

## Colorado Medicaid Hospital Rate Change: The Importance of the Broader Multi- Provider, Multi-Payer Environment

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### Abstract

In July 2011 Colorado Medicaid decreased its hospital reimbursement for uncomplicated cesarean deliveries to the same level as its payments for complicated vaginal deliveries to discourage medically unnecessary cesarean deliveries and reduce expenditures. This study seeks to understand why that fee change had such a modest impact on Medicaid cesarean rates. Our approach is novel in that we investigate the fee change in a broader context that includes the hospital-physician relationship. We find the fee change has a statistically significant, but modest, effect, on the rate of cesarean delivery. However, hospital ownership type and the presence of salaried employee physicians, also appear to have statistically significant and substantive effects on cesarean rates. We conclude that, if rate changes are to achieve their desired effects, policy makers must take into account network relationships and how incentives work within those relationships.

**Keywords:** Cesarean deliveries; Vaginal deliveries; Financial; Physician; Medicaid fee-for-service; Medicaid Management Information System

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## Introduction

### Motivation

The overall cesarean rate in the United States rose every year from 1996 (20.7%) to a peak in 2009 (32.9%) and has since remained relatively stable [1]. Low-risk cesarean rates, defined as cesarean delivery among low-risk women (full-term, singleton, and vertex presentation) giving birth for the first time, followed a similar pattern: from a low of 18.4% in 1997, to a high of 28.1% in 2009, finally decreasing to 26.9% in 2013 [2]. A consensus in studies on cesarean trends, both in the United States and globally, is that much of the increase is not clinically driven and that medically unnecessary cesareans pose risks for maternal and fetal health [3-5]. Consequently, policy initiatives such as Healthy People 2020 and the 2009 Joint Commission's National Quality Core Measures for hospitals include reducing medically unnecessary cesarean deliveries as an objective, and the World Health Organization discourages cesarean sections that are not medically necessary [6-8].

In an attempt to better understand the relationship between

payment and provider incentives, and the policy implications of this relationship, we studied a 2011 reduction in Colorado Medicaid facility reimbursement for uncomplicated cesarean deliveries. Using Colorado Medicaid fee-for-service (FFS) claims data for services rendered between July 2008 and June 2013, we measured the impact of the reimbursement reduction on cesarean rates in two ways:

- The intra-Medicaid differential- the difference between the hospital reimbursement for a given birth and the average amount the hospital received for normal vaginal deliveries in the given year; and
- The private-public pay differential- the difference between private and Medicaid reimbursement levels.

Colorado Medicaid reimburses for deliveries in two ways: (1) inpatient hospital reimbursement is based on diagnosis-related groups (DRGs), which group inpatient hospital cases or episodes for a single payment, and (2) physicians are reimbursed on a fee-for-service (FFS) basis. Because the reimbursement change was directed at the hospital, which in most cases is not the primary decision-maker in determining the appropriate delivery

modality, we examined both the type of hospital ownership and the relationship between the hospital and delivering physician(s), which were both significant predictors of cesarean rates.

When Colorado reduced hospital payment for uncomplicated cesarean deliveries, it narrowed the differential between its payments for all deliveries and its payments for normal vaginal deliveries. **Table 1** shows this intra-Medicaid differential shrinking from \$731 in 2008 to \$424 in 2012. This differential, in theory, encourages hospitals to shift the mix of services supplied to Medicaid patients in favor of other services, such as vaginal deliveries, and is investigated in the first part of our analysis.

Hospitals, however, operate in a multi-payer environment. The reduction in Medicaid facility reimbursement for uncomplicated cesarean delivery contributed to an already-widening gap between private and public reimbursement rates. In four of the years between 2008 and 2013, **Table 1** shows growth in average private insurance reimbursement for deliveries accompanied by declining average Medicaid reimbursement for deliveries. Consequently, in **Table 1** the private-public gap in our sample grew from an average of \$825 in 2008 to an average of \$3,458 in 2012. We examine the impact of that widening private-public pay gap on Medicaid cesarean rates. If hospitals treat Medicaid and privately-insured deliveries as unrelated markets, widening this private-public gap may not have any statistically significant effect on Medicaid cesarean rates. Alternatively, hospitals may respond to this widening private-public gap by performing fewer Medicaid deliveries and more privately-insured deliveries (whether vaginal or cesarean).

