Access to Primary, Mental Health, and Specialty Care: a Comparison of Medicaid and Commercially Insured Populations in Oregon

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OBJECTIVE: To describe how access to primary and specialty care differs for Medicaid patients relative to commercially insured patients, and how these differences vary across rural and urban counties, using comprehensive claims data from Oregon.

DESIGN: Cross-sectional study of risk-adjusted access rates for two types of primary care providers (physicians; nurse practitioners (NPs) and physician assistants (PAs)); four types of mental health providers (psychiatrists, psychologists, advanced practice NPs or PAs specializing in mental health care, behavioral specialists); and four physician specialties (obstetrics and gynecology, general surgery, gastroenterology, dermatology).

PARTICIPANTS: 420,947 Medicaid and 638,980 commercially insured adults in Oregon, October 2014–September 2015.

OUTCOME: Presence of any visit with each provider type, risk-adjusted for sex, age, and health conditions.

RESULTS: Relative to commercially insured individuals, Medicaid enrollees had lower rates of access to primary care physicians (–11.82%; CI –12.01 to –11.63%) and to some specialists (e.g., obstetrics and gynecology, dermatology), but had equivalent or higher rates of access to NPs and PAs providing primary care (4.33%; CI 4.15 to 4.52%) and a variety of mental health providers (including psychiatrists, NPs and PAs, and other behavioral specialists). Across all providers, the largest gaps in Medicaid-commercial access rates were observed in rural counties. The Medicaid-commercial patient mix was evenly distributed across primary care physicians, suggesting that access for Medicaid patients was not limited to a small subset of primary care providers.

CONCLUSIONS: This cross-sectional study found lower rates of access to primary care physicians for Medicaid enrollees, but Medicaid-commercial differences in access

rates were not present across all provider types and displayed substantial variability across counties. Policies that address rural-urban differences as well as Medicaid-commercial differences—such as expansions of telemedicine or changes in the workforce mix—may have the largest impact on improving access to care across a wide range of populations.

KEY WORDS: Medicaid; access to care; health policy; disparities; rural health.

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INTRODUCTION

The Medicaid program provides coverage for approximately 73 million Americans, making it the largest single insurance program in the USA. However, there is continued debate about Medicaid's future. In 2017, the program faced the potential for a major restructuring and shift to per capita financing, as the Congress unsuccessfully attempted to repeal and replace the Affordable Care Act (ACA).¹ Medicaid remains popular among the voting public,² and more than 35 states have adopted the ACA's Medicaid expansion. However, expansion seems unlikely in many remaining states and a considerable number of state and federal policymakers continue to question its value.

A common critique of the Medicaid program is that it does not provide adequate access to care. This sentiment was expressed by Centers for Medicare and Medicaid Services (CMS) Administrator Seema Verma, who noted that Medicaid would fail to live up to its promise if it “merely provides a card without care.”³ These concerns are not unwarranted; simulated patient studies have concluded that commercially insured patients' ability to secure appointments in primary care settings is about 25 percentage points higher than Medicaid patients',^{4,5} with access for Medicaid patients improving slightly following the ACA's 2014 Medicaid expansion.^{6,7}

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Empirical evidence about access to care can help inform debate about the relative value of the Medicaid program. Studies of differences in access to primary care have not been consistent,^{8–12} and less is known about variability in access across urban or rural areas,^{13,14} particularly when it comes to accessing mental health care (an important service for Medicaid enrollees), or other types of specialty care.^{15–22} The present study used “all-payer” data from Oregon to test access—defined as at least one visit with a provider within a year—from a variety of perspectives. We compare access for Medicaid and commercially insured enrollees for primary care providers, mental health providers, and other specialist physicians. We also assessed the extent to which gaps in access may vary according to rural or urban residence. Furthermore, we investigate the extent to which care for Medicaid patients is concentrated among a small subset of providers or distributed more evenly across providers. Together, these analyses provide a comprehensive, statewide assessment of Medicaid access, and how it varies across provider types and urban or rural regions.

