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HEALTHCARE AND HUMAN SERVICES POLICY, RESEARCH, AND CONSULTING—WITH REAL-WORLD PERSPECTIVE.

Evaluation of the Oklahoma Medicaid Cesarean Section Quality Initiative

Prepared for: **Oklahoma Healthcare Authority**

Submitted by: **The Lewin Group, Inc.**

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Executive Summary

In 2011, the Oklahoma Healthcare Authority (OHCA) created the Oklahoma Cesarean Section Quality Initiative. In light of Oklahoma's relatively high Cesarean section (C-section) rates, the initiative was designed to decrease the primary C-section rate to 18 percent or less by ensuring providers and hospitals were using best practices in performing C-sections on Medicaid mothers in the SoonerCare Program.

The Lewin Group conducted an evaluation to determine the effectiveness of the initiative for the period Oklahoma State Fiscal Year (SFY) 2011 through SFY 2013. Lewin's evaluation focused on the percentage of C-sections performed among the SoonerCare population, medically unnecessary C-sections, and quality implications. The evaluation was based on analysis of available claims data submitted by physicians and hospitals, and findings from both provider types are presented as appropriate. Lewin also analyzed the impact on service costs, although that was not a primary object of the state's initiative or this evaluation. A summary of Lewin's key findings is presented below. Items noted as significant are statistically significant at the 0.05 level, and those noted as highly significant are statistically significant at the 0.01 level.

Primary C-Section Rates

As part of the Initiative, OHCA regularly publishes physician and hospital primary C-section rates. Lewin's first analysis focused on validation of the OHCA rates for accuracy and to ensure that the data was complete. Lewin's analysis confirmed OHCA's published calculations of primary C-section rates. For hospital claims, each rate that Lewin calculated by region and year was within 2% of OHCA's rates. For physician claims, each rate was within 1% of OHCA's rates. It is important to note that some variation was expected given differences in the timing of the data draw.

In addition, Lewin found that the primary C-section rate among SoonerCare enrollees significantly decreased over the initiative period, from 19.75% to 17.83% among hospital claims and from 21.43% to 20.03% among physician claims. The primary C-section rates in the OHCA initiative and this evaluation reflect first births by SoonerCare mothers for which a C-section was performed, as a percentage of (all vaginal and primary C-section) births among SoonerCare mothers. C-section rates are more typically presented as the number of all C-sections (primary and secondary) as a percentage of total births, which explains why the OHCA rates may appear low.

Maternal Age. For hospital claims, the primary C-section rate significantly decreased over the initiative period, for mothers in each age group under the age of 40. The age group with the largest decrease was 35-39, decreasing from 25.18% to 20.87%. Age 20-34 was the most populous age group and had a significant decrease in primary C-section rate, from 19.12% to 17.23%. Similar reductions were seen in physician claims, where the primary C-section rate significantly decreased for mothers aged 20-34 from 20.88% to 19.51%, and the 35-39 age group rate decreased from 29.06% to 24.43%.

Medicaid Eligibility Category. Based on hospital and physician claims, alien mothers overall had a lower primary C-section rate (consistent with national trends), even though the average age for aliens is slightly higher than the age for non-aliens.

Race. For hospital claims, the primary C-section rate decreased significantly over the initiative period, for American Indian and White mothers. According to the 2010 U.S. census, Oklahoma has a relatively large American Indian population at 8.9%. The primary C-section rate for the American Indian population decreased from 21.40% to 19.40%. Similar reductions were seen in physician claims where the rate for American Indian mothers decreased from 23.36% to 21.35%. Nationally, overall C-section rates remained steady for American Indian mothers at 28.6 percent in 2012.[2] The primary rate for the White population decreased from 19.09% to 17.27%, which is slightly lower overall than the American Indian population.

Region. For hospital and physician claims, the primary C-section rate significantly decreased over the initiative period, in the Central, NW, and SE regions. A significant decrease was also found in Tulsa among physician claims. The region with the most births was Central, with a decrease from 20.09% to 17.53% in hospital claims and NW had the least amount of births, but the largest decrease in primary C-sections, from 19.28% to 14.41%.

Medical Necessity

The rate of medically unnecessary C-sections significantly decreased from 1.81% to 1.43%. This rate is calculated as the number of claims deemed medically unnecessary divided by the number of claims that were reviewed. Significant decreases in the medically unnecessary C-section rate were found among non-aliens (1.91% to 1.52%), American Indians (2.00% to 1.14%), and in the Southwest area of the state (2.16% to 1.28%). In SFY 2012 and SFY 2013, a total of 212 C-sections were deemed medically unnecessary.

While not a primary objective, the initiative did result in cost savings for the SoonerCare program. For C-sections that OHCA deemed medically unnecessary, hospitals were paid at the lower vaginal delivery rate. This resulted in an over $1.2 million savings for the SoonerCare program over two years. The savings are calculated as the number of medically unnecessary births multiplied by the difference in the average costs of a primary C-section and vaginal birth for that fiscal year. Lewin also found that the average cost of both methods of delivery significantly decreased over the initiative period. The average cost of delivery calculation includes maternal claims 60 days prior to delivery and maternal and infant claims 90 days after the date of delivery*.

* OHCA notes that the data set provided includes maternal claims with dates of service that overlap with the delivery date. This may include dates of service up to 60 days prior to delivery in some cases. In addition, the data set includes infant claims with dates of service that overlap with the first 14 days of life, which may include claims that run up to 90 days after delivery

Quality

Lewin analyzed eight common measures of maternal and fetal health over the initiative period. The average maternal and infant readmission, fetal demise and pre-term birth rates as well as NICU length of stay did not change significantly among hospital and physician claims. For physician claims, the stillbirth rate significantly decreased from 0.68% to 0.53%. However,

Lewin also found an insignificant increase in the stillbirth rate increased from 0.58% to 0.63% in the hospital claims.

Summary and Considerations

Lewin's evaluation indicates that the OHCA initiative was successful in reducing medically unnecessary C-sections among SoonerCare mothers. The implications of the initiative on quality are more difficult to assess given the small numbers and short period of study. However, Lewin's evaluation of several quality measures indicates that there was no negative impact on quality and no reduction in maternal hospital length of stay.

Lewin identified several considerations for OHCA's future efforts. Specifically, there may be merit is pursuing an initiative to reduce early inductions, improve accuracy of birth claims, review the medical necessity of C-sections performed by all providers, not just those who do not meet the 18 percent threshold, and requiring medical necessity codes on birth claims to support auto adjudication to reduce the volume of manual chart reviews.

