

# How All-Payer Claims Databases (APCDs) Can be Used to Examine Changes in Professional Spending: Experience from the Rhode Island APCD

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## ABSTRACT

States are increasingly the focus of health care spending reform efforts given political deadlock at the federal level. Using the Rhode Island All-Payer Claims Database (APCD) from 2016 to 2019, a modified National Uniform Claim Committee (NUCC) provider taxonomy, and the 2021 Restructured BETOS Classification System (RBCS), we evaluate professional spending trends in commercial and Medicaid populations, identify specialties and clinical service categories driving trends, and examine price and volume contributions to spending changes. We found that professional spending from 2016–2019 in Medicaid is increasing faster than professional spending in commercial (5.2% vs. 2.7% annually). We also found that nurse practitioner and physician assistant evaluation and management (E&M), behavioral health services E&M, anesthesia, diagnostic radiology imaging, and orthopedic procedures were among the largest areas of spending increase during the study period in Rhode Island. Three-year trends showed heterogeneity in whether volume or price was primarily responsible for these spending increases.

**KEYWORDS:** health care costs, state health policy, health care financing, Medicaid, health economics

## INTRODUCTION

Trends in national health care spending growth<sup>1</sup> are of great concern for states as they seek to ensure affordability of health care for their residents. The opportunity cost of high health care spending and spending growth is substantial; rising health care costs hinder investment in social services such as education, housing, transportation, and infrastructure.<sup>2</sup> States have increasingly been the focus of attempts to evaluate and moderate health care spending growth.<sup>3,4</sup> Identifying factors that increase health care costs is an important step towards improving the value and efficiency of care delivery. State All-Payer Claims Databases (APCDs) are a potentially valuable source of information to facilitate understanding of overall cost trends and the drivers of those trends.<sup>5</sup>

Total health care spending can be divided into two components: professional spending and facility spending.

Professional spending refers to reimbursement for health care personnel rendering care services. Facility spending refers to reimbursement for inpatient and outpatient centers where care is rendered. In recent years, national inpatient hospital spending has either been stable or declining as a result of care shifting to outpatient care settings (e.g., hospital outpatient departments, offices, and ambulatory surgical centers) where appropriate.<sup>6–10</sup> Innovative methods to evaluate professional spending trends are needed. The growth of spending on specialty care is of particular interest, as a potential driver of both overall costs and cost increases.<sup>11,12</sup> A study of Medicare beneficiaries from 2000–2019 showed an increase in outpatient office visits to specialists, representing increased coordination burden for PCPs<sup>13</sup> and likely proxies for increased use of specialty services. APCDs are uniquely suited to provide information on the growth of specialty care, and afford a systems-level perspective to consider trends across public and private insurance programs.

Rhode Island presents a unique opportunity to examine trends in specialty and primary care because prior policy efforts have been focused on increasing primary care spending as one mechanism to control total health care costs. Specifically, the Rhode Island Office of the Health Insurance Commissioner has implemented affordability standards in 2010 which emphasized primary care and established a hospital rate review process for commercial payers. Importantly, regulatory authority through hospital rate review restricts inpatient and outpatient facility rate increases, but does not apply to professional spending.<sup>14–16</sup> A 2018 HCCI report found RI professional spending among commercial payers exceeded the national average.<sup>17</sup> Primary care spending as a proportion of total spending in Rhode Island remains high relative to other states,<sup>18</sup> but little is known about the professional spending trends as they pertain to specific clinical areas.