METHODS

Study Population and Data

Our study population included non-pregnant adults aged 18–64 who resided in Oregon and were enrolled in either Medicaid or commercial insurance during the 12-month period between October 1, 2014, and September 30, 2015. We excluded Medicaid members who were also enrolled in Medicare, as well as those members who were enrolled for less than 11 of the 12 months in the study period. We obtained enrollment and claims data from the Oregon Health Authority’s Health Systems Division for Medicaid enrollees and the Oregon All-Payer All-Claims (APAC) database²³ for commercially insured enrollees. (Additional details are available in eAppendix, eTable 1.)

Setting

Oregon has been noteworthy for its Medicaid reform efforts, including the transition to “Coordinated Care Organizations” (a type of Medicaid Accountable Care Organization) in 2012^{24–26} and a robust expansion in 2014 as part of the ACA. In 2015, Medicaid provided coverage for approximately 942,000 (24%) of the state’s 3.9M residents, while the commercial market covered approximately 2.1M people (53% of the total population). Oregon’s Medicaid reimbursement is considered generous relative to the rest of the country,^{27,28} while among the commercially insured, Oregon is marked by low utilization but high prices.²⁹ Oregon has concentrated urban areas (Portland, Salem, Eugene) and a large rural population (17% of the population).³⁰

Variables

Provider Group Definitions. We identified three provider groups (primary care, mental health, and specialist physicians) for study, based on the most common health care needs of Medicaid and commercially insured populations, as well as the feasibility of identifying them through claims data and self-reported taxonomy information in the National Plan and Provider Enumeration System (NPPES). We selected two types of primary care providers: physicians and advanced practice nurse practitioners (NPs) or physician assistants (PAs) specializing in primary care. We considered four types of mental health providers: (1) psychiatrists; (2) psychologists; (3) advanced practice NPs or PAs specializing in mental health care; and (4) behavioral specialists, counselors, and therapists.³¹ We also included four physician specialties: (1) obstetrics and gynecology, (2) general surgery, (3) gastroenterology, and (4) dermatology. These specialties represent a range of physicians, some of which serve generalist, primary care needs. We validated our provider counts and workforce numbers against publicly available statewide workforce data to ensure data quality and integrity.^{32–35} Additional details are available in eAppendix, eTable 2.

Measures of Access. To evaluate access to care, we assessed whether enrollees had *any* visit with each provider type during the study period. We defined risk-adjusted access rates as the ratio of observed to expected number of visits for each provider and insurance type, multiplied by the overall statewide access rate. We obtained the expected number of visits as predictions from a logistic regression model that pooled all patients (Medicaid and commercial) and adjusted for age, sex, and health status using the Chronic Illness and Disability Payment System (CDPS), a claims-based risk adjustment model based on diagnosis codes, widely used by Medicaid programs for risk adjustment.³⁶ The observed-over-expected ratio takes values greater than 1 when, after controlling for patient demographics and risk, access is greater than average; values less than 1 represent lower access than average. Multiplying these ratios by the overall state average produces a risk-adjusted access rate for that specialty.

Statistical Analyses

Our first set of analyses focused on risk-adjusted rates of access to care, comparing these rates for the commercially insured to those with Medicaid coverage across a variety of provider groups, with results aggregated up to the county level for descriptive and display purposes. We denoted each county’s status as “urban” or “rural,” with urban status defined as the majority of the study population in the county residing within a designated urban zip code area.³⁷ We provide graphical displays of these risk-adjusted access rates across ten provider types. We note that pregnant women were excluded from our analysis and