Introduction

The Lewin Group conducted an evaluation of the Oklahoma C-section Quality Initiative at the request of the Oklahoma Healthcare Authority (OHCA). The goal of the study was to document the initiative to reduce medically unnecessary C-section births among Medicaid recipients and measure its impact. The study focused on the following key research questions:

1. What was the primary C-section rate among Medicaid recipients?
2. What was the prevalence and cost of medically unnecessary C-sections?
3. Were there any changes in maternal and infant health?

The report is organized into four sections: Background, Study Design and Findings, Summary and Considerations, and Appendices. The Background Section provides context on the prevalence of C-sections and Medicaid-funded births in Oklahoma.

Lewin's analysis of claims data provided by OHCA and findings in each of the primary focus areas of the study are presented in the Study Design and Findings Section. The primary C-section rates are analyzed by maternal age, Medicaid eligibility category, race, and region. A discussion of rates and costs associated with medically unnecessary C-sections follows. The remainder of this section presents Lewin's analysis of eight common measures of maternal and fetal health, including:

- Maternal length of stay;
- Neonatal Intensive Care Unit (NICU) admissions;
- NICU length of stay;
- Fetal demise;
- Stillbirth;
- Pre-term births;
- Maternal hospital readmission rates; and
- Infant hospital readmission rates.

The Summary and Considerations Section highlights the key evaluation findings and provides suggestions for OHCA to consider in the future.

Last, the Appendices Section presents our methodology for analyzing the OHCA data and includes 19 data tables documenting all of our findings.

Background

Healthy People 2020, the federal government's agenda for improving the health of Americans, and the American College of Obstetricians and Gynecologists both expressed the need to reduce the number of C-sections without medical necessity as well as induction of labor prior to 39 weeks.[1] Medically unnecessary C-sections are undesirable because they are linked to increased health complications for both mothers and infants resulting in (among other negative outcomes) hospital readmissions and NICU admissions.[2]

In 2012 the C-section delivery rate was 32.8 percent nationally, and overall the rate has risen nearly 60 percent from 1996 to 2009, increasing every year by as much as 7 percent.[3] Oklahoma ranked 14th nationally in 2011, with a C-section rate of 34.2 percent.[4] In the March of Dimes Premature Birth Report Card, Oklahoma scored a D, and a contributing factor to Oklahoma's low grade was the rise in late pre-term births (34-36 weeks) which were linked to the increased rate of C-sections and early inductions.[5]

Because Medicaid is the primary payer for nearly 40 percent of all births nationally, there is also concern about medically unnecessary C-sections among Medicaid recipients.[6] Concern is heightened in Oklahoma where Medicaid is the primary payer for over 60 percent of births in the state.[7] Considering that child birth is the most common reason for hospitalization in the U.S and with Oklahoma Medicaid paying for over 60% of births in the state, the time was ripe for addressing medically unnecessary C-sections.[8]

Prior to the start of the initiative, OHCA convened a stakeholder meeting to address the medically unnecessary C-sections and inform providers of the high rate among Medicaid recipients. This meeting and a subsequent follow-up meeting helped to build some consensus around the goals for the initiative and provided important feedback from key stakeholders, including private practice physicians, hospitals, and insurers.

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1 Martin, J., Hamilton, B., Ventura, S., Osterman, M., Mathews, T. "Births: Final Data for 2011." National Vital Statistics Reports Vol. 62, No. 1. June 28, 2013. Accessed from: www.cdc.gov/nchs/data/nvsr/nvsr62/nvsr62_01.pdf

2 Liu, S., Heman, M., Kramer, MS., Demissie, K., Wen, SW., Marcoux, S., Maternal Health Study Group of the Canadian Perinatal Surveillance System. "Length of hospital stay, obstetric conditions at childbirth, and maternal readmission: a population-based cohort study." Am J Obstet Gynecol. 2002 Sep: 187(3):681-7. Accessed from: http://www.ncbi.nlm.nih.gov/pubmed/12237648

3 Hamilton, B., Martin, J., Ventura, S. "Births: Preliminary Data for 2012." National Vital Statistics Reports Vol. 62, No. 3. September 6, 2013. Accessed from: www.cdc.gov/nchs/data/nvsr/nvsr62/nvsr62_03.pdf

4 "Cesarean Rates by Race All U.S. States, 2011." July 20, 2013. Accessed from: http://www.cesareanrates.com/blog/2013/7/20/cesarean-rates-by-race-all-us-states-2011.html

5 Cosgrove, M. "Fewer Oklahoma Babies Born Premature." November 4, 2013. Accessed from: http://newsok.com/fewer-oklahoma-babies-born-premature/article/3900917

6 "Medicaid Cost-Savings Opportunities." February 3, 2011. Accessed from: http://www.hhs.gov/news/press/2011pres/02/20110203tech.html

7 "Births Financed by Medicaid as a Percent of Total Births." *The Henry J. Kaiser Family Foundation*. Accessed from: http://kff.org/medicaid/state-indicator/as-percent-of-state-births/

8 Podulka, J., Stranges, E., and Steiner, C. "Hospitalizations Related to Childbirth, 2008." HCUP Statistical Brief #110. *Agency for Healthcare Research and Quality*. April 2011. Accessed from: http://www.hcup-us.ahrq.gov/reports/statbriefs/sb110.pdf

The OHCA Cesarean Section Quality Initiative

In an effort to decrease the number of medically unnecessary C-sections in the state, OHCA implemented the C-Section Quality Initiative in 2011. The purpose of the initiative was to decrease the primary C-section rate to 18 percent or less by ensuring providers and hospitals were using best practices in performing C-sections with enrollees in the SoonerCare Program. The primary C-section rate excludes C-sections subsequent to the first.

The quality initiative consisted of two phases. Phase I started January 2011 with data collection, feedback to providers and hospitals, and provider education. In collaboration with University of Oklahoma Quality Department, OHCA provided educational tools to providers and hospitals and links to educational resources on the project webpage. OHCA sent a letter was to in-state contracted providers and hospitals. The letter included their primary C-section rate and the total C-section rate. Phase I excluded providers and hospitals with less than six deliveries per quarter in a fiscal year, out-of-state providers and hospitals, and assistant surgeons.

Phase II, which began September 1, 2011, consisted of medical chart reviews of all C-section claims for providers with greater than 18 percent primary C-section rates to identify medical necessity. If reviewers determined that the C-section was medically necessary, OHCA processed payment at the C-section payment rate. Conditions indicating medical necessity included:

1. Maternal history of:
    a. previous C-section delivery;
    b. previous uterine rupture;
    c. HIV positive; or
    d. invasive cancer of cervix.
2. Clinical conditions of:
    a. placenta abruption;
    b. uterine rupture;
    c. multiple gestation;
    d. cord around the neck with compression complicating labor and delivery;
    e. postdates [greater than 41 weeks Estimated Gestational Age (EGA)];
    f. placenta previa;
    g. placenta accrete;
    h. transverse lie; or
    i. malpresentation.