During the study period, several changes in Colorado Medicaid's FFS and supplemental payments occurred that might have further changed provider incentives and behavior. It is important to consider all of these changes together in order to gain meaningful insight into effective payment reform and policy changes.

## Literature

A complex combination of factors appears to underpin elevated cesarean rates, including the hospital-level factors, insurer characteristics, and physician financial incentives that we include in our analysis. Studies have found considerable variability in cesarean rates between hospitals; this variability persists after adjusting for maternal clinical risk suggesting hospital culture

**Table 1** Average hospital reimbursement for deliveries, Medicaid and private insurers, calendar years 2008 to 2013.

Calendar Year	Medicaid	Private Insurance	Intra-Medicaid Differential	Private-Public Differential
2008	\$3,713	\$5,614	\$731	\$825
2009	\$3,664	\$5,782	\$728	\$972
2010	\$3,544	\$6,778	\$723	\$1,804
2011	\$3,430	\$7,214	\$567	\$2,306
2012	\$3,367	\$7,996	\$424	\$3,458
2013	\$3,393	\$8,113	\$435	\$3,119

**Source:** Authors' analysis of Medicaid Management Information System data for Colorado, July 1, 2008-June, 30 2013.

and practice may be influential [9-11]. There is mixed evidence that cesarean rates vary by type of insurance coverage. A study of births at hospitals across the United States between 2002 and 2009 found that, controlling for clinical, demographic, and hospital factors, Medicaid-insured births had lower odds of cesarean delivery compared to privately-insured births [12]. Further, a study of the association between health insurance and primary, elective cesarean deliveries in the state of New Jersey found that insurance type has a modest influence on the odds of cesarean section [13]. However, a study of births in the state of Michigan from 2004 to 2008 found, after adjustment for maternal clinical condition and demographics, no significant difference in the odds of cesarean delivery between privately-insured and Medicaid insured births [14].

The literature also finds that physician-level factors may affect cesarean rates. Some studies of Medicaid fees to physicians have found that the differential fees for cesarean delivery relative to vaginal delivery have a modest effect on cesarean rates [15-17]. One study of births in Taiwan finds that equal physician payments for vaginal and cesarean delivery reduces the rate of elective cesarean delivery among younger mothers but has no significant impact on the overall cesarean rate [17]. There is some evidence that cesarean rates may be lower in organizational structures that insulate physicians from differential financial rewards. One study of births in California finds lower cesarean rates among Kaiser-insured patients who deliver at Kaiser Foundation hospitals [18]. The authors attribute this finding to organizational and financial factors: Kaiser's physicians are salaried, participate in profit-sharing, and are part of a group-model. The salary breaks the nexus between delivery mode and financial incentive, while profit-sharing encourages choosing the least-expensive delivery mode. Kaiser also influences physician choice through utilization review, education, and clinical guidelines. Finally, Kaiser Physicians rotate on-call duty on a standard schedule, a model that reduces the incentive to choose a cesarean delivery when labor occurs or continues during non-regular work hours.

## Study Data and Methods

### Data

To conduct the analysis, we extracted paid fee-for-service claims data for deliveries between July 1, 2008 and June 30, 2013, and paid through December 31, 2014, from the State of Colorado's Medicaid Management Information System (MMIS). Of the 114,323 births extracted from the MMIS, we discarded nine outliers with Medicaid reimbursements below one dollar and 3,668 outliers with reimbursements ranging from a low of \$7,758 to a maximum of \$126,812. A disproportionate share (over 86 percent) of these discarded observations consisted of complicated cesarean deliveries performed either at the state-owned public hospital (41 percent) or at non-state owned public hospitals (37 percent). Discarding these outliers not only allowed our statistical software to produce estimates but also removed unrepresentative costly and complicated births from the sample (Appendix A). Because hospital ownership type was not available for all hospitals in the sample, we removed an additional 2,415 births and reduced the sample to 110,372. **Table 2** contains more

detailed information on the fields extracted from the claims data. We also used the average private reimbursement for vaginal deliveries over the study years from the Colorado Hospital Price Report, a joint project of the Colorado Department of Regulatory Agencies and the Colorado Hospital Association [19].

