

Insurance-based Disparities in Emergency Department Utilization and Hospitalization in Colorado Children, 2014

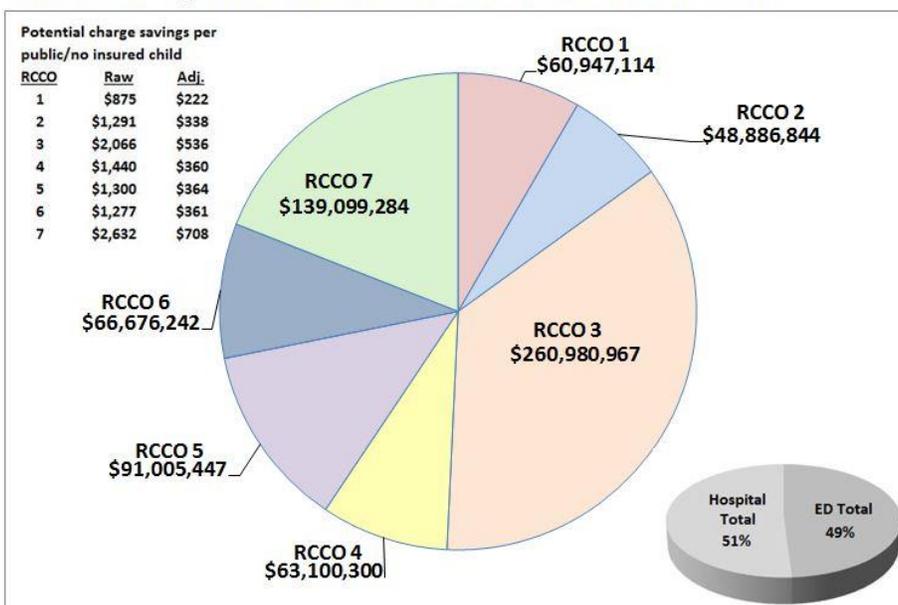
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Summary

A previous study in Colorado and the USA has documented higher hospitalization rates and hospital charges in children with Public/No insurance as compared with those with private health insurance.¹ More recently, we have documented similar insurance-based disparities for each of the seven Colorado Regional Collaborative Care Organizations (RCCOs).² This current analysis for 2014 provides insurance-based comparisons for both pediatric emergency department (ED) visits and inpatient hospitalizations statewide and by RCCO [detailed, individual RCCO analyses available on request].

Figure 1: Distribution of \$731 million (adjusted \$194 million) in direct potential charge savings by Colorado RCCOs for potentially avoidable hospitalizations and ED visits by children with Public or No health insurance, 2014



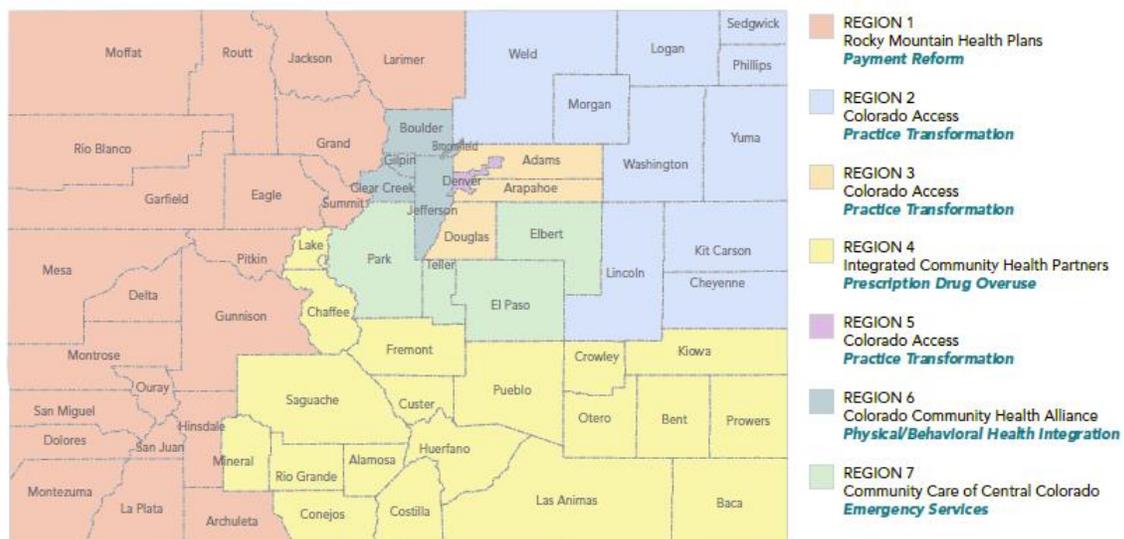
Using privately-insured children as a comparison group, charge savings of up to \$731 million for potentially avoidable hospitalizations and ED visits by children with Public/No insurance (Public/No) were shown for 2014. Figure 1 shows the breakdown of these potential charge savings by RCCO region. Even when adjusted for estimated actual payments, the potential annual saving is estimated to total \$194 million, ranging from \$222 to \$708 per Public/No insured child per year by RCCOs. Inpatient hospitalizations accounted for 51% of the potential charge savings and ED visits 49%.