Failure to progress and failure to descend were not determined to constitute medical necessity for C-sections. If medical necessity was not established, the delivery claim was paid at the vaginal delivery rate. The Medicaid vaginal delivery rate in Oklahoma is approximately a $200 reduction from the C-section reimbursement for physicians and $1,600 payment reduction for hospitals. [9]

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[9] Sylvia Lopez, MD, Chief Medical Officer for Oklahoma Health Care Authority

Study Design and Findings

To determine whether medically unnecessary C-sections declined, Lewin conducted an analysis to answer these primary questions:

1. What was the primary C-section rate among Medicaid recipients?
2. What was the prevalence and cost of medically unnecessary primary C-sections?
3. Were there any changes in maternal and infant health?

Lewin began the study with an analysis of the claims data submitted by OHCA. The files contained records providing demographic, Medicaid eligibility category, geographic regions, maternal birth data, infant birth data, and claims that were reviewed for medical necessity for the three-year initiative period, July 1, 2010 through June 30, 2013 (These dates correspond with the Oklahoma state fiscal year.). Additional details on the study design are provided in Appendix I: Methodology.

The evaluation was based on analysis of available claims data submitted by both physicians and hospitals. Therefore, most births will be captured in both categories, and the total number of births should not be considered as the combination of physician and hospital claims.

Throughout the report, we consider findings to be statistically significant at the 0.05 level, denoted by *, and highly statistically significant at the 0.01 level, denoted by **, which means that the probability of declaring an insignificant result as significant would be 5%, or 1% for declaring insignificant results as significant or highly significant respectively.

Primary C-Section Rates

Validation of OHCA Rates

Lewin examined the Medicaid claims data to identify primary births which occurred via C-section and vaginal delivery during the three year period and determined a primary C-section rate for physicians and hospitals. The primary C-section rate is defined as the number of first births performed by C-section divided by the total number of vaginal deliveries and first birth C-sections as defined by OHCA.

Lewin's analysis found that OHCA's published calculations of primary C-section rates were appropriate. For hospital claims, each rate that Lewin calculated by region and year is within 2% of OHCA's rates. For physician claims, each rate is within 1% of OHCA's rates. Hospital rates are presented by hospital and region in tables A, B, C, and D in Appendix II. Physician claims are compared by region in Table E in Appendix II. To protect the confidentiality of providers, Lewin provided the C-section rates comparison by region.

It is important to note that some variation is expected given differences in the date the data were pulled. OHCA conducted separate analyses annually based on claims that were paid through:

- 8/22/2011 for SFY 2010;
- 9/4/2012 for SFY 2012; and
- 9/9/2013 for SFY 2013.

Lewin analyzed claims paid through 11/19/2013 for SFY 2011 through SFY 2013 allowing for greater claims run-out than the data analyzed by OHCA. Additionally, Lewin examined the claims for SFY 2013 by month to ensure we were not missing claims due to delays in payments.

Primary C-Section Rates over Time

To identify the effect that the Oklahoma Health Care Authority's C-Section Quality Initiative had on the Medicaid population, Lewin computed the primary C-section and overall C-section rates for the three-year study period. This analysis is separated into maternal hospital claims and maternal physician claims, where the majority of births have a claim of each kind. Overall, both the primary C-section and overall C-section rates fell significantly during the study period. In this section, we report our findings over time by various demographic and regional factors. Lewin analyzed the data by region, race, age, and Medicaid eligibility to determine whether any of the above factors contributed to the C-section rate.

In Exhibit 1, the primary C-section rate significantly decreased over the initiative period from 19.75% to 17.83% in hospital claims. In physician claims, the primary C-section rate significantly decreased over the initiative period from 21.43% to 20.03%.

Exhibit 1. C-Section Rates

SFY	Primary C-Sections	Primary C-Sections & Vaginal Births	Primary C-Section Rate	All Births	Overall C-Section Rates
Hospital					
2011	4,972	25,181	19.75%	30,302	33.31%
2012	4,588	25,246	18.17%	30,355	31.95%
2013	4,543	25,482	17.83%**	30,823	32.07%
Physician					
2011	5,324	24,842	21.43%	29,312	33.41%
2012	4,957	24,829	19.96%	29,496	32.63%
2013	5,088	25,402	20.03%**	30,205	32.75%

Age

For hospital claims in Exhibit 2, the primary C-section rate significantly decreased over the initiative period for mothers in each age group under the age of 40. For mothers over the age of 40, the primary C-section rate increased from 27.92% to 31.15%, but this was not a significant change. The age group with the largest decrease was 35-39, from 25.18% to 20.87%. Age 20-34 was the most populated age group and had the most significant decrease in primary C-section rate, from 19.12% to 17.23%. These rate changes are highlighted in Exhibit 3, as well as the general trend in age groups, where older mothers have higher rates of C-sections.

In physician claims in Exhibit 4, the primary C-section rate significantly decreased over the initiative period for mothers aged 20-39. The under 20 population decreased from 20.98% to 20.12%, but this decrease was not significant. The rate for mothers aged 20-34 decreased from 20.88% to 19.51%, and the 35-39 age group rate decreased from 29.06% to 24.43%. The over 40 population increased from 33.44% to 34.95%, but this increase was not significant. These rate

changes are highlighted in Exhibit 5, as well as the general trend in age groups, where older mothers have higher rates of C-sections.