In this study, we examine trends in professional spending for Rhode Island residents from 2016 to 2019 in commercial and Medicaid Managed Care (hereafter Medicaid) populations; these include individuals of all ages, who account for approximately 75% of the member months captured by the RI APCD and 50% of the total spending. To evaluate trends in professional spending, we use the Restructured Berenson-Eggers Types of Service Classification System (RBCS)<sup>19</sup> that we have enhanced to be more comprehensive

for service categories relevant for applications beyond Medicare populations (e.g., including obstetric and pediatric spending for younger insured populations). RBCS was developed to track changes in spending under the Medicare Physician Fee Schedule according to clinically meaningful categories. Using this approach, we compare changes in primary and specialty care professional spending in commercial and Medicaid populations, identify specialties and clinical service categories for which costs are increasing, and for those examine whether cost increases are explained by volume or price. This analytic approach serves as a model for other states seeking to turn robust claims data captured by APCDs into summary information that is actionable for health system performance monitoring and evaluation and policy development.

In this paper, we seek to answer three main research questions: first, how are broad professional spending trends similar and different across commercial and Medicaid populations? Second, which provider specialties and service categories are responsible for professional spending trends from 2016 to 2019? Finally, are professional spending trends attributable to changes in volume or price?

### New Contribution

All-Payer Claims Databases (APCDs) are a tool for studying health system performance monitoring and policy. This study further demonstrates (1) APCDs can be leveraged to study professional spending across payers, (2) professional spending can proxy for total health care spending, and (3) practical tools for studying professional spending generalizable to other payers/states.

### Data and Methods

We constructed an analytic dataset for the study period, 2016 to 2019, using the Rhode Island APCD which included all professional claims linked to provider elements to be able to identify provider specialty information for all Rhode Island residents enrolled in either commercial (fully and reported self-insured) or Medicaid MCO insurance plans. We excluded Medicaid FFS professional spending (approximately 9% of total Medicaid spending). In RI patients often spend a few months in Medicaid FFS before being enrolled in a managed care plan, so we did not believe that examining this in detail would produce valid systematic findings. We excluded approximately 16,000 (~5%) commercial members per year who lack pharmacy claims (due to prescription drug carveouts), and for whom total costs cannot be evaluated.

Each medical claim line includes information about the clinician who rendered the service and their corresponding National Uniform Claim Committee (NUCC) provider taxonomy code.<sup>20</sup> As the NUCC provider taxonomy was very granular, we used a more parsimonious approach to construct a clinically relevant provider classification system; a hybrid between the pure NUCC taxonomy and a BETOS-adapted

taxonomy used in a recent Urban Institute report.<sup>21</sup> The crosswalk between the NUCC taxonomy and our adapted taxonomy as well as a visual representation of our provider classification system is available for dissemination by the corresponding author. The main categories of clinicians are primary care, non-procedural medical, procedural internal medicine, surgical, other physicians, and other health professionals (e.g., nurse practitioners, physician assistants, social workers, physical therapists, etc.).

We then linked our claims dataset with the Restructured BETOS Classification System (RBCS) to identify clinically relevant service groupings for study. RBCS was developed to categorize healthcare services from the Medicare physician fee schedule (MPFS, Part B) into clinically meaningful groups and subcategories.<sup>19</sup> The first level of classification (hereafter, 'RBCS Level 1') includes anesthesia, durable medical equipment (DME), evaluation and management (E&M), imaging, other, procedures, tests, and treatments. The second level of classification (hereafter, 'RBCS Level 2') includes groups of Current Procedural Terminology (CPT)/Healthcare Common Procedures Coding System (HCPCS) codes of related services. For example, "CT scans" are a RBCS Level 2 subset of the "Imaging" RBCS Level 1 service category. Beyond applications in the Medicare program, the BETOS coding system has previously been used to study utilization among Veterans' Administration-Medicaid dual enrollees,<sup>22</sup> Medicaid primary care services in Oregon,<sup>23</sup> and a study of commercial patients insured by BCBSTX.<sup>24</sup>