### Study limitations

Our study is limited to Colorado Medicaid births and therefore may be of limited applicability in other states. Limited by a lack of detailed reimbursement data from other payers, we were able to obtain only the average delivery reimbursement from private payers. Consequently, while we were able to calculate the private-public pay gap, we are unable to investigate how the private-public pay differential may have influenced privately-insured cesarean rates. Our efforts were further hampered by the availability of good proxies for the influences which we wish to test. Based on our literature review, we suspect that hospital organizational structure, physician incentives, and the physician-hospital relationship exert an influence on delivery mode. Yet our only proxy for these potentially complex factors is a variable indicating the presence of a salaried physician and a categorical variable indicating hospital ownership. The magnitude, sign, and statistical significance of the coefficients on these variables, however, may indicate a need for further, more detailed study of these factors. Finally, hospital responses to Medicaid fee changes may also be influenced by supplemental Medicaid funding to hospitals, such as payments under Colorado’s Hospital Provider Fee Supplemental Payments, and Hospital Quality Incentive Payments. Because we were unable to obtain data specific to births and the Hospital Provider Fee, we were not able to investigate how supplemental Medicaid payments influence a hospital’s policy to accept Medicaid patients for deliveries (Appendix B).

## Results

### Unadjusted results

For each birth, we calculated the intra-Medicaid differential as the difference between the actual Medicaid payment and

the average Medicaid payment for normal vaginal deliveries over the period. **Table 1** shows this intra-Medicaid gap by fiscal year (July 1<sup>st</sup>- June 30<sup>th</sup>). In **Table 1**, the intra-Medicaid gap fell dramatically in fiscal year 2011-12 and remained low as a result of the change in Medicaid payment for uncomplicated cesarean delivery. Although this fee reduction was intended to discourage uncomplicated cesarean delivery, **Table 3** shows that rates of uncomplicated cesarean deliveries changed little during the study period.

A comparison of the cesarean rates in **Tables 3 and 4** also suggests that some hospital-level characteristics as well as the physician-hospital relationship may be influencing cesarean rates. In **Table 3**, uncomplicated cesarean rates were lowest at the public, state-owned hospital and highest at for profit hospitals. **Table 4** shows average cesarean rates at hospitals by type of physician compensation (salaried and non-salaried). Cesarean rates at the hospital that employs salaried physicians **Table 4** were on average lower than cesarean rates at private hospitals and comparable to the cesarean rates found at the state-owned public hospital (**Table 3**).

For each birth, we also calculated the private-public differential, shown in **Table 1**, as the difference between the average private insurance reimbursement for a normal vaginal delivery and the Medicaid payment for a delivery. Through most of the study period, this private-public gap tended to increase for two reasons. First, average private reimbursement for each delivery

**Table 3** Uncomplicated caesarean births as per cent of deliveries, by hospital ownership type calendar years 2008 to 2013.

Calendar Year	Public, non-state owned	Public, state owned	Private, non-profit	Private, for profit	All Hospitals
2008	12%	8%	15%	14%	13%
2009	14%	7%	14%	13%	14%
2010	15%	7%	15%	15%	14%
2011	15%	9%	14%	15%	14%
2012	15%	8%	14%	17%	14%
2013	16%	10%	15%	19%	16%
Total	15%	8%	14%	15%	14%

**Source:** Authors’ analysis of Medicaid Management Information System data for Colorado, July 1, 2008-June, 30 2013.

**Table 4** Uncomplicated caesarean births as per cent of deliveries, hospitals with and without salaried physicians, calendar years 2008-2013.

Calendar Year	Hospitals with		All Hospitals
	No Salaried Physicians	Salaried Physician	
2008	14%	5%	13%
2009	14%	5%	14%
2010	15%	6%	14%
2011	15%	8%	14%
2012	15%	8%	14%
2013	16%	10%	16%
Total	15%	7%	14%

**Source:** Authors’ analysis of Medicaid Management Information System data for Colorado, July 1, 2008-June, 30 2013.

**Table 2** Data definitions.

Field	Description
CMS-DRG	370- Cesarean section w/complications
	371- Cesarean section w/out complications
	372- Vaginal delivery w/complicating diagnosis
	373- Vaginal delivery w/out complicating diagnosis
Maternal Characteristics	Age, delivery date
Hospital Characteristics	Hospital provider ID, reimbursement amount, hospital ownership type: state-owned public, non-state-owned, private nonprofit, private for profit
Root Primary Diagnosis Codes (ICD- 9) that adjusted the model	654- Prior cesarean
	661- Abnormal forces of labor
	652 and 669- breech presentation
	663- Umbilical cord complications
	660- Obstructed labor
	641- Placenta previa

