Issue Brief

Identifying Sources of Variation in Asthma Episodes of Care with PROMETHEUS Analytics©

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PROMETHEUS© ANALYTICS

Objective

To highlight the variation in the cost and quality of asthma care and pinpoint opportunities for improvement using PROMETHEUS Analytics.©

Impact

Asthma is a chronic disease that affects a large proportion of the U.S. population. About 24 million people, or approximately 7 percent of the U.S. population, currently have asthma. In 2010, 18.7 million adults had asthma (1 in 12 adults) while in that same year 7 million children (1 in 11 children) had asthma.[1] Additionally, the proportion of individuals with asthma has grown by about 19 percent in the last decade. Among adults over 18, women and African Americans are the more likely to have the condition. Among children, boys and African American children ages 18 and under are more likely to have it.

Data also reveal that financial standing plays a role in the probability of having asthma, showing that households with an annual income of $75,000 or less are more likely to have one or more members in the household with asthma. The C.D.C. estimates that asthma costs the U.S. $56 billion each year in direct and indirect costs, and the average yearly cost of caring for a child with asthma in 2009 was $1,039. In 2008 asthma caused 10.5 million missed days of school and 14.2 million missed days of work.[2]

HCI3

Approximately half of all asthma episodes experience a potentially avoidable complication, and the journey of improving asthma care begins by uncovering any inefficient spending towards these potentially avoidable complications. Focusing on improving care holds the potential to save money for payers and ultimately improve patient outcomes. A critical step toward those dual goals is to identify variation in the cost and quality of asthma care, and isolate opportunities for improvement.

That is what we have done in this analysis, using PROMETHEUS Analytics.© We distinguish "typical" care from potentially avoidable complications, identify gaps in care, spot potentially unnecessary services delivered, and measure costs of care. Our findings not only confirm the presence of inefficiencies in asthma care, but also indicate where many trouble spots may originate.

Methods

We studied two administrative claims datasets consisting of commercial and Medicaid members from 2012 to 2014. The datasets contained roughly 1.6 million covered lives and $19 billion in total medical and pharmacy allowed amounts combined. We processed the claims data through PROMETHEUS Analytics,© an episode grouping tool that is designed to separate costs of "typical" care from costs associated to potentially avoidable complications, or PACs.[3] Under our open-source, evidence-informed definitions, an asthma episode comprises the entire range of treatment for the condition, rather than a single procedure or diagnosis. Using the Asthma Evidence-informed Case Rate definition—a component of PROMETHEUS—we identified 30,745 plan members with asthma episodes in the commercially insured population, and 777,636 plan members with asthma episodes in the Medicaid population.[4] Episodes were excluded if they spanned less than 365 days, were cost outliers (at the 1st/99th percentile of episode costs), or if the plan members were not between the ages of 2 to 64.

In each population, we analyzed average episode costs for the management of asthma over the course of one year. We evaluated costs associated to typical or routine care separately from costs associated to PACs. We also compared the percentage of total asthma episode dollars categorized as PACs in the commercial and Medicaid asthma populations. PACs are events that negatively affect patients and are potentially controllable or compressible by the providers who co-manage those patients. In an asthmatic population, PACs can range from acute exacerbation of chronic obstructive pulmonary disease to acute esophagitis, gastritis, and duodenitis, and even gastrointestinal bleeding. PACs represent an opportunity for overall quality improvement and cost savings.

Additionally, among the commercial and Medicaid populations of patients with asthma, we compared the number of patients who received a potentially avoidable service (PAS). HCI[3] leveraged the work of more than 70 medical societies that have contributed to the American Board of Internal Medicine's Choosing Wisely campaign. These societies have developed "top 5" lists of services that may be overused or unnecessary.[5] Working with its evidence-informed case rate definitions, HCI[3] mapped the services identified in the Choosing Wisely campaign to administrative claims data in an effort to flag those that may be overused. In doing so, we can evaluate the extent to which potentially avoidable services contribute to the variability in episode costs.

We then studied gaps in care in the two asthmatic populations. In its chronic care episode definitions, HCI[3] used clinical guidelines and expert opinion to identify a set of "core services," which are considered essential to the management of the condition over the course of one year. Table 1 lists the number and type of core services defined for one year of management for a patient with asthma. We identified all patients with at least one gap in each core-service category in order to study the differences in potential underuse between the two populations.