Each professional claim was associated with a single provider specialty. Each claim was then assigned to a single RBCS Level 2 service category, nested within a Level 1 RBCS category. First, we calculated per-member-per-month (PMPM) spending across broad clinical categories and RBCS Level 1 service categories for commercial and Medicaid (see **Table 2**) members, separately. Next, we evaluated RBCS Level 1 service categories with the largest PMPM spending increases within specific provider specialties (see **Table 3**). Finally, we studied RBCS Level 2 service categories with the largest PMPM spending increases within specific provider specialties (see **Table 4**). In contrast to RBCS Level 1 service categories (e.g., Radiology Imaging), RBCS Level 2 service categories (e.g. Radiology CT Scans) offer the level of granularity necessary to meaningfully analyze changes in service price or volume over time. The largest RBCS Level 2 spending areas were evaluated to determine if trends in spending were driven primarily by volume or price (see **Figure 1**). This stepwise approach to health care cost analysis afforded a broad view of cost trends in addition to a granular view of the specific professional services responsible for those trends. Given stark differences across payers in age distribution, prices, and common population morbidities, analyses are conducted within each payer.

Our analyses have focused on professional spending given that the majority of health care spending has at least some

**Table 1.** Trends in Spending by Commercial and Medicaid Managed Care Payers, 2016–2019

Dollar Amounts	Year				2016–2019	Average Annual
	2016	2017	2018	2019	% Increase	% Increase
Total Paid Claims	5.8B	6.1B	6.2B	5.5B		
<b>Commercial</b>						
Member Months	3.66M	3.51M	3.24M	3.01M		
Total Paid Claims	1.74B	1.73B	1.63B	1.61B		
Professional (% of Total Commercial)	521M (30%)	511M (30%)	483M (30%)	474M (29%)		
Professional PMPM	143	145	149	155	8.4%	2.7%
Professional Assignable to Specialty (% of Total Commercial)	441M (25%)	427M (25%)	410M (25%)	411M (26%)		
<b>Medicaid Managed Care</b>						
Member Months	2.70M	2.85M	2.85M	2.77M		
Total Paid Claims	1.10B	1.22B	1.26B	1.32B		
Professional (% of Total Medicaid MCO)	314M (29%)	338M (28%)	355M (28%)	373M (28%)		
Professional PMPM	116	119	124	135	16%	5.2%
Professional Assignable to Specialty (% of Total Medicaid MCO)	191M (17%)	214M (18%)	232M (18%)	223M (17%)		

Notes: PMPM refers to “Per Member Per Month” spending. PMPM spending measures adjust for changes in insurance enrollment in each study year and is therefore the primary metric of analysis used in the remainder of this paper. “Professional Assignable to Specialty” is the denominator used in the remainder of this paper for cost driver analyses.

**Table 2.** PMPM Spending by Specialty Group in Commercial and Medicaid Managed Care Payers

	Spending Metrics			
	Total Spending 2019	PMPM 2019	PMPM Diff 2016–2019	PMPM Annual % Change 2016–2019
<b>Commercial</b>	\$391,648,623	\$ 128.07	\$ 12.07	3%
Other Health Professionals	\$112,308,264	\$ 36.72	\$ 6.51	7%
Other Physicians	\$ 91,826,022	\$ 30.02	\$ 3.68	5%
Nonprocedural Medical	\$ 42,301,959	\$ 13.85	\$ 1.40	4%
Surgical Specialties	\$ 52,334,282	\$ 17.10	\$ 0.82	2%
Primary Care	\$ 64,356,914	\$ 21.05	\$ (0.08)	0%
Procedural Internal Medicine	\$ 28,521,182	\$ 9.33	\$ (0.26)	-1%
<b>Medicaid Managed Care</b>	\$190,061,117	\$ 68.67	\$ 9.57	5%
Other Health Professionals	\$ 62,812,461	\$ 22.69	\$ 4.47	8%
Other Physicians	\$ 37,091,382	\$ 13.42	\$ 1.63	5%
Nonprocedural Medical	\$ 23,167,284	\$ 8.34	\$ 1.33	6%
Primary Care	\$ 38,616,401	\$ 13.96	\$ 1.17	3%
Procedural Internal Medicine	\$ 9,378,785	\$ 3.39	\$ 0.56	7%
Surgical Specialties	\$ 18,994,804	\$ 6.87	\$ 0.41	2%