Exhibit 2. Hospital C-Section Rates by Age

SFY	Age	Primary C-Sections	Primary C-Sections & Vaginal Births	Primary C-Section Rate	All Births	Overall C-Section Rates
2011	<20	835	4,029	20.72%	4,198	23.92%
2012	<20	739	3,839	19.25%	3,954	21.60%
2013	<20	697	3,653	19.08%*	3,769	21.57%
2011	20-34	3,774	19,741	19.12%	24,186	33.98%
2012	20-34	3,513	19,917	17.64%	24,384	32.73%
2013	20-34	3,507	20,355	17.23%**	24,965	32.51%
2011	35-39	284	1,128	25.18%	1,521	44.51%
2012	35-39	264	1,211	21.80%	1,631	41.94%
2013	35-39	244	1,169	20.87%**	1,645	43.77%
2011	40+	79	283	27.92%	397	48.61%
2012	40+	72	279	25.81%	386	46.37%
2013	40+	95	305	31.15%	444	52.70%

Exhibit 3. Hospital Primary C-Section Rates by Age

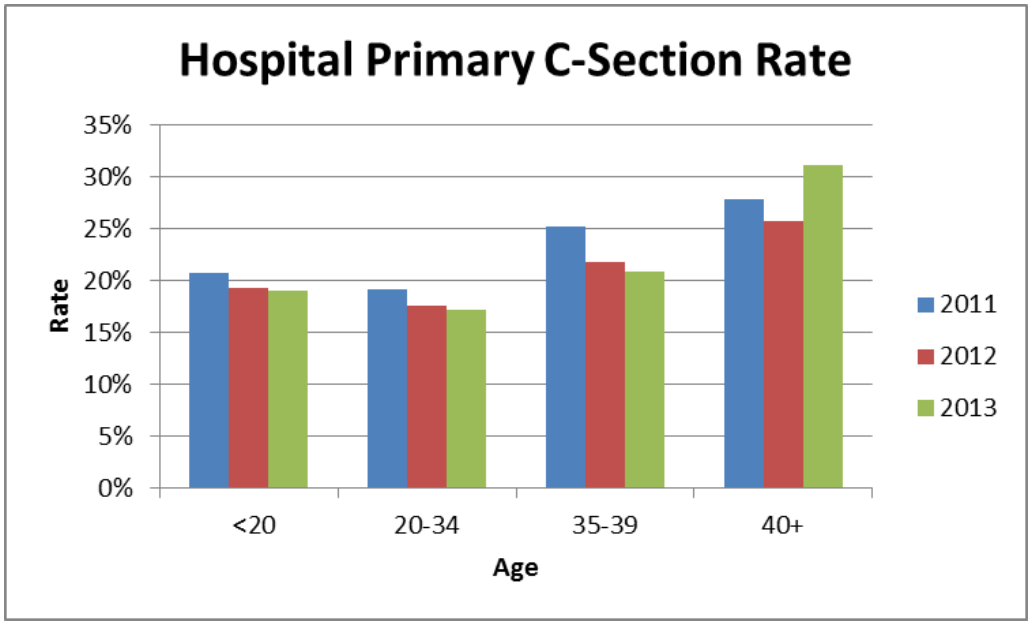
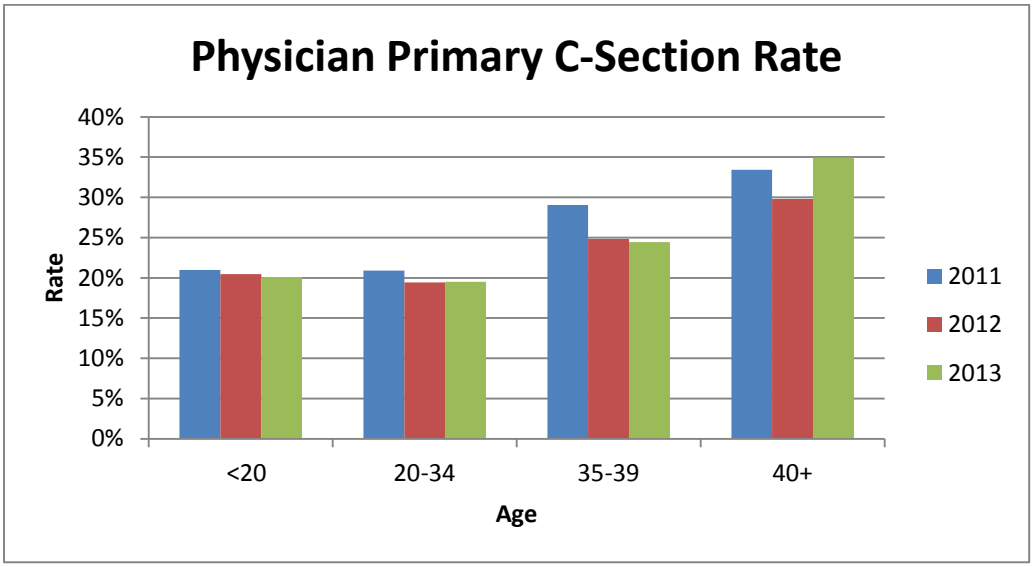


Exhibit 4. Physician C-Section Rates by Age

SFY	Age	Primary C-Sections	Primary C-Sections & Vaginal Births	Primary C-Section Rate	All Births	Overall C-Section Rates
2011	<20	814	3,880	20.98%	4,034	24.00%
2012	<20	760	3,712	20.47%	3,830	22.92%
2013	<20	725	3,603	20.12%	3,717	22.57%
2011	20-34	4,071	19,497	20.88%	23,389	34.05%
2012	20-34	3,809	19,612	19.42%	23,701	33.32%
2013	20-34	3,957	20,279	19.51%**	24,434	33.20%
2011	35-39	338	1,163	29.06%	1,488	44.56%
2012	35-39	303	1,220	24.84%	1,586	42.18%
2013	35-39	291	1,191	24.43%**	1,606	43.96%
2011	40+	101	302	33.44%	401	49.88%
2012	40+	85	285	29.82%	379	47.23%
2013	40+	115	329	34.95%	448	52.23%

Exhibit 5. Physician Primary C-Section Rates by Age



Medicaid Eligibility Category

For hospital claims in Exhibit 6, the primary C-section rate significantly decreased over the initiative period for non-alien mothers from 20.52% to 18.32%. For alien mothers, the primary C-section rate increased from 13.45% to 14.02%, but this was not a significant change. Based on hospital and physician claims, alien mothers overall had a lower primary C-section rate, even though the average age for aliens is slightly higher than the age for non-aliens. The average age for aliens is close to 28 for all three years, while the average age for non-aliens is close to 25 for all three years.

For physician claims in Exhibit 7, the primary C-section rate significantly decreased over the initiative period for non-alien mothers from 22.16% to 20.41%. For alien mothers, the primary C-section rate increased from 15.76% to 17.21%, but this was not significant.