Table 1 Characteristics of the Study Population, by Insurance Type

	Medicaid (N = 420,947)	Commercial (N = 638,980)
Age (years)—N (%)		
19–34	177,267 (42.1)	183,720 (28.8)
35–49	135,735 (32.2)	221,047 (34.6)
50–64	107,945 (25.6)	234,213 (36.7)
Female sex—N (%)	226,388 (53.8)	319,332 (50.0)
Place of residence—N (%)		
Rural	78,215 (18.6)	77,375 (12.1)
Urban	342,732 (81.4)	561,605 (87.9)
History of health conditions—N (%)		
Psychiatric	83,317 (19.8)	70,656 (11.1)
Cardiovascular	72,643 (17.3)	103,373 (16.2)
Skeletal and connective	59,330 (14.1)	79,253 (12.4)
Gastrointestinal	46,333 (11.0)	48,934 (7.7)
Pulmonary	47,272 (11.2)	41,348 (6.5)
Diabetes	29,847 (7.1)	30,642 (4.8)
Substance abuse	40,384 (9.6)	9072 (1.4)
Skin	27,930 (6.6)	22,527 (3.5)
Central nervous system	24,727 (5.9)	21,546 (3.4)
Metabolic	18,100 (4.3)	27,203 (4.3)
Genital	14,925 (3.5)	20,658 (3.2)
Renal	13,085 (3.1)	12,379 (1.9)
Other infection	14,736 (3.5)	8770 (1.4)
Eye	9775 (2.3)	19,862 (3.1)
Cancer	7648 (1.8)	18,960 (3.0)
Hematological	5428 (1.3)	5314 (0.8)
Cerebrovascular	1958 (0.5)	1333 (0.2)
HIV/AIDS	1644 (0.4)	843 (0.1)
Developmental disability	1560 (0.4)	290 (0)
Health risk score—mean, SD	1.2, 1.2	1.0, 0.9

History of health conditions and health risk score at baseline are assessed using 1 year of historical claims data and the Chronic Illness and Disability Payment System (CDPS)

thus access rates for obstetrics and gynecology excluded the majority of maternity, pre-natal, or post-natal care.

In addition to visual displays of access, we also conducted multivariate, patient-level logistic regression models to assess whether access differences were statistically significant across insurance types and rural versus urban areas. We conducted these analyses for the ten provider types described above.

We conducted a separate set of analyses to clarify the extent to which Medicaid and commercially insured patients might be shared evenly across providers. We restricted this analysis to providers who treated a combined total of 50 or more Medicaid and commercially insured patients during the study period. We then generated ridgeline plots to display the distribution of payer mix for each provider type.

Data management and analyses were done using Stata 15.0³⁸ and R 3.5.1.³⁹ This study was approved by the Institutional Review Board at Oregon Health & Science University.

RESULTS

Our study cohort included 1,059,927 non-pregnant adult enrollees (420,947 Medicaid and 638,980 commercial). Compared with commercially insured patients, Medicaid patients were more likely to be rural (18.6% vs 12.1%) and younger and have higher prevalence rates for most health conditions, including psychiatric (19.8% vs 11.1%), gastrointestinal

(11.0% vs 7.7%), pulmonary (11.2% vs 6.5%), and skin conditions (6.6% vs 3.5%) (Table 1).

Figure 1 displays risk-adjusted access rates by county for two types of primary care providers (physicians; NPs and PAs). Points above the 45° line indicate counties with higher access rates for the commercial population relative to Medicaid, while counties below the 45° line had higher access rates for Medicaid (relative to commercial). Points further away from 0 represent counties with higher access rates.

Overall, risk-adjusted access rates for primary care physicians were significantly lower (−11.8 percentage points) for Medicaid patients relative to commercial patients (eAppendix, eTable 3). In contrast to the *lower* access rates for primary care physicians, Medicaid patients exhibited *higher* rates of access (approximately 4.3 percentage points) for NPs and PAs specializing in primary care. These differences in access rates by insurance type were similar, on average, across urban and rural areas for primary care physicians, but higher access to NPs and PAs was only observed in urban areas. Rural counties displayed greater variability than urban counties, with some rural counties exhibiting large (> 20 percentage point) gaps in access for Medicaid enrollees relative to their commercial counterparts.

Figure 2 displays differences in access to a variety of mental health provider types. Compared with the commercially insured, Medicaid enrollees had significantly higher rates of access to masters-level behavioral health specialists such as counselors and therapists (risk-adjusted absolute higher rate of 3.9 percentage points), and mental health NPs and PAs (1.2 percentage points). They also had a slightly higher rate of access to psychiatrists (0.3 percentage points) and slightly lower rates of access to psychologists (−0.4 percentage points; eAppendix, eTable 3). Rates of access for both commercial and Medicaid enrollees approached 0% for all mental health provider types in many rural counties.