Notes: PMPM = Per Member Per Month. E&M = Evaluation and Management. DME = Durable Medical Equipment. Percentages represent total spending in 2019. PMPM Difference 2016-19 is the difference of Spending PMPM 2019 subtracted by Spending PMPM 2016 (not shown).

professional component, and we first confirmed a strong linear association between professional and facility spending at the procedure code encounter level. It is therefore reasonable to apply RBCS to professional spending alone as a tool for evaluating categories of spending, with the caveat that any services billed exclusively with facility claims or that are not classified by RBCS are beyond the scope of this study. Specifically, there are some CPT codes that are exclusively claims for children (for example, well-child visits, CPT 99381-99385) and would not be relevant for a Medicare population, so these codes would not be captured by RBCS; this represents approximately 7% of professional spending in Medicaid and 2% of professional spending in commercial. Professional claims submitted by organizations for which a single specialty could not be assigned were excluded from analysis (13% of the professional spending by commercial payers and 35% of professional spending in Medicaid). Finally, any professional spending for medical pharmacy (e.g., “J-codes”) claims were also excluded from this analysis because APCDs lack information about drug rebates and therefore we cannot interpret data values as the true costs of these services.

**RESULTS**

PMPM professional spending among commercially insured individuals increased by 8.4% from \$143 in 2016 to \$155 in 2019 (Table 1). Decreases in commercial covered lives included in the study population are a result declining reporting from self-insured commercial plans; PMPM calculations account for the change in the population over time. From 2016 to 2019, PMPM professional spending among individuals covered by Medicaid increased by 16% from \$116 in 2016 to \$135 in 2019. PMPM professional spending in Medicaid was 81% and 92% of professional spending in commercial in 2016 and 2019, respectively.

**Table 3.** Spending in Provider Specialties and RBCS Level 1 Specialty Service Categories, 2016–2019

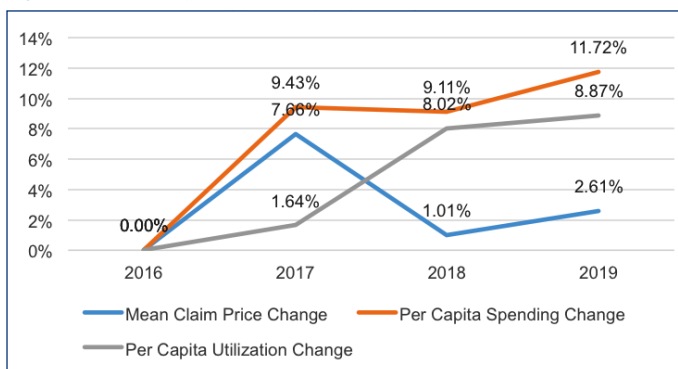
		Spending Metrics			
		PMPM 2019 (\$)	Total Spending 2019 (\$)	PMPM Difference 2016–2019 (\$)	PMPM Annual % Change 2016–2019
<b>Commercial</b>					
Provider Specialty	RBCS Level 1				
Nurse Practitioner	E & M	5.18	15,832,051	2.02	21%
Anesthesiology	Anesthesia	5.53	16,906,129	1.37	11%
Diagnostic Radiology	Imaging	11.13	34,031,741	1.31	4%
Counselor	E & M	2.91	8,886,012	0.91	15%
Physician Assistant	E & M	2.61	7,987,615	0.78	14%
Orthopedic Surgery	Procedure	4.6	14,053,745	0.64	5%
Social Worker	E & M	3.4	10,380,540	0.6	7%
CRNA/Anesthesiology Assistant	Anesthesia	1.68	5,121,845	0.51	15%
Emergency Medicine	E & M	4.72	14,411,743	0.43	3%
Radiation Oncology	Treatment	2.04	6,244,026	0.43	9%
<b>Medicaid Managed Care</b>					
Provider Specialty	RBCS Level 1				
Nurse Practitioner	E & M	4.47	12,362,633	1.7	20%
Diagnostic Radiology	Imaging	3.42	9,460,830	1.12	16%
Psychiatry	E & M	2.01	5,573,085	0.91	27%
Social Worker	E & M	2.63	7,267,784	0.61	10%
Counselor	E & M	2.4	6,641,543	0.5	9%
Physician Assistant	E & M	1.48	4,103,943	0.44	14%
Pediatric Primary Care	E & M	5.13	14,192,776	0.42	3%
Physical Therapist	Treatment	1.72	4,751,076	0.36	9%
Primary Care Internal Medicine	E & M	3.84	10,623,670	0.36	3%
Clinical Psychologist	E & M	1.12	3,099,830	0.34	15%