Exhibit 6. Hospital C-Section Rates by Medicaid Eligibility Category

SFY	Eligibility Category	Primary C-Sections	Primary C-Sections & Vaginal Births	Primary C-Section Rate	All Births	Overall C-Section Rates
2011	Alien	370	2,750	13.45%	3,301	27.90%
2012	Alien	353	2,821	12.51%	3,379	26.96%
2013	Alien	405	2,889	14.02%	3,467	28.35%
2011	Other	4,602	22,431	20.52%	27,001	33.97%
2012	Other	4,235	22,425	18.89%	26,976	32.57%
2013	Other	4,138	22,593	18.32%**	27,356	32.54%

Exhibit 7. Physician C-Section Rates by Medicaid Eligibility Category

SFY	Eligibility category	Primary C-Sections	Primary C-Sections & Vaginal Births	Primary C-Section Rate	All Births	Overall C-Section Rates
2011	Alien	370	2,750	13.45%	3,301	27.90%
2012	Alien	353	2,821	12.51%	3,379	26.96%
2013	Alien	405	2,889	14.02%	3,467	28.35%
2011	Other	4,880	22,024	22.16%	25,997	34.05%
2012	Other	4,528	21,986	20.59%	26,136	33.20%
2013	Other	4,571	22,398	20.41%**	26,688	33.20%

Race

Oklahoma has a relatively large American Indian population (8.9 % according to the 2010 U.S. census) and it is important to understand the C-section rates and trends for such a large population. For hospital claims in Exhibit 8, the primary C-section rate significantly decreased over the initiative period for the American Indian, Other, and White populations. The rate decreased for Black mothers, but this change was not significant. The rate for the American Indian population decreased from 21.40% to 19.40%, which is similar to the rate change for the Black population. Nationally, C-section rates remained steady for American Indian 28.6 percent in 2012.[2] The primary rate for the White population decreased from 19.09% to 17.27%, which is lower overall than the American Indian population. These rate decreases are presented graphically in Exhibit 9, with the other group incurring the sharpest decrease.

For physician claims in Exhibit 10, the primary C-section rate significantly decreased over the initiative period, between SFY 2011 and SFY 2013, for the American Indian and White populations. The rate decreased for all other populations, but these were not significant. The rate for the American Indian population decreased from 23.36% to 21.35%, which is similar to the rate change for the Black population. The rate for the White population decreased from

20.70% to 19.34%, which is lower overall than the Black and American Indian populations. These rate decreases are presented graphically in Exhibit 11.

Exhibit 8. Hospital C-Section Rates by Race

SFY	Race Category	Primary C-Sections	Primary C-Sections & Vaginal Births	Primary C-Section Rate	All Births	Overall C-Section Rates
2011	American Indian	836	3,907	21.40%	4,747	35.31%
2012	American Indian	795	3,939	20.18%	4,812	34.66%
2013	American Indian	778	4,010	19.40%*	4,862	33.53%
2011	Black	661	3,066	21.56%	3,725	35.44%
2012	Black	605	3,058	19.78%	3,691	33.54%
2013	Black	617	3,099	19.91%	3,778	34.30%
2011	Other	134	710	18.87%	811	28.98%
2012	Other	142	826	17.19%	957	28.53%
2013	Other	107	766	13.97%**	929	29.06%
2011	White	3,341	17,498	19.09%	21,019	32.65%
2012	White	3,046	17,423	17.48%	20,895	31.19%
2013	White	3,041	17,607	17.27%**	21,254	31.47%

Exhibit 9. Hospital Primary C-Section Rates by Race

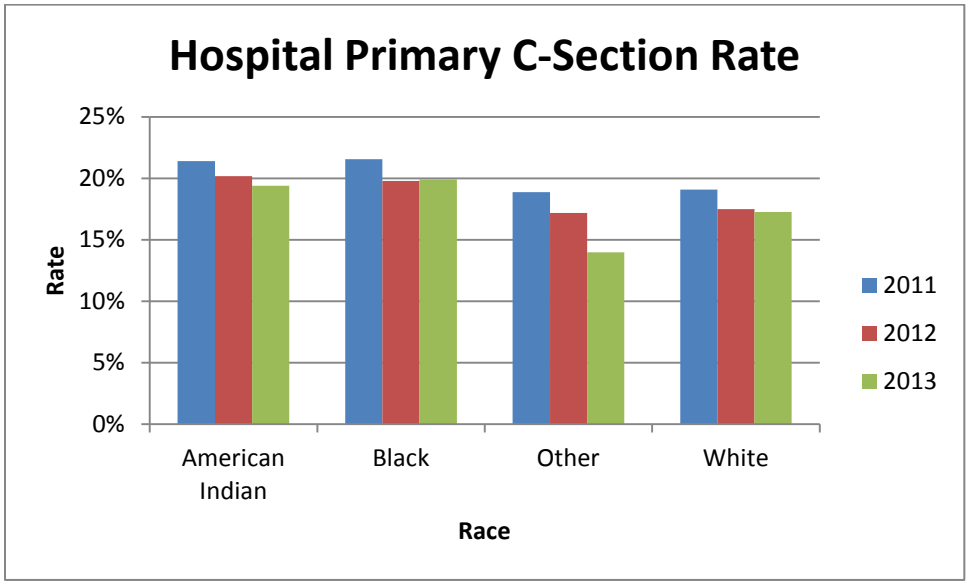
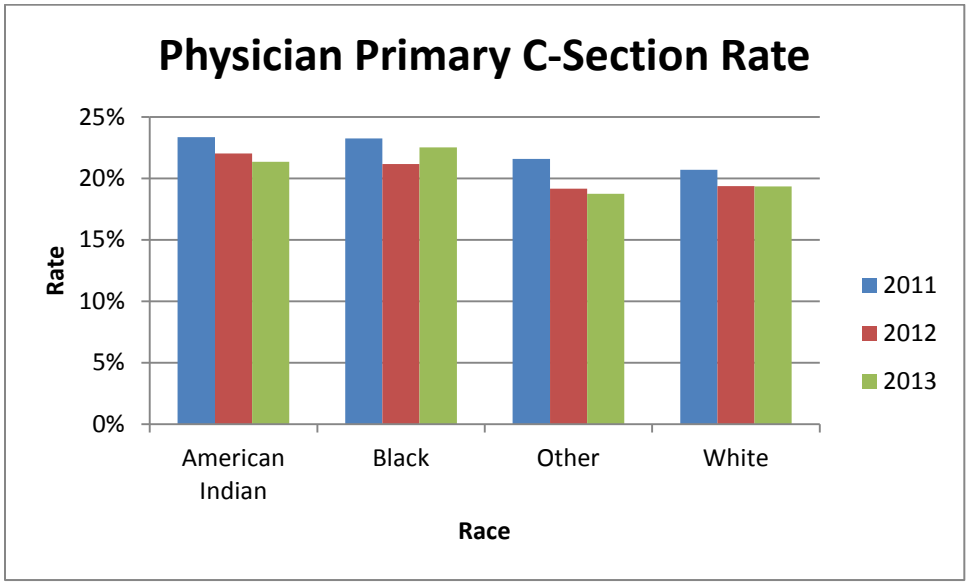


