	-1.1
PQI acute	3.1	2.6	-0.5	2.8	2.6	-0.2	-0.5	-0.7	-0.2
PQI chronic	4.9	5.0	0.1	7.0	8.2	1.1	-1.5	-2.0	-0.9
Low-value care/appropriateness of care									
Appropriate medications for individuals with asthma	74.3%	70.5%	-3.8%	70.2%	68.6%	-1.6%	-0.5%	-0.9%	-0.3%
Appropriate testing for children with pharyngitis	62.0	64.0	2.0	48.6	54.2	5.6	-2.6	-5.2	0.1
Appropriate use of imaging studies for low back pain	78.8	77.8	-1.0	80.2	78.4	-1.8	1.2	0.6	1.9
Avoidance of head imaging for uncomplicated headache	15.9	16.5	0.6	19.1	17.9	-1.2	1.2**	0.9	1.5**
Avoidance of unnecessary cervical cancer screening	90.8	97.5	6.7	92.0	97.5	5.5	1.0**	0.7	1.3**

SOURCE Authors' analysis of 2011-14 Medicaid claims data from Oregon and Washington State. NOTES ED is emergency department. PQI is Prevention Quality Indicators as defined by the Agency for Healthcare Research and Quality for preventable hospitalizations.

\*\* p < 0.05

\*\*\* p < 0.01

\*\*\*\*  
 $p < 0.0001$