Figure 3 displays differences in access to four physician specialties: obstetrics and gynecology, dermatology, general surgery, and gastroenterology. Medicaid access rates for obstetrics and gynecology were about half those of commercial enrollees; Medicaid access rates for dermatology were about one-quarter those of commercial enrollees (eAppendix, eTable 3). In contrast, there was relatively little Medicaid-commercial disparity in access to general surgery, with both groups displaying similar rates. Within the gastroenterology specialty, differences in access were most prominent across the urban-rural divide, with individuals in rural areas accessing care about half as frequently as those in urban areas.

Figure 4's ridgeline plots display the distributions of the share of Medicaid versus commercially insured patients seen by each provider and across provider types. Dermatologists had one of the most left-skewed (large commercial/small Medicaid payer mix) distributions; almost no physicians in this specialty saw a majority of Medicaid patients. In contrast, the distributions of mental health providers were right-skewed

Figure 1 County-level access to primary care providers, by insurance type and rurality. Dots denote percent of Medicaid and commercial patients in each county who accessed a given provider during the study period. Each county is represented by a dot; rural counties are colored green and urban counties are orange. The size of the dot reflects the percent of the total study population residing in the county. The 45° line indicates where points would fall if access rates were the same for Medicaid and commercial populations.

(large Medicaid/small commercial payer mix). Payer mix distributions among psychiatrists, psychologists, and NP and PA mental health providers were bimodal, with large densities at either tail, suggesting that providers tended to care primarily for Medicaid patients or for commercially

insured patients. Payer mix was more uniformly distributed across primary care physicians. The lack of a clear bimodal distribution for primary care providers suggests that care for Medicaid patients was not separated into two distinct payer markets.

Figure 2 County-level access to mental health providers, by insurance type and rurality. Dots denote percent of Medicaid and commercial patients in each county who accessed a given provider type during the study period. Each county is represented by a dot; rural counties are colored green and urban counties are orange. The size of the dot reflects the percent of the total study population residing in the county. The 45° line indicates where points would fall if access rates were the same for Medicaid and commercial populations. Other = behavioral specialists, counselors, and therapists.

Figure 3 County-level access to other physician specialists, by insurance type and rurality. Dots denote percent of Medicaid and commercial patients in each county who accessed a given provider type during the study period. Each county is represented by a dot; rural counties are colored green and urban counties are orange. The size of the dot reflects the percent of the total study population residing in the county. The 45° line indicates where points would fall if access rates were the same for Medicaid and commercial populations. Access to obstetricians/gynecologists excludes maternity care.

DISCUSSION

This cross-sectional study used all-payer claims data from Oregon to describe differences in access for Medicaid and commercially insured individuals across a variety of provider groups, and between urban and rural areas. Although Medicaid patients had less access to primary care physicians and to some specialists (e.g., obstetrics and gynecology, dermatology), they had equivalent or greater access to NPs and PAs providing primary care as well as a variety of mental health providers (including psychiatrists, NPs and PAs, and other behavioral specialists). Overall, our study suggests that, in Oregon, differences in access to care between insurance types exist, but the magnitude of these differences may be less than many popular perceptions. However, these findings were not consistent across regions; rural counties displayed substantial variations in access to care.

In relative terms, Medicaid patients' access to primary care physicians was about 80% of that of their commercial counterparts, a finding that is consistent with the existing literature.⁴⁰ However, the uniform distribution of payer mix across primary care physicians indicated that most of these physicians accepted Medicaid patients. We did not find evidence to

Figure 4 Share of Medicaid patients, by provider type. Each dot represents an individual provider, and the distribution of these providers is displayed as density estimates. "Other" mental health providers include behavioral specialists, counselors, and therapists.

suggest primary care was bifurcated into Medicaid and commercial markets.

Access to care was more restricted for Medicaid patients for some physician specialties, including obstetrics and gynecology and dermatology. However, access rates for some mental health providers were higher for Medicaid patients than commercial patients. This finding parallels research suggesting that, relative to their commercial counterparts, Medicaid enrollees with mental health needs may be more likely to use care.⁴¹

The higher rates of access for mental health–related specialties may reflect provider preference or training. Mental health conditions are common among Medicaid enrollees, and many providers may enter this field with an expectation or desire to serve this population. Furthermore, Figure 4 suggests that, in contrast to other providers, mental health providers appear to be primarily either Medicaid or commercial, with less mixing of payer types. This may reflect both the contracting arrangements that are common with mental health providers—with some groups focusing their efforts on contracting with Medicaid and/or counties that serve as the conduit for mental health services. In contrast, primary care providers, by nature of their generalist practice, may have more flexibility in who they see and may be able to work within a variety of contracting arrangements. The observed distributions in mental health providers may also reflect provider specialization, with providers who focus on Medicaid patients implicitly specializing in the care of low-income patients with a higher degree of social risk.