In this analysis, children with Public/No health insurance were most likely to be seen in the ED during weekday hours for common, self-limited illnesses suggesting lack of access to and/or under-utilization of a medical home. These children were also more likely than privately-insured children to be hospitalized with a higher severity of illness and on the weekend or after-hours, suggesting a gap in access to expanded acute primary care that could reduce hospital use. The existence of such large disparities in ED and hospital utilization for children with Public/No insurance in Colorado (and in each RCCO) present a strong incentive to improve access to (and utilization of) an enhanced medical home model for all Colorado children.

Background

Colorado is currently divided into seven Regional Care Collaborative Organizations (RCCOs) for purposes of measuring, coordinating and improving healthcare for publicly-insured children and adults (figure 2).³ As defined by the Colorado Department of Healthcare Policy and Financing (HCPF): “A *Regional Care Collaborative Organization (RCCO)* connects Medicaid clients to Medicaid providers and helps clients find community and social services in their area. RCCOs help providers communicate with Medicaid clients and with each other, so Medicaid clients receive coordinated care. A RCCO will also help Medicaid clients get the right care when they are returning home from the hospital or a nursing facility, by providing the support needed for a quick recovery. RCCOs help with other changes, too, like moving from children’s health services to adult health services.”³

Figure 2: Colorado Regional Care Collaborative Organizations (RCCOs), 2014-2015



The total pediatric population (0-17 years) and percentage of children with Public/Nohealth insurance varies by RCCO region as follows: Region 1= 186,006 (37.4%); Region 2= 92,973 (40.7%); Region3= 365,771 (34.5%); Region 4= 74,879 (58.5%); Region 5= 141,261 (49.6%); Region 6= 198,277 (26.3%); Region 7= 178,522 (29.6%).

HCPF defines policies and procedures, provides data management and analytics and defines key performance Indicators (KPIs) while contracting with various healthcare organizations to operate each RCCO. For 2013-2014⁴ these KPIs were: reducing emergency room visits; reducing 30-day all cause hospital re-admissions; reducing high-cost imaging and assuring annual well-child visits.

Methods

For this analysis we made the assumption that low private insurance rates of ED and hospital utilization are the consequence of optimal medical home patient management and care coordination. A significant increase in these indicators in children with Public/No insurance is then assumed to reflect an opportunity to improve care and reduce excess cost.

We compared 2014 ED visit and inpatient hospitalization rates by insurance type for publicly or uninsured children (public/no) to private insurance rates. Denominator estimates of at risk populations were obtained from the American Community Survey (data courtesy of the Colorado Health Institute). Numerators (excluding newborns) were obtained from the Colorado Hospital Association (CHA) ED and hospitalization inpatient databases. ED and inpatient hospitalization rates for Colorado children less than 18 years of age were calculated for Colorado and each RCCO by insurance status. Rate ratios compared privately-insured children to Public/No children. In addition, for emergency department visits, the top 20 principal diagnoses were examined in detail, and for hospital admissions, the top 20 Diagnostic Related Groups (DRGs) were examined in detail.

Children with Public/No insurance were combined for the calculation of inpatient hospitalization rates since many children with no insurance are often retroactively qualified for public insurance payment after hospitalization^{1,5,6} for ED visits, rates for children less than 18 years of age with private insurance were compared to those with Public/No insurance in order to provide data similar to those for inpatient hospitalizations.