mode tended to rise in all but the last two fiscal years of the study period **Table 1**. Second, from fiscal year 2008-09 through 2011-12, average Medicaid reimbursements declined across all delivery modes as the result of across-the-board decreases in Medicaid fees to most providers. Reimbursements for uncomplicated cesarean deliveries showed a greater decline because of a reduction in the weight Medicaid used to calculate payment for this delivery mode. When combined, these changes translated into a widening gap between private and public reimbursement for deliveries until the last two years of the study, when Medicaid instituted across-the-board fee-for-service increases.

### Adjusted Results

**Table 5** reports the results of two logit models that adjust for the influence on cesarean rates of payment differentials, maternal primary diagnosis, maternal age, hospital ownership type, the presence of salaried physicians, and year of delivery. The dependent variable in this table is a categorical variable indicating a cesarean birth. The estimates show the factor by which the variables affect the odds of cesarean delivery, where an estimate equal to one indicates no effect on the odds. In the first model, the financial variable is the intra-Medicaid gap between Medicaid payments for all deliveries and for normal vaginal delivery. Since the intra-Medicaid gap fell when Medicaid reduced its payment for uncomplicated cesareans, the model predicts that as the payments between all deliveries and normal vaginal deliveries are more alike, the odds of a cesarean are decreased by a statistically significant factor of 1.004 or by 0.4%; that is, reducing payment for cesarean sections closer to payment for vaginal deliveries decreases the odds of a cesarean.

The second model, where we used the private-public reimbursement gap as the financial variable, predicts that a

**Table 5** Effect of variables of interest on odds of caesarean delivery, Medicaid patients.

Variable	Reference Group	Intra-Medicaid Gap	Private-Public Gap
Financial Variables			
Private-public gap			0.997***
Intra-Medicaid gap		1.004***	
Hospital Ownership Type			
State-owned public	Non-state owned public hospitals	0.225***	0.022***
Private, nonprofit		0.618***	0.514***
Private, for profit		0.842**	0.860**
Physician Variable			
Salaried physician	Non-salaried physicians	0.171***	0.017***
N		1,10,372	1,10,374

Legend: \* p<0.05; \*\* p<0.01; \*\*\* p<0.001.

**Source:** Authors' analysis of Medicaid Management Information System data for Colorado, July 1, 2008-June, 30 2013.

dollar increase in the private-public reimbursement gap reduces the odds of Medicaid cesarean rates by a statistically significant factor of 0.997 or 0.3% in the years when the private-public gap widened; that is, as the difference between private and Medicaid reimbursement increases, the odds of a cesarean decrease.

**Table 6** conveys these modest changes in terms of changes in the adjusted average probability (as opposed to changes in the odds) of cesarean delivery. A decrease of \$100 in the intra-Medicaid gap reduces the average probability of cesarean delivery by about one percentage point, and an increase of \$100 in the private-public reimbursement gap reduces the average probability of cesarean delivery by about one percentage point.

Hospital ownership type also has a statistically significant effect on the odds of experiencing cesarean delivery. The estimates reported in both models in **Table 5** indicate that a patient experiences reduced odds of cesarean delivery if, instead of a non-state owned public hospital, the delivery takes place at either a state-owned public hospital or at a private hospital. **Table 7** shows a statistically significant drop in the average probability of cesarean delivery if the delivery moves from a non-state-owned public hospital to any one of the other hospital ownership types. Finally, our results suggest that physician compensation and physician relationship to the hospital may have a substantive and

**Table 6** Effect of change in financial variable on adjusted caesarean probability, Medicaid patients.

Variable	Dollar Change	Change in Adjusted Probability of Cesarean Delivery		
		From	To	Change
Intra-Medicaid gap	-\$100	0.219	0.209	-0.010***
Private-public Gap	+\$100	0.219	0.21	-0.009***

Legend: \* p<0.05; \*\* p<0.01; \*\*\* p<0.001.