The relatively comparable rates of access may reflect robust Medicaid participation among providers in Oregon, perhaps attributable to higher reimbursement. Oregon ranks 12th nationally in terms of the number of physicians (per 100,000 residents) accepting Medicaid^{42,43} and 6th nationally in terms of total spending per adult enrollee,²⁷ with fee-for-service payment rates about 11% higher than the national average.²⁸ Furthermore, the Oregon Health Authority has historically made provider engagement a priority, using a statewide, participatory process as a mechanism to seek feedback from providers on the design and performance of the Medicaid program.⁴⁴

One perspective on these results is that Medicaid coverage in Oregon has translated into access to a clinically important range of providers, even if there remains room to move access closer to that of commercially insured individuals. A straightforward approach to addressing the Medicaid-commercial disparities described here may be to increase reimbursement rates. However, this approach may challenge state and federal budgets. Furthermore, there is some evidence that simply increasing payment might not translate to increases in access. For example, studies of the ACA's 2013/2014 primary care fee “bump”—which resulted in an average increase in primary care payments of more than 70%—found no association with primary care providers' participation in Medicaid or Medicaid service volume.^{45,46} While reimbursement may matter,

physicians may be more responsive to efforts to simplify Medicaid's administrative processes and increase the speed of reimbursement.⁴⁷ Recent network adequacy regulations, which require Medicaid managed care plans in every state to set standards for specialty care access, including limits on wait times and distance traveled, may also narrow existing disparities in access.⁴⁸ A 2017 CMS-Mathematica Toolkit provides a framework and a variety of metrics for monitoring provider network adequacy in ways that support service availability in the Medicaid population, as well as highlighting effective practices.⁴⁹ Some research suggests that standards alone may not be sufficient to ensure full access to needed medical care.⁵⁰ Vigilant monitoring and reassessment of standards, reimbursement rates, incentives, and provider engagement are all likely to play important roles in sustaining access for Medicaid beneficiaries.

A portion of the gap we observed between Medicaid and commercial access may be attributable to social determinants of health. Medicaid patients and rural patients may be more likely to experience access barriers such as housing insecurity⁵¹ and lack of transportation.⁵² Several states, including Oregon, have already identified social determinants of health as targets for improvement.⁵³ Other potential levers for improving the program may include alternative payment models that hold providers accountable for access,^{24,26} changes in the supply, training, and mix of the health care workforce; or telemedicine.⁴⁵ Given the disparities observed in this study, a high priority should be placed on approaches with the potential to address differences in urban-rural access, as well as Medicaid-commercial disparities.

Limitations

There are several limitations to this analysis. First, our analyses adjusted for demographics and health characteristics, but not for other factors. In particular, the Medicaid population may have transportation barriers or other social complexities that would tend to overestimate the role of Medicaid insurance on gaps in access. On the other hand, Medicaid patients may have more significant chronic conditions and behavioral health conditions; if the severity of these conditions were not captured in our recorded data, our estimates would tend to underestimate disparities in access.

Second, this cross-sectional study uses data from a single state with a unique Medicaid model, which may not generalize to the rest of the country. Compared with other states, Oregon's payment rates and overall benefit package may be more generous, which may affect provider participation.^{27,28,42,43} Third, our study used claims data, which does not capture all clinically relevant information. Furthermore, our measure of access does not distinguish a number of additional dimensions, such as appointment availability, ease of appointment, wait times, or distance traveled. Finally, we were unable to include all possible provider types. In particular, we did not include social workers, a group that provides a

significant proportion of mental health services for both commercially insured and Medicaid enrollees, and this could underestimate access to mental health providers.⁵⁴