Hospital and ED charges per insured child were calculated by dividing total hospital charges for each RCCO, principal diagnosis or DRG by insured group and dividing these totals by the total number of children in each insured (at risk) group. Potential estimated charge savings for Public/No insured children were calculated by subtracting the private insured mean charge per insured child from the Public/No mean charge per insured child, and multiplying this value by the total Public/No population. The sum of these potential charge savings for all seven RCCOs provided the statewide potential charge savings values. Calculation of hospitalization rates by insurance status for the top 20 DRGs among Colorado children less than 18 years of age was done using similar methods.

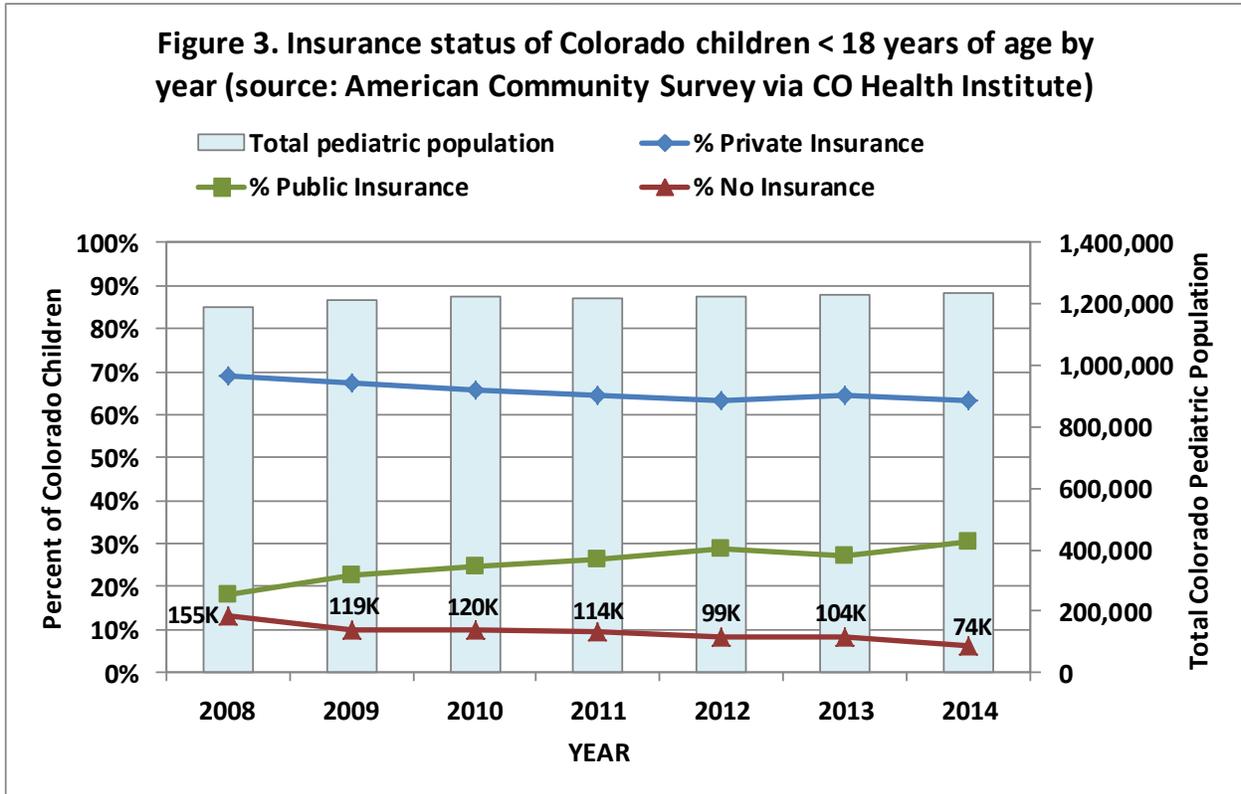
Because hospital and emergency visit charges often exceed public health insurance reimbursement, we adjusted charges based on estimated reimbursement levels for several common but low severity diagnoses, resulting in a universally applied an adjustment factor of 33% for hospitalization charges and 20% for emergency department charges. These values were then assumed to be the actual excess cost to Healthcare Policy and Financing for avoidable ED and hospital utilization. For ED visits, rates for all pediatric visits by insurance status were calculated, as well as those with only a single ICD-9 diagnosis. Single diagnosis rates were further stratified by those with no procedures performed and those with no imaging or laboratory charges. These rates were further compared by day (weekend versus weekday) and time (8 AM – 5 PM, 5 PM – 8 AM).