TABLE 1. RECOMMENDED CORE SERVICES FOR 1 YEAR OF ASTHMA MANAGEMENT

EPISODE	CORE SERVICES CATEGORY	CODE GROUPS	NUMBER OF RECOMMENDED SERVICES
Asthma	Physician Services - Outpatient	PCP-New Visits / Established Visit	2
		SPECIALIST (Endocrine / Nephrologist / Cardiology / Pulmonologist/ Allergy / Immunology / GI) Physician Consults	
Asthma	Preventive Medicine, Counseling, Coordination	Preventative Medicine Services / Individual Counseling	1
		Case Management Services And Care Plan Oversight Services, Counseling	
		Telephone Services	
		Alcohol / Drug Abuse Counseling & Screening	
		Smoking / Tobacco Cessation	
		Cardiac / Pulmonary Rehab	
		Blood Pressure Monitoring	
		Diabetes Specific Exam, Education, Insulin Pump Training	0
Asthma	Vaccine For Flu Or Pneumonia	Vaccination For Influenza, Pneumococcal Pneumonia	1
Asthma	Lung Function Test	Lung Function Test (Spirometry)	1
Asthma	Blood Gases, Pulse Oximetry	Assessment Of Oxygen Status	1
		Office Pulse Oximetry	
		ABG	

We also performed a provider-level analysis by attributing asthma episodes to individual physicians via the provider-attribution methodology embedded in PROMETHEUS Analytics.©[6] Episodes were attributed to a single physician based upon a preponderance of office visits. All results are reported at the provider-group level, consisting of episodes attributed to multiple physicians belonging to the same provider group. At the provider-group level, we compared risk-adjusted average episode costs and coefficients of variation, average typical and PAC costs, rates of potentially avoidable complications and potentially avoidable services, as well as gaps in care. Risk adjustment was performed using PROMETHEUS Analytics© and accounted for individuals' demographics, pre-existing comorbidities, and episode severity.

Results

Population Level Analysis

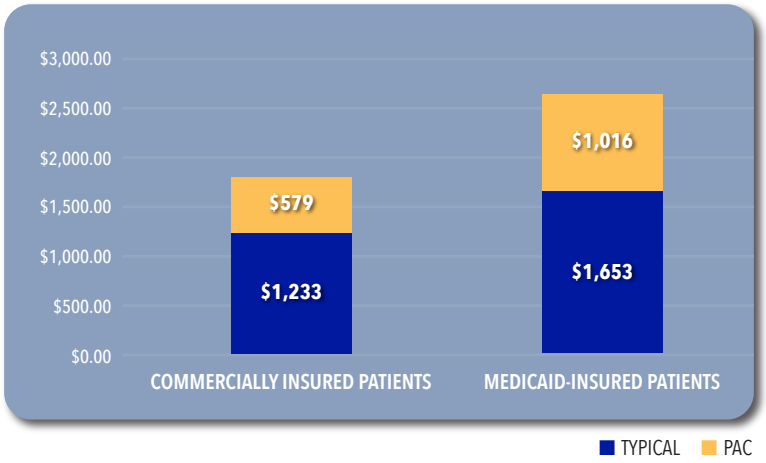
We found that the average annual cost of an episode of asthma is $1,812 in the commercially insured population. If we extrapolate that figure and apply it to the entire asthmatic population in the US of 24 million individuals, this amounts to $43.5 billion per year, which is lower than the $56 billion estimated by the C.D.C. However, our research shows that in the Medicaid population, annual average asthma episode costs were higher at $2,669 per year. This value translates to $64 billion per year. The annual cost of potentially avoidable complications (PACs) is $13.9 billion for the commercially insured and $24.4 billion for those with Medicaid coverage. Additionally, the annual cost of potentially avoidable services (PAS) is $1.5 billion and $558 million, respectively (Table 2).