Notes: PMPM = Per Member Per Month. Table 3 is sorted by highest PMPM spending difference from 2016–2019. PMPM Difference 2016-19 is the difference of Spending PMPM 2019 subtracted by Spending PMPM 2016 (not shown).

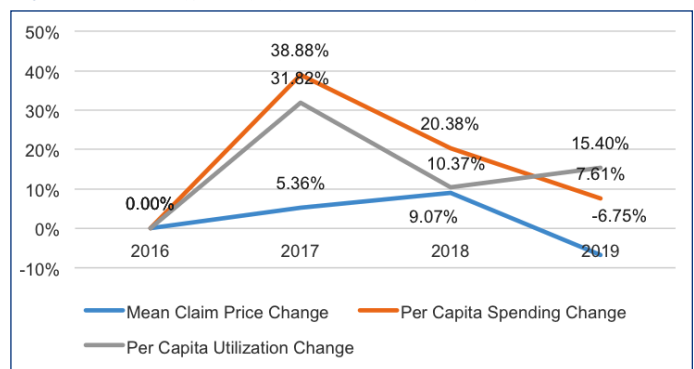
The annual percent increase in professional spending over the study period was higher in Medicaid than commercial (5.2% vs. 2.7%). Subsequent analyses show spending trends within specific provider specialties.

In 2019, PMPM spending levels were almost twice as large in commercial compared to Medicaid (Table 2) – while there is variation by clinician group, PMPM spending levels are larger in commercial across all clinician groups, reflecting higher levels of commercial payment compared to Medicaid. PMPM surgical specialty spending is 2.5 times that of Medicaid, and PMPM procedural internal medicine spending is 2.8 times that of Medicaid spending. Importantly, the ordering and relative magnitude of group spending by insurance program differs. For both commercial and Medicaid payers, other health professionals and other physician specialists represent high PMPM spending areas. However, in commercial, other health professionals and other physician specialists are similar in magnitude, whereas in Medicaid, other physician specialist spending is about 2/3 that of other health professionals. In commercial, other health professionals and other physician specialists saw the largest absolute growth in PMPM spending, while showing decreases in primary care and procedural internal medicine spending. In Medicaid, other health professionals saw the largest

**Figure 1a.** Radiology-Imaging-CT Commercial



**Figure 1b.** Radiology-Imaging-CT Medicaid Managed Care



Notes: Examples of price/volume analyses; figures represent yearly changes in price and volume of CT scans by diagnostic radiology in Commercial and Medicaid. Identical analyses were conducted for high spending areas from Table 4.