Stepwise logistic regression of factors associated with ED visit or hospital admission of Public/No insured children compared to privately-insured children were performed with independent variables being weekend admission, after hours admission, single diagnosis and no procedures performed (for ED visits) or severity (for hospitalizations).

Results

Changes in health insurance status of Colorado children

Since the year 2008 Colorado has achieved gradual progress in assuring that all children have access to health insurance. Although there has been a significant decrease in the percentage of Colorado children covered by consistent private health insurance, a compensatory increase in the percentage covered with public insurance has been attained (Figure 3). At the same time, the percentage of children with no health insurance has decreased in half, to a low of 2.5 % in 2015.



Colorado and RCCO emergency department utilization by children with Public/Nohealth insurance

In 2014, there were 422,393 emergency department visits for Colorado children less than 18 years of age; 120,217 (28%) were among privately-insured children, and 302,176 (72%) were among children with Public/No insurance. In contrast, children with Public/No insurance make up 37% of Colorado’s pediatric population. Emergency department visitation rates for children with Public/No insurance were 4.4 times more frequent than for children with private insurance, (Table 1). If children with Public/No insurance had the same rates of ED visits as privately-insured children in 2014, there would be a potential unadjusted charge savings of \$355.4 million (ranging from \$22.7 million to \$116.4 million by RCCO).

Table 1: Emergency department rates of Colorado children less than 18 years of age with Public/No insurance as compared to privately-insured children by Colorado RCCO, 2014.

RCCO	All Cases	Private Insurance		Public/No Insurance compared to Private Insurance				
		Visits per 100,000	% Weekend or After Hours	Rate Ratio*	Potential Charge Savings	Weekend visit Odds Ratio†	After hours visit Odds Ratio†	Single diagnosis and no procedures Odds Ratio†
1	44,907	11,368	65.7%	4.00	\$24,467,548	0.83		1.36
2	32,902	17,126	66.9%	3.62	\$22,736,416	0.88	1.13	1.26
3	127,046	17,669	70.7%	3.80	\$116,445,314	0.78	0.93	1.38
4	32,819	18,433	66.7%	3.35	\$23,610,014	0.92		1.36
5	60,400	14,700	70.5%	4.85	\$54,729,845	0.70	0.85	1.26
6	61,848	18,599	71.9%	3.57	\$41,241,193	0.71		1.35
7	62,471	9,462	64.4%	10.11	\$72,141,290	0.75	0.91	1.34
All Colorado	422,393	15,317	69.3%	4.36	\$355,371,619	0.76	0.93	1.34

*P-value < 0.001

†Logistic regression results with stepwise selection with dependent variable being Public/No Insurance.

Odds Ratios shown have P-value < 0.05

Abbreviation: RCCO, Regional Care Collaborative Organization.

As documented in Table 2, children with Public/No health insurance were significantly less likely to be seen in the emergency room on the weekends and more likely to be seen in an emergency department during weekday hours whereas privately-insured children were more likely to be seen on the weekend or after hours. Public or uninsured children were more likely to be provided care in the emergency department for a single diagnosis with no procedures performed compared to privately-insured children.

Comparing crude rates by insurance type, for all ED visits, the rate of ED visits for Public/No insured children was 4.4 times greater than that for children for private insurance, with this rate ratio increasing to 5.2 for visits during weekday daytime. The rates for weekday after hours or weekend visits for Public/No insured children did not vary much from weekday daytime hours. Each was significantly higher than the comparison rate for privately-insured children who did have higher after hours and weekend ED visitation rates than their comparable weekday rate (Table 2).

Among ED visits that had a single diagnosis, the rate of ED visits for children with Public/No insurance was 5.3 times greater than that for children for private insurance (Table 2). Public/No children were significantly more likely (28.6% vs 21.5%, p<0.001) to have ED visits for common conditions like: 'Acute URI', 'Otitis media', 'Fever', 'Acute pharyngitis', 'Viral infection', 'Croup', and 'Vomiting alone', 25,900 (21.5%) as compared to privately-insured children.