TABLE 2. ANNUAL IMPACT OF ASTHMA WITHIN THE U.S. POPULATION

TYPE OF INSURANCE	COMMERCIAL	MEDICAID
Average Episode Cost	$1,812	$2,669
Rate of Potentially Avoidable **Complications**	32%	38%
Average Potentially Avoidable **Complication Cost**	$579	$1,016
Average Potentially Avoidable **Service Cost**	$64	$23
Total Episode Cost	$43,494,040,407	$64,073,096,900
Total Cost of Potentially Avoidable **Complications**	$13,897,627,321	$24,397,107,646
Total Cost of Potentially Avoidable **Services**	$1,532,011,908	$558,394,333

In addition to looking at average asthma episode costs as a whole, we segmented costs into two categories: dollars spent on typical or routine care and dollars spent on complications, or PACs. In the commercial population, we found the average cost of typical services to be $1,233 while the average PAC cost is $579 (Figure 1). Average typical and average PAC costs in the Medicaid population were higher, at $1,653 and $1,016 respectively (Figure 1).

FIGURE 1. AVERAGE TYPICAL & PAC ASTHMA COSTS PER YEAR



The total dollars spent on potentially avoidable complications amounted to 32 percent of total asthma episode costs in the commercial population and 38 percent in the Medicaid population, which represents sizeable opportunity for both quality improvement to reduce the prevalence of complications and cost compression overall.

A substantial percentage of patients with asthma experienced at least one potentially avoidable complication over the course of one year. In the commercial population, 52 percent experienced a PAC compared to 61 percent in the Medicaid population (Figure 2). The top costly potentially avoidable complication categories included complications arising from acute exacerbation of COPD, respiratory insufficiency, fluid/electrolyte/acid base problems, respiratory failure, and hypotension (Figure 3).

FIGURE 2. ASTHMA EPISODES WITH AT LEAST ONE PAC

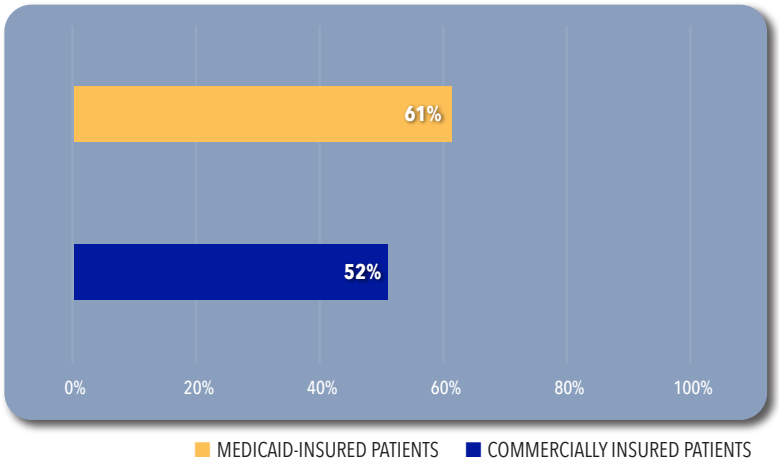
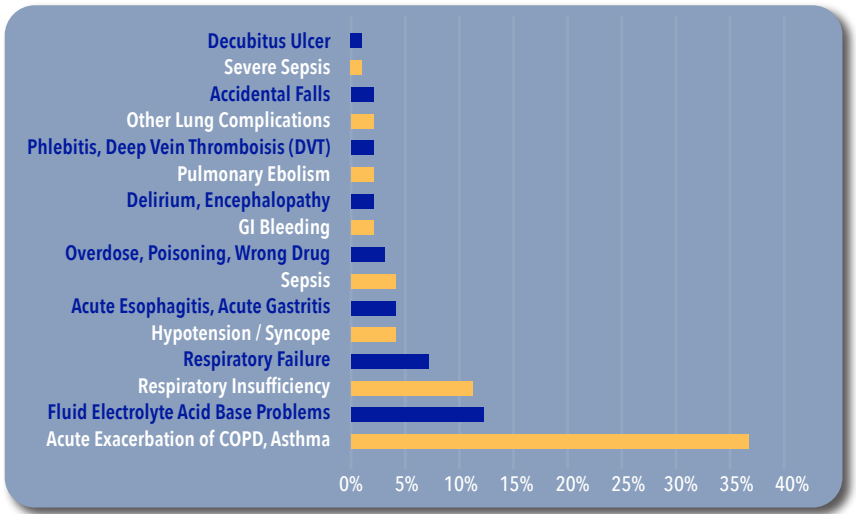