**Table 4.** Spending in Provider Specialties and RBCS Level 2 Specialty Service Categories, 2016–2019

			Price and Volume Analysis	
			Annual % Change in Mean Price	Annual % Change in Per Capita Utilization
<b>Commercial</b>				
Provider Specialty	BETOS Lvl 1	BETOS Lvl 2		
Nurse Practitioner	E & M	Office/outpatient services	2.0%	7.0%
Anesthesiology	Anesthesia	Anesthesia	1.5%	-1.0%
Counselor	E & M	Behavioral health services	-0.2%	8.1%
Physician Assistant	E & M	Office/outpatient services	1.0%	3.6%
Orthopedic Surgery	Procedure	Musculoskeletal	6.8%	-1.6%
Diagnostic Radiology	Imaging	CT Scan	3.8%	3.0%
Social Worker	E & M	Behavioral health services	-0.4%	3.0%
CRNA/Anes. Assistant	Anesthesia	Anesthesia	0.6%	3.6%
Radiation Oncology	Treatment	Radiation oncology	2.5%	-0.4%
Diagnostic Radiology		Standard XRay	11.9%	0.8%
<b>Medicaid Managed Care</b>				
Provider Specialty	BETOS Lvl 1	BETOS Lvl 2		
Nurse Practitioner	E & M	Office/outpatient services	1.3%	9.2%
Social Worker	E & M	Behavioral health services	1.2%	8.6%
Counselor	E & M	Behavioral health services	3.2%	7.3%
Primary Care Internal Medicine	E & M	Hospital inpatient services	8.5%	6.3%
Physician Assistant	E & M	Office/outpatient services	3.0%	2.3%
Psychiatry	E & M	Hospital inpatient services	-7.6%	56.9%
Diagnostic Radiology	Imaging	CT Scan	2.4%	5.1%
Pediatric Primary Care	E & M	Office/outpatient services	5.6%	0.2%
Physical Therapist	Treatment	Phys, occup, and speech therapy	1.5%	5.5%
Clinical Psychologist	E & M	Behavioral health services	-2.6%	20.9%

Notes: PMPM = Per Member Per Month. Table 4 is sorted by highest PMPM spending increases from 2016–2019 (not shown).

absolute growth in PMPM spending.

Next, we evaluated the clinical service categories within provider specialties that had the largest absolute increases in PMPM spending between 2016 and 2019. Among specialty-specific RBCS Level 1 service categories that experienced a PMPM increase from 2016–2019 (about 33% in both payers), the median increase in PMPM spending was \$0.03 in both payers; among these service categories, the median PMPM annual percent increase was 9.5% in commercial and 10.4% in Medicaid. Across high spending areas in both payers from 2016 to 2019, E&M for nurse practitioners, counselors, physician assistants, and social workers and imaging for diagnostic radiology had notable increases in PMPM spending (Table 3). Additionally, anesthesia and orthopedic procedures had notable PMPM spending increases in commercial while E&M for psychiatry, internal medicine primary care, and pediatric primary care saw increases in Medicaid.

Finally, we evaluated the specific types of services, as relevant groupings of CPT/HCPCS codes (RBCS Level 2), driving overall spending trends. Among specialty-specific RBCS Level 2 service categories that experienced a PMPM increase from 2016 to 2019 (about 5–6% in both payers), the median increase was \$0.02 in both payers; among these service categories, the median PMPM annual percent increase was 22% in commercial and 15% in Medicaid. The median annual percent change in average service category prices was 4.9% in commercial and 3.8% in Medicaid. The median annual percent change in service category per capita utilization was 4.0% in commercial and 3.8% in Medicaid.

We further evaluated RBCS Level 2 categories with the largest PMPM spending differences; this final analysis is illustrative of potential cost drivers. Nurse practitioner (NP) and physician assistant (PA) office/outpatient services, counselor and social worker behavioral health services,