Hospital admission rates for children less than 18 years of age by RCCO

Of the 26,875 hospital admissions of Colorado children less than 18 years of age in 2014, 12,061 (45%) were among privately-insured children, and 14,814 (55%) were among children with Public/No insurance. In contrast, children with Public/No insurance make up 37% of Colorado's pediatric population. If children with Public/No insurance had the same rates of hospital admissions as privately-insured children in 2014, there would be a potential unadjusted charge savings of \$375.3 million (Table 4), ranging from \$25.4 million to \$144.5 million by RCCO.

Among all RCCOs, hospitalization rates for children with Public/No insurance were significantly greater than those for privately-insured children. Hospitalization is significantly more likely on weekends and after hours, suggesting the important role of access to acute primary care in reducing hospital utilization. The severity of illness of children with Public/No insurance was significantly greater than the severity of illness of privately-insured children (Table 4).

Among 17 of the top 20 diagnostic related groups (and overall), hospitalization rates for children with Public/No insurance were significantly greater than those rates for privately-insured children. For "other pneumonia", major depressive disorders, bipolar disorders, and diabetes (and overall), the severity of illness of children with Public/No insurance was significantly greater than the severity of illness of privately-insured children (Table 5).

Table 2: Emergency department visitation rates per 100,000 Colorado children less than 18 years of age by insurance type, 2014.

Category	Crude Rate		Per Day Rate		Relative Rate to Private		Relative Rate to Weekday Rate	
	Private Insurance	Public/No Insurance	Private Insurance	Public/No Insurance	Private Insurance	Public/No Insurance	Private Insurance	Public/No Insurance
All patients, all times	15,317	66,734			1.00	4.36*		
Disposition:								
Single diagnosis	4,823	25,420			1.00	5.27*		
Single diagnosis, No procedures, No imaging, No lab	2,722 (16.8%)	16,051 (24.1%)*			1.00	5.90*		
Time of visit:								
Weekday day time visit (8 am - 5 pm)	4,702	24,635	940	4,927	1.00	5.24*	1.00	1.00
Weekday after-hours visit (5 pm - 8 am)	5,330	22,996	1,066	4,593	1.00	4.31*	1.13* *	0.93* *
Weekend day time visit (8 am - 5 pm)	2,999	10,000	1,499	5,000	1.00	3.34*	1.59* *	1.01
Weekend after-hours visit (5 pm - 8 am)	2,285	9,133	1,143	4,567	1.00	4.00*	1.22* *	0.93* *

* Significantly different (P < 0.001) than Private Insurance rate

** Significantly different (P < 0.001) than corresponding Weekday daytime visit rate

Table 3: Emergency department visitation rates per 100,000 for Colorado children less than 18 years of age by top 20 principal diagnoses and stepwise logistic regression of selected factors associated with Public/No emergency department visits, 2014.

Top 20 emergency department principal diagnoses among children	All Cases	Private Insurance	Public or No Insurance compared to Private Insurance				
		Rate/100,000	Rate Ratio*	Potential Charge Savings	Weekend visit Odds Ratio†	After hours visit Odds Ratio†	Single diagnosis and no procedures Odds Ratio†
Acute URI NOS	35,471	854	7.44	\$25,305,535	0.60	0.78	1.42
Otitis media NOS	20,198	538	6.56	\$13,587,550	0.63	0.81	1.11
Fever NOS	14,178	415	5.81	\$12,591,101	0.68		
Acute pharyngitis	12,427	380	5.49	\$8,309,381	0.59	0.83	1.38
Viral infection NOS	11,396	340	5.68	\$8,853,878	0.70	0.86	1.11
Croup	9,538	516	2.35	\$4,343,604	0.76	0.62	0.87
Vomiting alone	9,414	258	6.34	\$8,923,390	0.89	0.84	
Head injury NOS	7,762	388	2.68	\$5,020,389	0.74	1.11	
Strep sore throat	6,774	232	4.73	\$4,916,848	0.57		
Flu with respiratory manifestation NEC	6,592	179	6.42	\$6,721,088	0.70		1.28
Asthma NOS with (ac) exac.	6,079	219	4.40	\$7,847,714	0.78	0.76	1.35
Constipation NOS	5,632	206	4.31	\$5,340,795	0.88		
Abdominal pain unspecified site	5,486	218	3.83	\$7,126,426	0.81		
Urinary tract infection NOS	5,397	161	5.65	\$6,893,942	0.82	0.79	
Noninfectious gastroenteritis NEC	4,994	154	5.42	\$4,923,019	0.83	0.78	1.26
Viral enteritis NOS	4,893	170	4.61	\$3,557,089	0.72	0.80	1.45
Sprain of ankle NOS	4,650	214	3.06	\$3,539,822	0.72		
Cough	4,621	110	7.52	\$3,696,044	0.70		
Pneumonia, organism NOS	4,542	185	3.70	\$5,719,049	0.82	0.84	
Contusion face/scalp/neck	4,281	176	3.64	\$3,047,437	0.77		0.48
All emergency department visits	422,393	15,317	4.36	\$355,371,619	0.76	0.93	1.34