CONCLUSIONS

Our study confirms the existence of Medicaid-commercial disparities in access to care and also finds relative comparability across some provider types, including NPs and PAs providing primary care and a range of mental health providers. Despite the structural barriers faced by the Medicaid program—including lower provider participation, a vulnerable and complex patient population, and lower reimbursement rates—the program in Oregon appears to provide levels of access that are reasonably comparable, although not always at parity, with commercial rates for important medical services. Additional efforts to monitor provider participation and network adequacy across urban and rural regions will be necessary to ensure that Medicaid coverage does indeed translate to timely access to needed medical services. Policies that aim to improve access in innovative ways—such as expansions of telemedicine or changes in the workforce mix—have the potential to reduce disparities across the program broadly, and may be particularly effective in addressing gaps in care for individuals located in rural areas.

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Compliance with Ethical Standards:

This study was approved by the Institutional Review Board at Oregon Health & Science University.

Conflict of Interest: The authors declare that they do not have a conflict of interest.

REFERENCES

- Rosenbaum S, Schmucker S, Rothenberg S, Gunsalus R. What would block grants or limits on per capita spending mean for Medicaid? Issue Brief (Commonw Fund). 2016;39:1-10.
- Iglehart JK, Sommers BD. Medicaid at 50 — From Welfare Program to Nation's Largest Health Insurer. N Engl J Med. 2015;372(22):2152-2159.
- Verma S. Speech: Remarks by Administrator Seema Verma at the National Association of Medicaid Directors (NAMD) 2017 Fall Conference | CMS. <https://www.cms.gov/newsroom/fact-sheets/speech-remarks-administrator-seema-verma-national-association-medicare-directors-namd-2017-fall>. Accessed July 30, 2019.
- Bassey S, Saloner B, Kenney GM, Wissoker D, Polsky D, Rhodes KV. Primary care appointment availability for Medicaid patients: comparing traditional and premium assistance plans. Med Care. 2016;54(9):878-883.
- Rhodes KV, Kenney GM, Friedman AB, et al. Primary care access for new patients on the eve of health care reform. JAMA Intern Med. 2014;174(6):861-869.
- Rhodes KV, Bassey S, Friedman AB, Kenney GM, Wissoker D, Polsky D. Access to primary care appointments following 2014 insurance expansions. Ann Fam Med. 2017;15(2):107-112.
- Neprash HT, Zink A, Gray J, Hempstead K. Physicians' participation in Medicaid increased only slightly following expansion. Health Aff (Millwood). 2018;37(7):1087-1091.
- Long SK, Stockley K, Grimm E, Coyer C. National Findings on Access to Health Care and Service Use for Non-Elderly Adults Enrolled in Medicaid (MACPAC Contractor Report No. 2); 2012. https://www.macpac.gov/wp-content/uploads/2015/01/Contractor-Report-No_2.pdf. Accessed July 30, 2019.
- Nguyen KH, Sommers BD. Access and quality of care by insurance type for low-income adults before the Affordable Care Act. Am J Public Health. 2016;106(8):1409-1415.
- Chou S-C, Deng Y, Smart J, Parwani V, Bernstein SL, Venkatesh AK. Insurance status and access to urgent primary care follow-up after an emergency department visit in 2016. Ann Emerg Med. 2018;71(4):487-496.e1.