Exhibit 10. Physician C-Section Rates by Race

SFY	Race Category	Primary C-Sections	Primary C-Sections & Vaginal Births	Primary C-Section Rate	All Births	Overall C-Section Rates
2011	American Indian	859	3,677	23.36%	4,437	36.49%
2012	American Indian	812	3,688	22.02%	4,497	36.05%
2013	American Indian	867	4,060	21.35%*	4,870	34.44%
2011	Black	717	3,085	23.24%	3,620	34.59%
2012	Black	641	3,029	21.16%	3,588	33.44%
2013	Black	698	3,098	22.53%	3,667	34.55%
2011	Other	152	704	21.59%	792	30.30%%
2012	Other	157	820	19.15%	942	29.62%
2013	Other	145	774	18.73%	899	30.03%
2011	White	3,596	17,376	20.70%	20,463	32.66%
2012	White	3,347	17,292	19.36%	20,469	31.87%
2013	White	3,378	17,470	19.34%**	20,769	32.15%

Exhibit 11. Physician Primary C-Section Rates by Race



Given the large American Indian population in Oklahoma, Lewin reviewed claims from Indian Health Service (IHS) hospitals. However, given the small numbers of births at IHS hospitals these numbers should be used cautiously. In Exhibit 12, the primary C-section rate at Indian Health Services (IHS) hospitals is significantly lower than at non-IHS hospitals for SFY 2011 only, but not SFY 2012 and SFY 2013. Also, the primary C-section rate decreased significantly for non-IHS hospitals, from 19.86% to 17.86%. This rate increased slightly for IHS hospitals, from 16.83% to 16.92%, but this change was not significant.

Exhibit 12. Hospital C-Section Rates for IHS Hospitals

SFY	Hospital	Primary C-Sections	Primary C-Sections & Vaginal Births	Primary C-Section Rate	All Births	Overall C-Section Rates
2011	IHS	155	921	16.83%	1,098	33.61%
2012	IHS	160	961	16.65%	1,173	31.71%
2013	IHS	165	975	16.92%	1,157	29.99%
2011	Non-IHS	4,817	24,260	19.86%	29,204	35.56%
2012	Non-IHS	4,428	24,285	18.23%	29,182	31.95%
2013	Non-IHS	4,378	24,507	17.86%**	29,666	32.15%

Region

For hospital claims in Exhibit 13, the primary C-section rate significantly decreased over the initiative period in the Central, Northwest, and Southeast regions. The rate decreased in the Southeast and Tulsa but was not significant, and the rate increase in Northeast was not significant. The region with the most births was Central, with a decrease from 20.09% to 17.53%. Northwest had the fewest births, but the largest decrease in primary C-sections, from 19.28% to 14.41%. These rate variations for the different regions are presented graphically in Exhibit 14.

For physician claims in Exhibit 15, the primary C-section rate significantly decreased over the initiative period in the Central, Northwest, Southeast, and Tulsa regions. The rate decreased in the Northeast and Southeast, but it was not significant. The region with the most births was Central, with a decrease from 22.21% to 20.76%. Northwest had the fewest births, but the largest decrease in primary C-sections, from 22.88% to 18.78%. These rate variations for the different regions are presented graphically in Exhibit 16.

Exhibit 15. Hospital C-Section Rates by Region

SFY	Region	Primary C-Sections	Primary C-Sections & Vaginal Births	Primary C-Section Rate	All Births	Overall C-Section Rates
2011	Central	1,898	9,448	20.09%	11,372	33.61%
2012	Central	1,661	9,311	17.84%	11,144	31.35%
2013	Central	1,700	9,699	17.53%**	11,703	31.65%
2011	NE	663	3,060	21.67%	3,720	35.56%
2012	NE	685	3,041	22.53%	3,716	36.60%
2013	NE	629	2,893	21.74%	3,607	37.23%
2011	NW	240	1,245	19.28%	1,511	33.49%
2012	NW	202	1,305	15.48%	1,605	31.28%
2013	NW	201	1,395	14.41%**	1,695	29.56%
2011	SE	478	2,383	20.06%	2,889	34.06%
2012	SE	417	2,327	17.92%	2,861	33.24%
2013	SE	362	2,253	16.07%**	2,768	31.68%

SFY	Region	Primary C-Sections	Primary C-Sections & Vaginal Births	Primary C-Section Rate	All Births	Overall C-Section Rates
2011	SW	454	2,494	18.20%	3,000	32.00%
2012	SW	423	2,470	17.13%	2,975	31.19%
2013	SW	427	2,514	16.98%	3,013	30.73%
2011	Tulsa	1,239	6,551	18.91%	7,810	31.98%
2012	Tulsa	1,200	6,792	17.67%	8,054	30.57%
2013	Tulsa	1,224	6,728	18.19%	8,037	31.52%

Exhibit 15. Hospital Primary C-Section Rates by Region

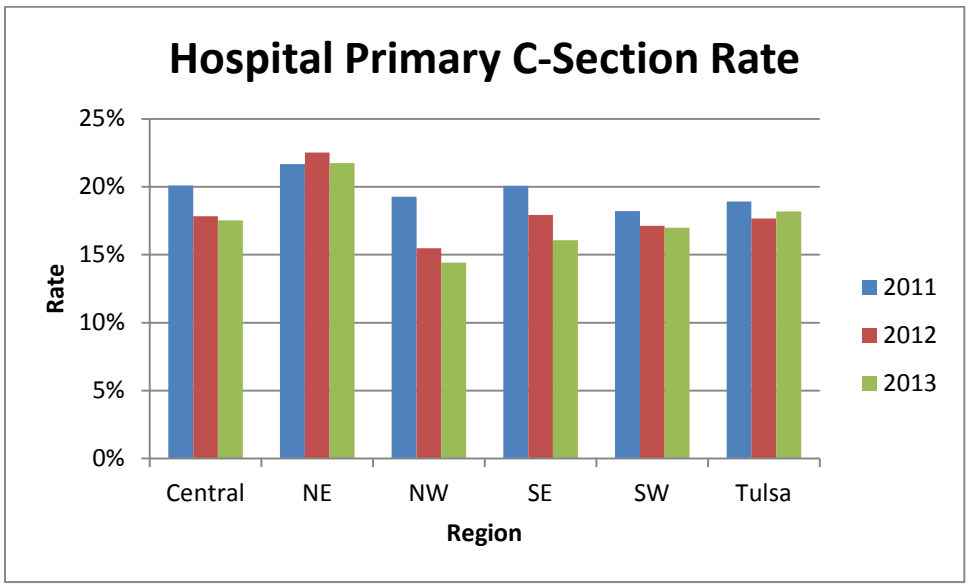
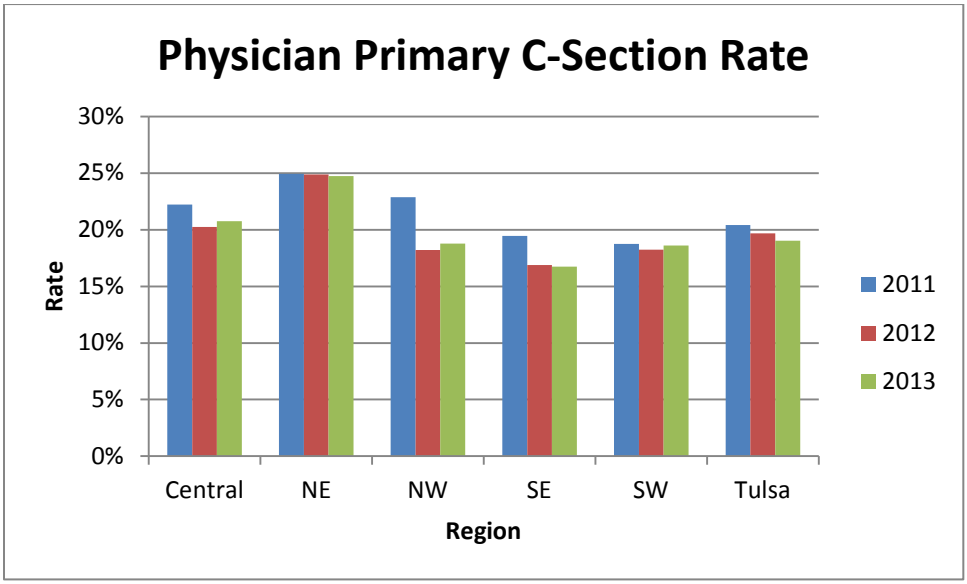