FIGURE 3. TOP COSTLY ASTHMA POTENTIALLY AVOIDABLE COMPLICATIONS, MEDICAID (PACS)



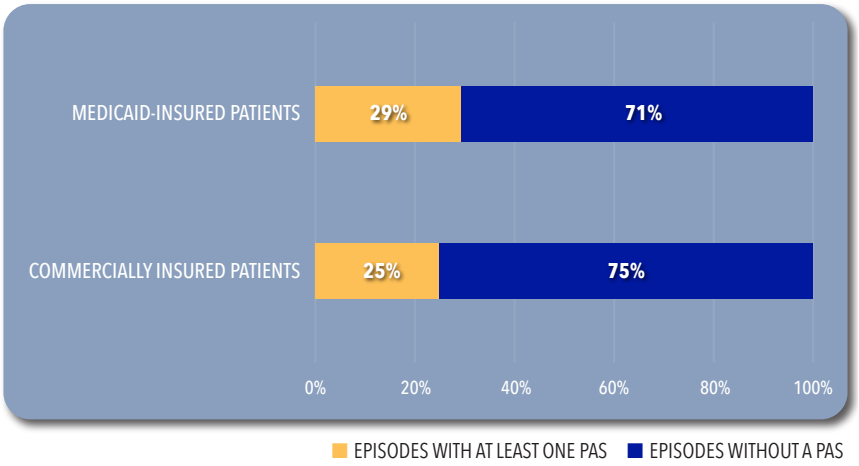
In addition to a high prevalence of PACs in both populations, our data show that 25 percent of commercially insured and 29 percent of Medicaid patients with asthma incur at least one potentially avoidable service (Figure 4). While the likelihood of at least one potentially avoidable service is 4 percentage points higher in the Medicaid population, PAS costs run higher on average in the commercially insured population at $64 compared to $23 in the Medicaid-insured population, and a total cost of $1.5 billion in the commercial population, and $560 million in the Medicaid population. The types of potentially avoidable services are similar amongst the two populations, however they come in a different ranking order as shown in Table 3.

TABLE 3. MOST COMMON POTENTIALLY AVOIDABLE SERVICES FOR ASTHMA

MEDICAID-INSURED POPULATION		COMMERCIALLY INSURED POPULATION	
Rank	Potentially Avoidable Service	Rank	Potentially Avoidable Service
1	Chest X-Ray	1	Chest X-Ray
2	CT or CTA Chest	2	Lab Tests CBC Blood Chemistry
3	Lab Tests CBC Blood Chemistry	3	CT or CTA Chest
4	Blood Gases, Pulse Oximetry	4	Tests for Allergens, Antibodies, Infectious Agents
5	Tests for Allergens, Antibodies, Infectious Agents	5	Cardiac Stress Test
6	Cardiac Stress Test	6	Blood Gases, Pulse Oximetry

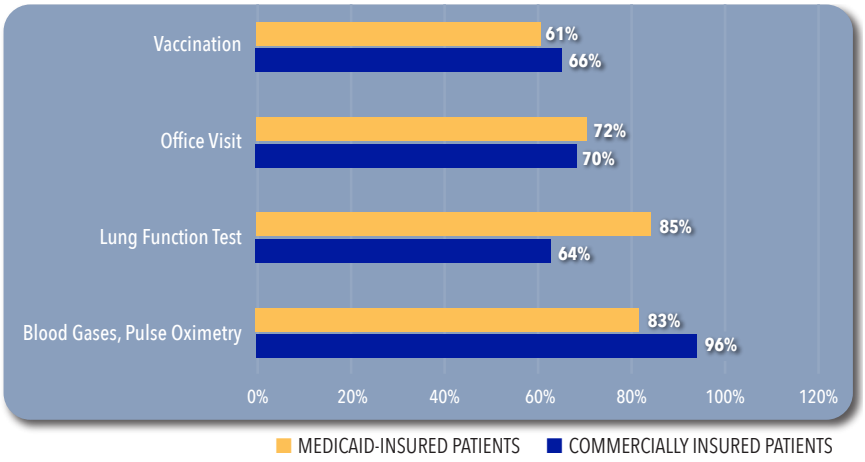
The most common potentially avoidable services amongst both populations are chest x-rays, CT or CTA of the chest, and lab tests. While the potentially avoidable services are similar in both populations, the costs of each service differ resulting in the difference in total and average costs of potentially avoidable services.