- Alcalá HE, Roby DH, Grande DT, McKenna RM, Ortega AN. Insurance type and access to health care providers and appointments under the Affordable Care Act. Med Care. 2018;56(2):186-192.
- Bruen BK, Ku L, Lu X, Shin P. No evidence that primary care physicians offer less care to Medicaid, Community Health Center, or Uninsured patients. Health Aff (Millwood). 2013;32(9):1624-1630.
- Hartley D. Rural health disparities, population health, and rural culture. Am J Public Health. 2004;94(10):1675-1678.
- Singh GK, Siahpush M. Widening Rural-urban disparities in life expectancy, U.S., 1969-2009 Am J Prev Med. 2014;46(2):e19-e29.
- Anandasivam NS, Wiznia DH, Kim C-Y, Save AV, Grauer JN, Pelker RR. Access of patients with lumbar disc herniations to spine surgeons. Spine. 2017;42(15):1179-1183.
- Kim C-Y, Wiznia DH, Roth AS, Walls RJ, Pelker RR. Survey of patient insurance status on access to specialty foot and ankle care under the Affordable Care Act. Foot Ankle Int. 2016;37(7):776-781.
- Hsiang W, McGeoch C, Lee S, et al. The effect of insurance type on access to inguinal hernia repair under the Affordable Care Act. Surgery. 2018;164(2):201-205.
- Lee YH, Chen AX, Varadaraj V, et al. Comparison of access to eye care appointments between patients with Medicaid and those with Private Health Care Insurance. JAMA Ophthalmol. 2018;136(6):622-629.
- Wiznia DH, Maisano J, Kim C-Y, Zaki T, Lee HB, Leslie MP. The effect of insurance type on trauma patient access to psychiatric care under the Affordable Care Act. Gen Hosp Psychiatry. 2017;45:19-24.
- Labrum JT, Paziuk T, Rihn TC, et al. Does Medicaid insurance confer adequate access to adult orthopaedic care in the era of the patient protection and Affordable Care Act? Clin Orthop Relat Res. 2017;475(6):1527-1536.
- Medford-Davis LN, Lin F, Greenstein A, Rhodes KV. "I Broke My Ankle": access to orthopedic follow-up care by insurance status. Acad Emerg Med. 2017;24(1):98-105.
- Bishop TF, Press MJ, Keyhani S, Pincus HA. Acceptance of insurance by psychiatrists and the implications for access to Mental Health Care. JAMA Psychiatry. 2014;71(2):176-181.
- Oregon Health Authority. All Payer All Claims Reporting Program. March 2018. <https://www.oregon.gov/oha/HPA/ANALYTICS/APAC%20Page%20Docs/APAC-Overview.pdf>. Accessed July 30, 2019.
- McConnell KJ, Chang AM, Cohen DJ, et al. Oregon's Medicaid Transformation: an innovative approach to holding a health system accountable for spending growth. Health Aff (Millwood). 2014;33(3):163-167.
- McConnell KJ. Oregon's Medicaid Coordinated Care Organizations. JAMA. 2016;315(9):869-870.
- McConnell KJ, Renfro S, Lindrooth RC, Cohen DJ, Wallace NT, Chernew ME. Oregon's Medicaid reform and transition to global budgets were associated with reductions in expenditures. Health Aff (Millwood). 2017;36(3):451-459.
- Kaiser Family Foundation. Medicaid Spending per Enrollee (Full or Partial Benefit). Henry J Kais Fam Found. June 2017. <https://www.kff.org/medicaid/state-indicator/medicaid-spending-per-enrollee/>. Accessed July 30, 2019.
- Zuckerman S, Skopec L, Epstein M. Medicaid Physician Fees after the ACA Primary Care Fee Bump. Urban Institute. <https://www.urban.org/research/publication/medicaid-physician-fees-after-aca-primary-care-fee-bump>. Published March 9, 2017. Accessed July 30, 2019.