Exhibit 16. Physician C-Section Rates by Region

SFY	Region	Primary C-Sections	Primary C-Sections & Vaginal Births	Primary C-Section Rate	All Births	Overall C-Section Rates
2011	Central	2,092	9,421	22.21%	11,031	33.56%
2012	Central	1,885	9,307	20.25%	10,848	31.58%
2013	Central	2,007	9,668	20.76%**	11,327	32.37%
2011	NE	655	2,627	24.93%	3,145	37.30%
2012	NE	653	2,625	24.88%	3,187	38.12%
2013	NE	675	2,730	24.73%	3,333	38.34%
2011	NW	284	1,241	22.88%	1,448	33.91%
2012	NW	229	1,257	18.22%	1,502	31.56%
2013	NW	261	1,390	18.78%**	1,638	31.07%
2011	SE	454	2,335	19.44%	2,847	33.93%
2012	SE	395	2,339	16.89%	2,931	33.67%

SFY	Region	Primary C-Sections	Primary C-Sections & Vaginal Births	Primary C-Section Rate	All Births	Overall C-Section Rates
2013	SE	389	2,323	16.75%**	2,865	32.50%
2011	SW	466	2,486	18.75%	2,964	31.85%
2012	SW	447	2,450	18.24%	2,923	31.47%
2013	SW	471	2,534	18.59%	3,016	31.60%
2011	Tulsa	1,373	6,732	20.40%	7,877	31.97%
2012	Tulsa	1,348	6,851	19.68%	8,105	32.10%
2013	Tulsa	1,285	6,757	19.02%*	8,026	31.82%

Exhibit 17. Physician Primary C-Section Rates by Region



Medical Necessity

Claims Associated with Medical Chart Review of Medical Necessity

Lewin received a list of reviewed claims to determine medically unnecessary C-sections. As shown in Exhibit 18, the rate of medically unnecessary C-sections significantly decreased from 1.81% to 1.43%. The rate is calculated as the number of claims deemed medically unnecessary divided by the total number of claims that were reviewed. In Exhibit 19, the medically unnecessary C-section rate decreased in both aid categories, but only the decrease from 1.91% to 1.52% in non-aliens was significant. Medically unnecessary rates were reviewed by age category, but no rate changes were significant (Table F in Appendix II). In Exhibit 20, the medically unnecessary C-section rate decreased in all race categories except for Black, but only the decrease from 2.00% to 1.14% for American Indians was significant. In Exhibit 21, the medically unnecessary C-section rate decreased in all regions except for Southwest and Tulsa, but only the decrease from 2.16% to 1.28% for the Central region was significant.

Exhibit 18. Hospital Medically Unnecessary C-Section Rates

SFY	Medically Unnecessary C-Sections	Reviewed C-Sections	Medically Unnecessary Rate
2011	0	14	0.00%
2012	143	7,914	1.81%
2013	131	9,177	1.43%*

Exhibit 19. Hospital Medically Unnecessary C-Section Rates by Eligibility Category

SFY	Eligibility Category	Medically Unnecessary C-Sections	Reviewed C-Sections	Medically Unnecessary Rate
2011	Alien	-	2	0.00%
2012	Alien	7	788	0.89%
2013	Alien	6	953	0.63%
2011	Other	-	12	0.00%
2012	Other	136	7,126	1.91%
2013	Other	125	8,224	1.52%*

Exhibit 20. Hospital Medically Unnecessary C-Section Rates by Race

SFY	Race Category	Medically Unnecessary C-Sections	Reviewed C-Sections	Medically Unnecessary Rate
2011	American Indian	-	3	0.00%
2012	American Indian	24	1,202	2.00%
2013	American Indian	15	1,313	1.14%*
2011	Black	-	1	0.00%
2012	Black	11	1,035	1.06%
2013	Black	14	1,234	1.13%
2011	Other	-	1	0.00%
2012	Other	2	238	0.84%
2013	Other	1	258	0.39%
2011	White	-	9	0.00%
2012	White	106	5,439	1.95%
2013	White	101	6,372	1.59%

Exhibit 21. Hospital Medically Unnecessary C-Section Rates by Region

SFY	Region	Medically Unnecessary C-Sections	Reviewed C-Sections	Medically Unnecessary Rate
2011	Central	-	3	0.00%
2012	Central	64	2,967	2.16%
2013	Central	46	3,596	1.28%**
2011	NE	-	4	0.00%
2012	NE	31	1,013	3.06%
2013	NE	23	1,161	1.98%
2011	NW	-	-	-
2012	NW	3	425	0.71%
2013	NW	1	489	0.20%
2011	SE	-	4	0.00%
2012	SE	16	657	2.44%
2013	SE	15	674	2.23%
2011	SW	-	-	-
2012	SW	12	791	1.52%
2013	SW	24	893	2.69%
2011	Tulsa	-	3	0.00%
2012	Tulsa	17	2,061	0.82%
2013	Tulsa	22	2,364	0.93%

Reduced Payments

Lewin also determined the rate of denied payments for hospital C-sections, and the cost of the denials to the hospitals. This cost was calculated for SFY 2012 and SFY 2013, when chart reviews were conducted. Overall, these payment reductions saved the SoonerCare program over $1.2 million during this two-year time frame.