FIGURE 4. ASTHMA EPISODES WITH AT LEAST ONE POTENTIALLY AVOIDABLE SERVICE (PAS)



While asthma episodes in both populations contained high rates of complications and potentially avoidable services, we also observed underuse in the form of gaps in care (Figure 5). For example, 64 percent of asthmatic patients in the commercial population and 85 percent of Medicaid populations did not receive a lung function test. A large proportion of asthmatic patients in both populations (70 percent in commercial; 71 percent in Medicaid) had fewer than the recommended office visits. Ninety-six percent of commercially insured and 83 percent of Medicaid-covered asthmatics did not receive testing of blood gases or pulse oximetry. Sixty-six percent of asthmatics in the commercial population and 61 percent in the Medicaid population did not receive necessary vaccinations. These gaps in care for asthmatic patients represent a significant opportunity for quality improvement in asthma management for both commercial and Medicaid populations.

FIGURE 5. PERCENT OF ASTHMATIC PATIENTS WITH AT LEAST ONE GAP IN RECOMMENDED CARE



Provider Level Analysis

FIGURE 6. AVERAGE RISK-ADJUSTED ASTHMA EPISODE COSTS & COEFFICIENTS OF VARIATION BY PROVIDERS, COMMERCIALLY INSURED POPULATION

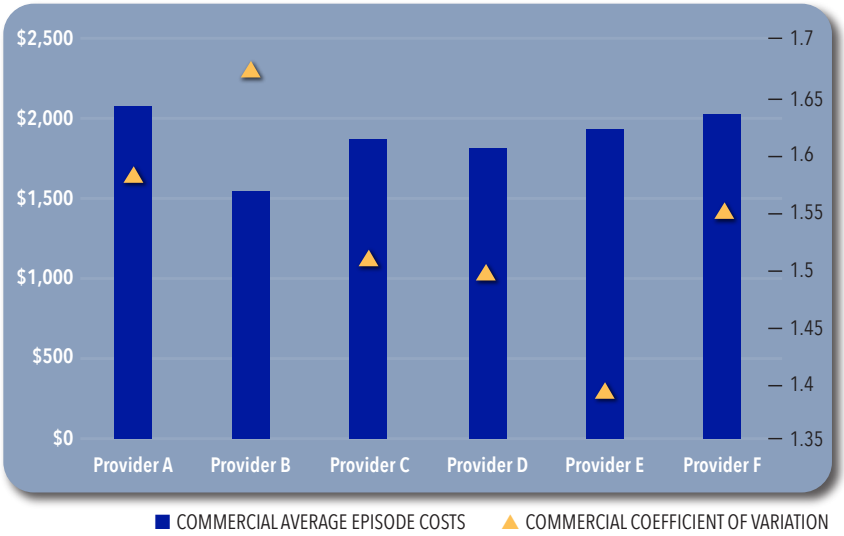


FIGURE 7. AVERAGE RISK-ADJUSTED ASTHMA EPISODE COSTS & COEFFICIENTS OF VARIATION BY PROVIDERS, MEDICAID-INSURED POPULATION