*P-value < 0.001

†Logistic regression results with stepwise selection with dependent variable being Public/No Insurance, Odds Ratios shown have P-value < 0.05

Abbreviations: URI, upper respiratory infection; NOS, not otherwise specified.

Table 4: Hospitalization rates and average length of stay of Colorado children less than 18 years of age among Public/No insured compared to privately-insured children, and stepwise logistic regression of selected factors associated with Public/No hospitalizations, by Colorado RCCO and statewide, 2014.

RCCO	Private Insurance		Public/No Insurance		Public/No Insurance Compared to Private Insurance				
	Admissions per 100,000	Average length of stay	Admissions per 100,000	Average length of stay	Rate Ratio*	Potential Charge Savings	Weekend adm. Odds Ratio†	After hours adm. Odds Ratio†	Severity Odds Ratio†
1	1,339	4.2	2,433	5.8	1.77	\$36,479,566	1.38		
2	1,869	4.6	3,144	5.6	1.73	\$26,150,428			
3	1,644	4.3	3,698	4.7	2.25	\$144,535,653		1.10	1.11
4	1,962	5.1	2,109	4.9	1.25	\$39,490,287			
5	1,732	4.7	3,647	4.4	1.95	\$36,275,603		1.27	1.10
6	1,732	4.8	2,953	4.5	1.76	\$25,435,050	1.19		
7	946	4.5	4,230	4.6	4.34	\$66,957,994		1.15	
All Colorado	1,532	4.5	3,371	4.8	2.22	\$375,324,580	1.10	1.13	1.05

*P-value < 0.001

†Logistic regression results with stepwise selection with dependent variable being Public/No Insurance, Odds Ratios shown have P-value < 0.05

Abbreviations: RCCO, Regional Care Collaborative Organization; adm., admission.

Table 5: Pediatric hospitalization rates and average length of stay of Colorado children less than 18 years of age by top 20 DRGs among Public/No insured compared to privately-insured children, and stepwise logistic regression of selected factors associated with Public/No hospitalizations, 2014.

Top 20 DRGs among children	All Cases	Private Insurance		Public/No Insurance		Public/No Insurance Compared to Private Insurance				
		Rate/100,000	Average length of stay	Rate/100,000	Average length of stay	Rate Ratio	Potential Charge Savings	Weekend admission Odds Ratio†	After hours admission Odds Ratio†	Severity Odds Ratio†
Bronchiolitis & RSV pneumonia	2,707	125.8	3.0	379.9	3.1	3.02*	\$23,062,473		1.26	
Other pneumonia	2,433	139.0	2.7	296.4	2.9	2.13*	\$14,745,783		1.46	1.21
Asthma	2,034	92.1	2.1	289.5	2.1	3.14*	\$16,073,825			0.86
Major depressive disorders & other/unspecified psychoses	1,195	111.5	6.8	70.7	7.5	0.63*	-\$1,810,204			1.51
Seizure	1,060	52.9	2.1	142.4	2.2	2.69*	\$9,167,648	1.83		
Bipolar disorders	916	73.1	7.8	75.5	11.3	1.03	\$2,044,338			1.40
Infections of upper respiratory tract	783	38.9	2.0	105.6	2.2	2.72*	\$5,583,216		1.44	
Appendectomy	562	32.4	3.5	68.0	3.5	2.10*	\$6,079,805			
Diabetes	472	26.5	1.5	58.3	1.6	2.20*	\$2,678,824			1.58
Chemotherapy	421	27.9	5.5	44.6	6.4	1.60*	\$6,199,623			
Cellulitis & other bacterial skin infections	417	22.2	2.3	53.7	2.2	2.42*	\$2,474,707			
Poisoning of medicinal agents	413	24.1	2.1	49.5	2.2	2.05*	\$2,127,598			
Non-bacterial gastroenteritis, nausea & vomiting	402	17.2	3.0	59.0	2.5	3.43*	\$3,128,717		2.05	
Kidney & urinary tract infections	388	18.2	2.9	54.1	3.1	2.97*	\$3,514,604			
Other digestive system diagnoses	377	23.6	3.2	42.4	3.5	1.80*	\$2,065,937			
Depression except major depressive disorder	315	26.2	5.5	24.1	10.2	0.92	-\$118,434			
Signs, symptoms & other factors influencing health status	301	13.9	3.4	42.4	3.2	3.05*	\$2,556,580	0.57		
Respiratory signs, symptoms & minor diagnoses	265	13.6	2.2	34.9	2.5	2.56*	\$2,541,295			
Major hematologic/immunologic diag exc sickle cell crisis & coagulation	248	14.4	5.1	29.8	5.7	2.07*	\$4,838,338			
Malnutrition, failure to thrive & other nutritional disorders	248	10.3	4.0	36.9	5.9	3.57*	\$4,682,135			0.66
All DRGs	26,875	1,537	4.5	3,272	4.8	2.13*	\$375,324,580	1.10	1.13	1.05