29. **Cooper Z, Craig SV, Gaynor M, Van Reenen J.** The price ain't right? Hospital prices and health spending on the privately insured. *Q J Econ.* 2019;134(1):51-107.
30. United States Department of Agriculture Economic Research Service. State Data: Oregon. State Fact Sheets. https://data.ers.usda.gov/reports.aspx?StateFIPS=41&StateName=Oregon&ID=17854#Pa578a9f8109d444ab1-b570e93ea08d16_2_39fT0. Accessed July 30, 2019.
31. **Zhu JM, Zhang Y, Polsky D.** Networks in ACA Marketplaces are narrower for mental health care than for primary care. *Health Aff (Millwood).* 2017;36(9):1624-1631.
32. Association of American Medical Colleges. 2015 State Physician Workforce Data Book. Washington DC: Association of American Medical Colleges; 2015.
33. Oregon Health Authority. Oregon's Primary Care Workforce: Based on Data Collected during 2015 and 2016. Portland, OR: Oregon Health Authority; 2017.
34. Oregon Center for Nursing and the Oregon Healthcare Workforce Institute. Oregon's Licensed Behavioral/Mental Health Care Workforce. Portland, OR: Oregon Health Authority; 2015.
35. Bureau of Labor Statistics. Occupational Employment Statistics Query System. Washington DC: United States Department of Labor; 2018. <https://data.bls.gov/oes/#/home>. Accessed July 30, 2019.
36. **Kronick R, Gilmer T, Dreyfus T, Lee L.** Improving health-based payment for Medicaid beneficiaries: CDPS. *Health Care Financ Rev.* 2000;21(3):29-64.
37. **Hart G.** Rural-urban commuting area (RUCA) codes (version 2.0). 2006.
38. StataCorp. Stata Statistical Software. College Station, TX: StataCorp LLC; 2017.
39. R Core Team. R: A Language and Environment for Statistical Computing. Vienna, Austria; 2018. <https://www.R-project.org/>. Accessed July 30, 2019.
40. **Cook NL, Hicks LS, O'Malley AJ, Keegan T, Guadagnoli E, Landon BE.** Access to specialty care and medical services in Community Health Centers. *Health Aff (Millwood).* 2007;26(5):1459-1468.
41. **McKenna RM, Pintor JK, Ali MM.** Insurance-based disparities in access, utilization, and financial strain for adults with psychological distress. *Health Aff (Millwood).* 2019;38(5):826-834.
42. **Sommers BD, Kronick R.** Measuring Medicaid Physician participation rates and implications for policy. *J Health Polit Policy Law.* 2016;41(2):211-224.
43. **Barnett ML, Clark KL, Sommers BD.** State policies and enrollees' experiences in medicaid: evidence from a new national survey. *Health Aff (Millwood).* 2018;37(10):1647-1655.
44. **Berenson RA, Hayes E, Lallemand NC.** Health Care Stewardship: Oregon Case Study. Urban Institute. <https://www.urban.org/research/publication/health-care-stewardship-oregon-case-study>. Published June 4, 2016. Accessed July 30, 2019.
45. **Mulcahy AW, Gracner T, Finegold K.** Associations between the Patient Protection and Affordable Care Act Medicaid primary care payment increase and physician participation in Medicaid. *JAMA Intern Med.* 2018.
46. **Decker SL.** No association found between the Medicaid primary care fee bump and physician-reported participation in Medicaid. *Health Aff (Millwood).* 2018;37(7):1092-1098.
47. **Long SK.** Physicians may need more than higher reimbursements to expand Medicaid participation: findings from Washington State. *Health Aff Proj Hope.* 2013;32(9):1560-1567.
48. Centers for Medicare & Medicaid Services. Medicaid and Children's Health Insurance Program (CHIP) Programs; Medicaid Managed Care, CHIP Delivered in Managed Care, and Revisions Related to Third Party Liability [81 FR 27497]. Washington DC; 2016. <https://www.federalregister.gov/documents/2016/05/06/2016-09581/medicaid-and-childrens-health-insurance-program-chip-programs-medicaid-managed-care-chip-delivered>. Accessed July 30, 2019.
49. **Lipson DJ, Libersky J, Braley K, Lewis C, Siegarth AW, Lester R.** Promoting access in Medicaid and CHIP managed care: a toolkit for ensuring provider network adequacy and service availability. Washington DC: Mathematica Policy Institute; 2017.
50. Ndumele CD, Cohen MS, Cleary PD. Association of State access standards with accessibility to specialists for Medicaid managed care enrollees. *JAMA Intern Med.* 2017.
51. **Ash AS, Mick EO, Ellis RP, Kiefe CI, Allison JJ, Clark MA.** Social determinants of health in managed care payment formulas. *JAMA Intern Med.* 2017.
52. **Chaiyachati KH, Hubbard RA, Yeager A, et al.** Association of rideshare-based transportation services and missed primary care appointments: a clinical trial. *JAMA Intern Med.* 2018;178(3):383-389.
53. **Artiga S, Hinton E.** Beyond health care: the role of social determinants in promoting health and health equity. Washington DC: Kaiser Family Foundation; 2018.
54. **Heisler EJ.** The mental health workforce: a primer. Washington DC: Congressional Research Service; 2018. <https://fas.org/sgp/crs/misc/R43255.pdf>. Accessed July 30, 2019.

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