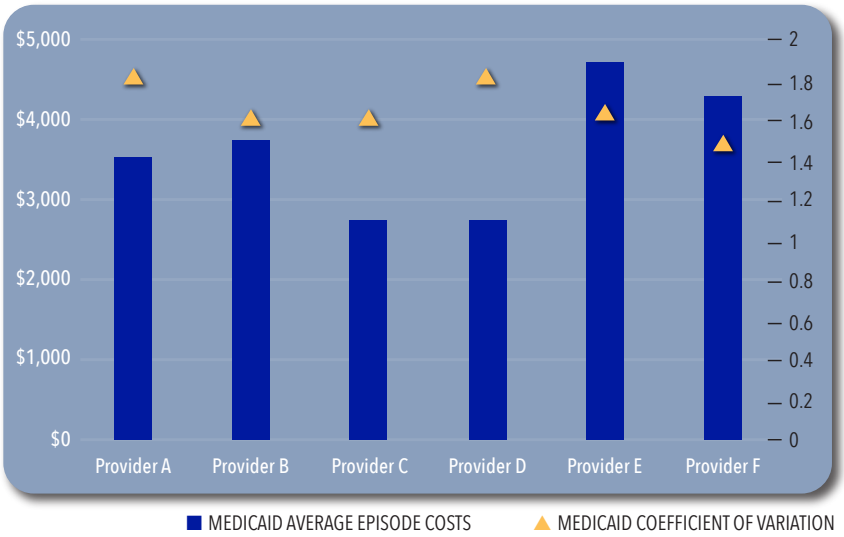


FIGURE 8. AVERAGE RISK-ADJUSTED TYPICAL & PAC ASTHMA EPISODE COSTS BY PROVIDER

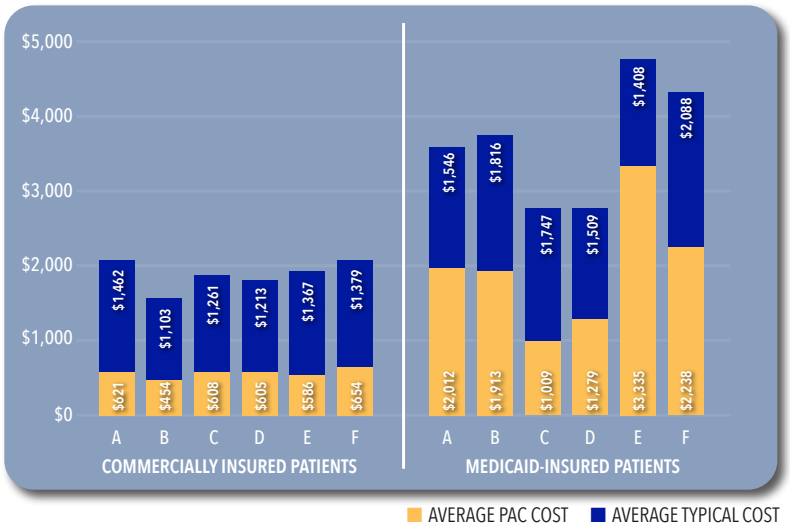


FIGURE 9. RISK-ADJUSTED PAC RATES BY PROVIDER

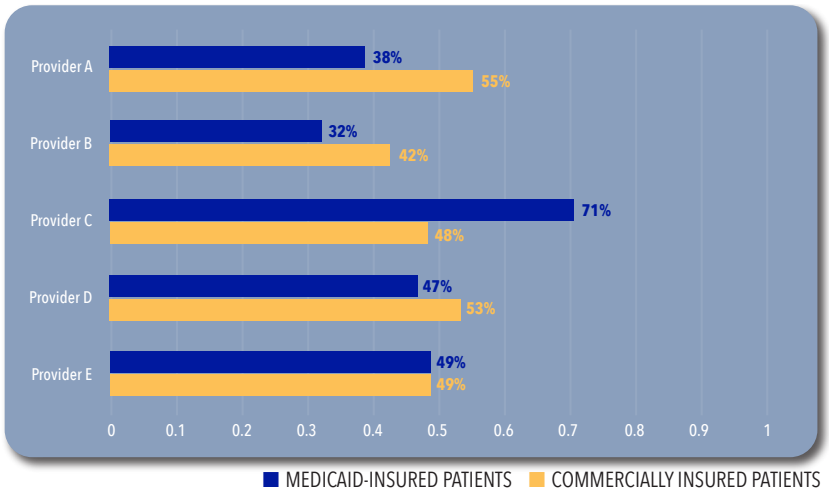


FIGURE 10. FREQUENCY OF POTENTIALLY AVOIDABLE SERVICES (PAS) PER ASTHMA EPISODE PER PROVIDER

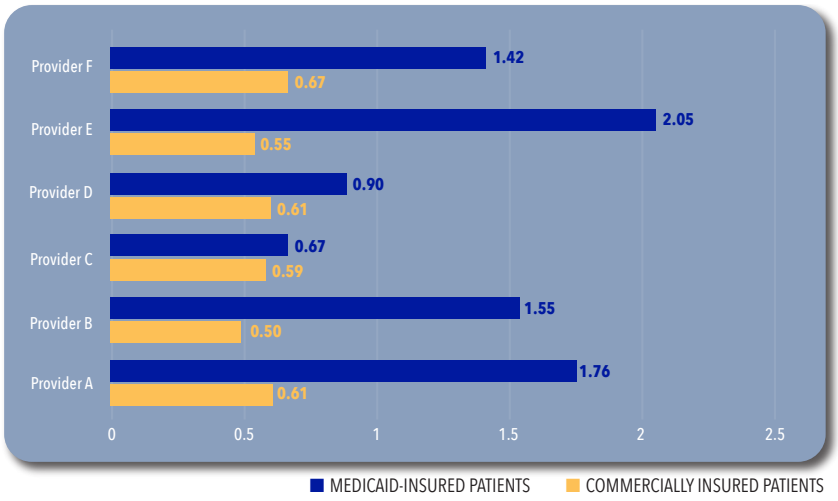
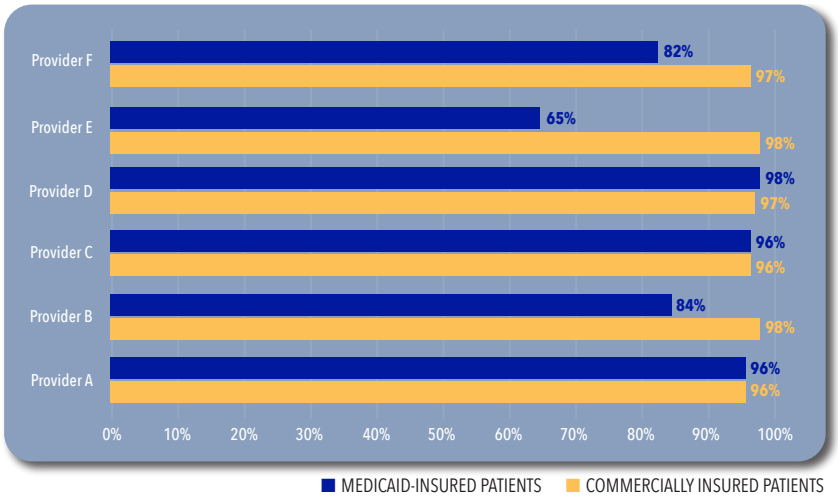


FIGURE 11. PERCENTAGE OF ASTHMATICS WITH AT LEAST ONE GAP IN RECOMMENDED CARE PER PROVIDER



Conclusion

Asthma is a common and costly chronic disease affecting 24 million people throughout the U.S., and represents a ripe opportunity for the design and implementation of quality improvement and cost savings programs. By analyzing administrative data using PROMETHEUS Analytics,© we have highlighted several sources of variation among individuals with asthma. By type of insurance coverage and provider, we see differences in average costs, type of care (typical vs. PAC), potential overuse and unnecessary care, and underuse or gaps in care. Our data reveal the high percentage of both Medicaid-insured and commercially insured patients with at least one gap in recommended care, which if lowered, could help to improve asthma quality care amongst patients. Additionally, we found that both typical and PAC costs average higher amongst the Medicaid-insured population. This variation and these differences represent opportunities to reengineer clinical practices, reward excellent care, or develop other interventions to improve health care quality and affordability. Leveraging an episode of care construct as the unit of account can be an essential tool in measuring and tracking quality and cost improvement goals. ■

1 Centers for Disease Control and Prevention. FastStats: Asthma, October 2015. http://www.cdc.gov/nchs/fastats/asthma.htm

2 Centers for Disease Control and Prevention. Data, Statistics and Surveillance for Asthma, March 2016. http://www.cdc.gov/asthma/asthmadata.htm

3 http://www.hci3.org/wp-content/uploads/files/files/files/The%20HCI3%20ECR%20Analytics%20Advantage.pdf

4 http://www.hci3.org/programs-efforts/prometheus-payment/evidence_informed_case_rates/ecrs-and-definitions

5 http://www.choosingwisely.org/about-us/history/ Accessed Jan 28 2016.

6 http://www.hci3.org/programs-efforts/prometheus-payment/ecr-analytics/core-components-ecr-analytics

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