and diagnostic radiology CT were notable areas of spending increases in both payers. We disaggregated spending into utilization per capita and average price (see **Figure 1**) for one example of this analysis with Diagnostic Radiology CT) to evaluate the two determinants of health care spending. Three-year trends show spending increases across both payers in NP/PA office visits and most behavioral services were primarily driven by utilization; despite increased spending in these areas. Increased commercial spending on diagnostic radiology CT scans was driven by increases in price in commercial and increases in utilization in Medicaid. Rising spending for anesthesia services was driven by price in the commercial population. Commercial spending for orthopedic procedures increased by 5.4% annually between 2016 and 2019, driven by a 6.8% annual increase in price despite a 1.6% annual decrease in utilization. In Medicaid, primary care internal medicine hospital services and pediatric primary care office/outpatient services experienced price annual increases of 8.5% and 5.6% respectively. Medicaid spending for psychiatry hospital inpatient services increased substantially from 2016–2019, driven by a 56.9% annual increase in utilization despite a 7.6% annual decrease in price.

## DISCUSSION

This paper has three main findings. First, PMPM professional spending from 2016 to 2019 increased at a faster rate in Medicaid compared to increases in professional spending in commercial (5.2% in Medicaid vs. 2.7% in commercial, annually). Second, we observed that other health professionals and other physician specialties (primarily diagnostic radiology) exhibit high PMPM professional spending growth in both payers. Nurse practitioner and physician assistant E&M, diagnostic radiology imaging, behavioral health services E&M, anesthesia, and orthopedic procedures were the specific services areas of increasing spending. Finally, three-year trends showed heterogeneity in whether changes in volume or price drove spending increases in these service categories.

We were not surprised to find that levels of commercial professional spending were considerably higher compared to Medicaid professional spending. Medicaid almost universally compensates providers less for similar services compared to commercial insurers or Medicare.<sup>25,26</sup> However, less is known about trends in professional costs across different insurance programs. In February of 2019, Governor Raimondo signed an Executive Order establishing a target growth rate of 3.2% for total health care spending in Rhode Island.<sup>27</sup> While this target growth rate applies to total costs, not professional spending in isolation, it is a useful reference point. We find that professional spending in commercial (2.7% annual growth) met this target, while Medicaid (5.3% annual growth) exceeded it. One potential interpretation of

these trends is that more attention to control cost growth is needed in the Medicaid MCO program (through additional oversight of MCO contracts), and that professional spending represents an actionable target for future efforts to reduce spending. A more nuanced interpretation, which we favor, is that persons with Medicaid coverage may have more complicated health needs and additionally face significant health-related social needs, which have the potential to increase both utilization and overall costs. It is essential to ensure appropriate provider reimbursement rates in the Medicaid program to avoid further disadvantaging providers who treat patient populations with complex medical and health-related social needs. While spending growth in the commercial population may be cause for concern and ripe for intervention given that prices are already higher and rising, we may instead seek to monitor spending growth in public payer programs to ensure sustainability. Importantly, primary care spending was relatively flat/decreasing in commercial but increasing for Medicaid over the study period. Increases in professional spending, if they represent appropriate evidence-based care, may improve quality and value, both for patients individually and the Medicaid program overall. For example, these increases may represent an appropriate response to the opioid epidemic. Studies that formally evaluate quality of care would be required to distinguish between these two alternatives; and elements of both may contribute.

Studies have shown that the employment of NPs and PAs in healthcare may decrease health care spending and improve efficiency of care.<sup>28</sup> NPs have also been shown to provide high quality care<sup>29</sup> while being more likely to treat vulnerable populations.<sup>30</sup> A move towards increased employment of other health professionals, especially in primary care evaluation and management settings, may improve value of care delivered. Other physician specialties were also shown to have large and increasing PMPM spending in both payers; diagnostic radiology and anesthesiology are large components of this specialty group. Since consumers tend not to choose the radiologists or anesthesiologists who render their care, spending growth in these areas may merit special attention, especially if it is resulting from considerable price increases. This has been an area of interest as it relates to the recently implemented and challenged No Surprises Act,<sup>31</sup> which limits reimbursement for out of network providers not selected by patients (emergency medicine, anesthesiology, pathology, radiology, etc.).<sup>32</sup>