*P-value < 0.05

†Logistic regression results with stepwise selection with dependent variable being Public/No Insurance, Odds Ratios shown have P-value < 0.05

Abbreviations: DRG, diagnostic-related group; RSV, respiratory syncytial virus.

Discussion

Since 2000, the gradual increase in the percentage of children covered by public health insurance has compensated for a decrease in private insurance while cutting the percentage of children with no health insurance in half. There remain substantial, but potentially avoidable, disparities between emergency department visit rates and hospital discharge rates for children with Public/Nohealth insurance as compared to children with private health insurance. The substantial excess in cost of ED and hospital utilization among publicly insured children makes a business case for redirecting public funding to support community-based approaches to develop a more accessible medical home. In fact, three of the four current Colorado RCCO key performance indicators reflect the priority to improve well-child visit rates, decrease ED visit rates and reduce hospital admission rates.⁴

This analysis does not provide evidence that public insurance is inferior to private insurance. Rather it would appear children with Public/No health insurance utilize primary care, urgent care, EDs and hospital care in ways different from children with private insurance. They use EDs more frequently for illnesses more effectively managed by phone triage or a same or next day primary care visit on weekdays. They have higher hospitalization rates that are more likely to occur after hours or on the weekends and may be of higher severity due to a delay in seeking care. These observations suggest that many of these children may not have access to a true medical home that could have reduced the need for ED and hospital care.

Based on Senate Bill 07-130, the Colorado Revised Statutes (C.R.S. 25.5-1-103) define the nature and requirement for “medical homes” for children covered by Medicaid and/or SCHIP health insurance (as shown below in the text boxes) with the directive to: “maximize the number of children enrolled in the state medical assistance program or the children’s basic health plan who have a medical home” .^{7,8}

(2) On or before July 1, 2008, the state department, in conjunction with the Colorado medical home initiative in the department of public health and environment, shall develop systems and standards to maximize the number of children enrolled in the state medical assistance program or the children’s basic health plan who have a medical home. The systems and standards developed shall include, but need not be limited to, ways to ensure that a medical home shall offer family-centered, compassionate, culturally effective care and sensitive, respectful communication to a child and his or her fam-

(5.5) “Medical home” means an appropriately qualified medical specialty, developmental, therapeutic, or mental health care practice that verifiably ensures continuous, accessible, and comprehensive access to and coordination of community-based medical care, mental health care, oral health care, and related services for a child. A medical home may also be referred to as a health care home. If a child’s medical home is not a primary medical care provider, the child must have a primary medical care provider to ensure that a child’s primary medical care needs are appropriately addressed. All medical homes shall ensure, at a minimum, the following:

- (a) Health maintenance and preventive care;
- (b) Anticipatory guidance and health education;
- (c) Acute and chronic illness care;
- (d) Coordination of medications, specialists, and therapies;
- (e) Provider participation in hospital care; and
- (f) Twenty-four-hour telephone care.