**Source:** Authors' analysis of Medicaid Management Information System data for Colorado, July 1, 2008-June, 30 2013.

**Table 7** Effect of Change in Hospital Ownership Type on Adjusted Caesarean Probability, Medicaid Patients.

Change in ownership type from non-state-owned hospital to	Model	Change in Adjusted Probability of Cesarean Delivery		
		From	To	Change
State-owned public hospital	Intra-Medicaid payment gap	0.231	0.192	-0.040***
Private, nonprofit hospital		0.231	0.216	-0.015***
Private, for-profit hospital		0.231	0.226	-0.006**
State-owned public hospital	Private-public payment gap	0.252	0.136	-0.116***
Private, nonprofit hospital		0.252	0.223	-0.028***
Private, for-profit hospital		0.252	0.245	-0.007**

Legend: \* p<0.05; \*\* p<0.01; \*\*\* p<0.001.

**Source:** Authors' analysis of Medicaid Management Information System data for Colorado, July 1, 2008-June, 30 2013.



**Table 8** Effect of presence of salaried physician on adjusted caesarean probability, Medicaid patients, fiscal years 2008-09 to 2012-13.

Model	Adjusted average probability of cesarean delivery with		Change in probability
	Salaried physician	Non-salaried physician	
Intra-Medicaid payment gap	0.181	0.224	-0.043***
Private-Public payment gap	0.123	0.246	-0.123***

Legend: \*  $p < 0.05$ ; \*\*  $p < 0.01$ ; \*\*\*  $p < 0.001$ .

**Source:** Authors' analysis of Medicaid Management Information System data for Colorado, July 1, 2008-June, 30 2013.

statistically significant effect on adjusted caesarean probability in both models. **Table 8** shows that having salaried physicians reduces the probability of caesarean delivery by 0.04 in the intra-Medicaid model and by 0.12 in the private-public model.

## Policy Implications/Conclusion

The purpose of our inquiry is to understand why Medicaid-funded caesarean rates appeared to fall only modestly following the cut in Medicaid hospital reimbursement for uncomplicated caesarean delivery in 2011. We looked for evidence of other financial and non-financial variables that may counteract the rate decrease. Our literature search suggested that physician financial incentives, the physician-hospital relationship, and other hospital-level characteristics, such as public and private ownership, may influence delivery mode. For each birth, we therefore included variables indicating hospital ownership type and the presence of hospital-employed, salaried physicians. Significant findings associated with these variables suggest that these factors and their influence on provider response to Medicaid fees merit closer, more detailed study.

Our study finds that changes in hospital Medicaid payments have only modest impacts on caesarean rates and that hospital-level and physician-level variables have a substantive and statistically significant effect on caesarean rates. Together, these results suggest that a rate change directed at a single provider category may not by itself achieve meaningful reduction in caesarean rates. We

speculate that, first, when a service involves collaboration among multiple providers, payment rate changes must be directed at the provider(s) most capable of influencing the targeted outcome. Second, the nature of the provider relationship may have an important influence on health outcomes and expenditures. For example, our sample contains a state-owned public hospital whose physicians belong to a large physician group and a large public hospital with salaried employee physicians. We find that, compared to deliveries in all other hospital ownership types, delivery in the state-owned public hospital significantly reduces the probability of caesarean birth. Likewise, our model predicts a lower adjusted probability of caesarean delivery in a hospital with physician employees compared to hospitals without salaried physician employees. Further theoretical and empirical research is needed to understand whether and why different provider relationships may produce different health care outcomes, patterns of care utilization, and level of expenditures.

In the current healthcare reform policy environment, it is important to consider why a reimbursement change may have had a modest effect on policy goals, and why provider relationships might be significant predictors of the likelihood of a caesarean birth. Payment reform initiatives need to consider complex provider relationships to ensure that incentives are directed at the provider with the most influence on the desired outcome, especially as the hospital-provider relationship grows more complex. As accountable care models become a prominent mechanism to improve health outcomes, patient experience, and reduce costs, it is important to consider network relationships and how incentives work within those relationships to achieve policy goals. Healthcare reform initiatives do not happen in a vacuum; the reimbursement change at the center of this study happened concurrently with other rate decreases, the implementation of the Colorado Medicaid Accountable Care Collaborative [20], and the introduction of the Hospital Provider Fee model, which includes significant supplemental payments, intended to ensure that access to care for Medicaid patients is maintained. These payments may counteract the incentives of the payment change, but data are not available on a service specific level. A study on the impact of the Colorado Hospital Provider Fee on access to care could yield informative results on the relationship between Medicaid payments and access to care.

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