Our results demonstrate that trends in volume and price are very sensitive to the service categories and payers being studied (See **Figure 1** for one example of the price/volume analyses carried out for high spending areas identified in **Table 4**). In addition, the year-to-year variation that we observe emphasizes the importance of examining multi-year trends. Understanding these trends is complicated; in most cases, ascertaining changes in volume and price could

only be meaningfully done via a granular view of specific professional services (i.e., analyzing RBCS Level 2 service categories within specific specialties). Increases in spending attributable to other health professionals (NPs, Counselors, PAs, etc.) were driven by increased volume of evaluation and management claims; the number of other health professionals and the number of patients served by other health professionals increased from 2016 to 2019, in line with national trends indicating greater reliance on other health professionals to meet population health needs.<sup>33</sup> We also identified notable increases in behavioral health professional spending (e.g. psychiatry, social workers, counselors), a likely response to increased population morbidity (namely, the ongoing opioid epidemic).

These approaches can inform efforts to identify spending drivers in other states. First, we show that APCDs can be leveraged to analyze multiple payers simultaneously while employing a consistent methodology. Second, we show that the RBCS classification system can be adapted to comprehensively evaluate professional spending for patients beyond the Medicare program. Further, our initial analyses confirmed that professional spending is a strong proxy for total spending, and may provide a more accessible avenue for analyses of health care spending using APCDs. Many states are developing infrastructure to evaluate and intervene on rising health care costs. The approach outlined by this study can support analyses of claims data to have actionable insights for policy and identify areas of further investigation in subsequent analyses. Third, our provider specialty crosswalk is generalizable across states for providers where a single specialty based on taxonomy is listed. Finally, spending for medical pharmacy (e.g., provider administered medications) is substantial, and increasing. Including professional and facility spending is essential to evaluating this category of services, and as such, they were out of the scope for this study. Additionally, the absence of high-quality data on rebates that would otherwise reduce the total spending on these services creates challenges for understanding the true spending growth of this service category. Further studies are needed to characterize the growth of spending on medical pharmacy and the impacts to overall spending.

This study has several limitations. First, APCDs only include information for claims billed to insurance; these data do not include additional information on non-claims payments, other incentive payments for high quality care, or health outcomes data, which may be advantageous to fully evaluate cost and value in the health system. Second, APCDs are likely to lack a significant portion of data for individuals enrolled in self-insured plans as a result of the Gobeille Supreme Court Decision,<sup>35</sup> the full story of professional spending trends in the commercial insurance market may not be represented. Third, we found that a substantial proportion of professional claims (13% in commercial and 35% in Medicaid) are billed with a specialty taxonomy that

refers to a multispecialty organization, and therefore cannot be associated with a particular individual provider specialty classification. Fourth, our substantive findings may not be generalizable to other states. Finally, claims analyses generally cannot capture the experience of the uninsured.

Future studies can use this generalized provider taxonomy and stepwise approach for evaluating spending in RBCS categories to study drivers of cost in other states and populations. We would expect findings to potentially vary in line with each state's market structure and their particular regulatory context. Understanding trends and drivers of health care costs are one important step towards improving value in the U.S. health system; analyses of professional spending as proposed are one potentially valuable step forward in achieving this goal.

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### Disclosures

The authors declare no conflict of interest.

### Acknowledgments

A grant from the Peterson Center for Healthcare to the Brown University School of Public Health funded the following authors: Ira B. Wilson, Yoojin Lee, and Jim Lucht.

Dr. Wilson is partially supported by Institutional Development Award Number U54GM115677 from the National Institute of General Medical Sciences of the National Institutes of Health, which funds Advance Clinical and Translational Research (Advance-CTR) from the Rhode Island IDEa-CTR award (U54GM115677).

Support was provided by RI EOHHS to facilitate access to the principal non-public data source for this study: the Rhode Island All-Payer Claims Database (APCD).

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