This act led to the creation of a collaborative effort between the Department of Healthcare Policy and Financing, Colorado Department of Public Health and Environment and many community stakeholders in the form of the Colorado Medical Home Initiative which further defined the medical home and standards for measuring it.⁹ Similar initiatives exist at the national level including the Child Health USA 2014 initiative¹⁰ of the Maternal Child Health Bureau of HRSA.

In addition, when potential charge savings are adjusted for estimated public insurance reimbursement rates, \$193.5 million annually appears to be available to support measures to reduce excess ED and hospital utilization. For Colorado in 2014, we calculate that \$427 (adjusted for estimated 2014 reimbursement rates) per Public/No insurance child per year would be available in Colorado for improving access to and utilization of more efficient and effective medical home services. The Colorado estimated reimbursement rate for a complete well-child visit (including developmental screening and vaccination) is \$150 and the reimbursement for an uncomplicated primary care visit is \$73. The expected per capita savings for avoided ED and hospital costs calculated above would be more than enough to pay for one well-child visit and two acute primary care visits for every child with Public/Nohealth insurance yearly while still covering necessary ED and hospital care. This is likely a conservative estimate since actual aggregate costs for children with Public/No insurance are probably greater than the adjusted charge (payment) which does not account for unreimbursed provider services and does not yet account for excess visits to urgent care facilities unrelated to EDs currently reporting to CHA. Additionally, this analysis suggests that even private insurance may not be the true “gold standard” marker for optimal acute, primary care since a minimum estimate of 19% of all ED visits in that group occurred for conditions commonly resolved successfully in a medical home environment.

Numerous studies support the general concept that enhanced medical home (primary care) services may be helpful in improving care and reducing downstream higher-cost utilization.^{11,12} Nonetheless, it is fair to assert that: not all eligible children in Colorado are enrolled in public health insurance; not all enrolled children have a consistent primary care provider; not all primary care providers provide comprehensive medical home services; and not all families know how to (or always take advantage of) available medical home services.^{13,14} As just one example a recent study suggest that “tailored efforts for socioeconomically disadvantaged populations remain warranted to decrease parental drivers of unnecessary antibiotic prescribing.”¹⁵

Strategies to improve access to (and utilization of) more efficient and effective medical home services include: extended clinic hours, available acute primary care visits, assuring regular well child visits, pediatric-focused after-hours telephone triage, provision of care coordination, and care compliance incentives. These require the appropriate, culturally competent resources to educate families on the proper way to access the medical home.¹⁶⁻¹⁸ Such systems include 1): extended office hours for acute primary care which may improve satisfaction and reduce ED utilization and overall cost;¹⁹⁻²⁴ 2): well-designed phone triage protocols which can be a very effective means to decrease unnecessary utilization and improve care.^{9,23-33} However, not all after-hours phone triage lines have the same content or results;^{34,35} 3): family incentives which may increase compliance and utilization of appropriate care,^{36,37} as disincentives

(co-payment, high-deductible plans, low-benefit plans) discourage utilization and perhaps necessary care;³⁸⁻⁴⁰ and 4): care coordination which may decrease excess utilization of resources^{9,11,41}

Although the most effective combination of the above system enhancements is not currently known, they represent system changes that have been shown to improve care and reduce cost,⁴² the potential exists for Colorado RCCO's and/or Healthcare Policy and Financing to implement an array of these measures to improve care and reduce costs as has been documented in other accountable care collaborative's.⁴³

The existence of such large disparities in emergency department and hospital utilization for children in Colorado with Public/No health insurance as compared to those with private insurance, suggests a strong business case to explore ways to improve access to (and utilization of) an enhanced medical home to improve the efficiency and efficacy of healthcare for Colorado's children.

Limitations

Additional risk-adjustment data (e.g. race/ethnicity, socio-demographic factors) are unavailable in these datasets. Because of these data limitations, it is difficult to predict with precision the impact of approaches to improve outcomes and reduce emergency department and hospitalization utilization and charges. This analysis does not address the magnitude of other potential savings resulting from improved access to medical home care such as time off work, lost wages, and decreased productivity. Our method for calculating "adjusted charge savings" only applies to the public insurance costs of care without accounting for potentially significant additional costs shifted to other providers or payers.^{5,6} It is likely that overall system-wide savings for reducing ED and hospital utilization for publically-insured children are even higher.

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