In Exhibit 22, most hospitals had some C-section claims that were reviewed for medical necessity, and 212 C-sections were deemed medically unnecessary in SFY 2012 and SFY 2013. These 212 deliveries cost hospitals $720,130 in SFY 2012, and $498,968 in SFY 2013, resulting in a savings for Medicaid of $1,219,104 for the study period. The money saved is calculated as the number of medically unnecessary births multiplied by the difference in the average costs of a primary C-section and vaginal birth for that fiscal year. Very few C-sections were reviewed in SFY 2011, and none of these were deemed medically unnecessary.

In table G in Appendix II, the average cost of delivery includes maternal claims 60 days prior to delivery and maternal and infant claims 90 days after the date of delivery. Each year, the cost of a vaginal birth is significantly less than the cost of a primary C-section. Also, the average cost of both methods of delivery is significantly decreasing over the initiative period.

Exhibit 22. Cost Savings Analysis

		2012			2013		
Region	Hospital	Medically Unnecessary C-Sections	Medically Unnecessary Rate	Money Saved*	Medically Unnecessary C-Sections	Medically Unnecessary Rate	Money Saved*
Central	Deaconess Hosp	5	2.60%	$31,310	2	0.93%	$10,288
Central	Integris Baptist Medical CTR	5	1.97%	$31,310	7	1.91%	$36,008
Central	Integris Canadian Valley Hospital	8	6.50%	$50,096	3	1.54%	$15,432
Central	Integris Health Edmond, Inc.	-	0.00%	$0	-	0.00%	$0
Central	Integris Southwest Medical	3	1.48%	$18,786	3	1.15%	$15,432
Central	Kingfisher Regional Hospital	-	-	$0		-	$0
Central	Lakeside Women's Center of OK City	-	0.00%	$0	-	0.00%	$0
Central	Medical Center Hospitals	2	0.31%	$12,524	3	0.36%	$15,432
Central	Mercy El Reno Hospital Corp	-	0.00%	$0		-	$0
Central	Mercy Health Center	11	3.30%	$68,882	6	1.66%	$30,864
Central	Midwest City Regional Hospital	-	0.00%	$0	-	0.00%	$0
Central	Norman Regional Hospital	18	4.71%	$112,716	11	2.30%	$56,584
Central	Park View Hospital	-	-	$0		-	$0
Central	Purcell Municipal Hospital	-	0.00%	$0	-	0.00%	$0
Central	St Anthony Hosp	4	2.37%	$25,048	-	0.00%	$0
Central	St. Anthony Shawnee Hospital	-	0.00%	$0	-	0.00%	$0
NE	Adair County HC Inc	-	0.00%	$0	-	0.00%	$0
NE	Cherokee Nation - WW Hastings	-	-	$0	-	-	$0
NE	Craig General Hospital	-	0.00%	$0	-	0.00%	$0
NE	Cushing Regional Hosp	1	2.33%	$6,262	-	0.00%	$0
NE	Epic Medical Center	-	-	$0	-	-	$0
NE	Integris Baptist Regional Health Ce	-	0.00%	$0	2	2.08%	$10,288
NE	Integris Blackwell Regional Hospital	-	-	$0	-	-	$0
NE	Integris Grove Hospital	1	1.45%	$6,262	-	0.00%	$0
NE	Integris Mayes County Med Center	-	0.00%	$0	-	-	$0
NE	Jane Phillips EP Hosp	-	0.00%	$0	2	1.59%	$10,288

		2012			2013		
Region	Hospital	Medically Unnecessary C-Sections	Medically Unnecessary Rate	Money Saved*	Medically Unnecessary C-Sections	Medically Unnecessary Rate	Money Saved*
NE	Muskogee Community Hospital	-	0.00%	$0	-	-	$0
NE	Muskogee Regional Medical Center	9	5.42%	$56,358	6	3.33%	$30,864
NE	Ponca City Medical Center	10	6.45%	$62,620	5	2.99%	$25,720
NE	Stillwater Medical Center	2	1.77%	$12,524	5	2.51%	$25,720
NE	Tahlequah City Hosp	1	1.19%	$6,262	-	0.00%	$0
NW	Clinton HMA LLC	-	0.00%	$0	-	0.00%	$0
NW	Harper Co Com Hosp	-	-	$0	-	-	$0
NW	Integris Bass Mem Bap	-	0.00%	$0	-	0.00%	$0
NW	Integris Clinton Regional Hospital	-	0.00%	$0	-	0.00%	$0
NW	Memorial Hospital of Texas County	2	3.03%	$12,524	-	0.00%	$0
NW	Newman Memorial Hosp	-	0.00%	$0	-	0.00%	$0
NW	St Mary's Regional Ctr	-	0.00%	$0	1	2.00%	$5,144
NW	Watonga Hospital Trust Aut	-	-	$0	-	-	$0
NW	Weatherford Hospital Authority	-	0.00%	$0	-	0.00%	$0
NW	Woodward Regional Hospital	-	0.00%	$0	-	0.00%	$0
SE	Arbuckle Mem Hosp	-	-	$0	-	-	$0
SE	Chickasaw Nation Medical Center	-	-	$0	-	-	$0
SE	Choctaw Nation - Talihina	-	-	$0	-	-	$0
SE	Eastern Oklahoma Medical Center	-	0.00%	$0	1	1.06%	$5,144
SE	McAlester Regional	7	6.25%	$43,834	4	3.13%	$20,576
SE	McCurtain Mem Hosp	-	0.00%	$0	-	0.00%	$0
SE	Medical Center of Southeastern OK	3	1.71%	$18,786	6	2.78%	$30,864
SE	Valley View Reg Hosp	2	2.00%	$12,524	3	3.37%	$15,432
SW	Comanche County Memorial Hospital	-	0.00%	$0	1	0.65%	$5,144
SW	Duncan Regional Hospital	-	0.00%	$0	-	0.00%	$0
SW	Elkview Gen Hosp	-	-	$0	-	0.00%	$0

		2012			2013		
Region	Hospital	Medically Unnecessary C-Sections	Medically Unnecessary Rate	Money Saved*	Medically Unnecessary C-Sections	Medically Unnecessary Rate	Money Saved*
SW	Grady Memorial Hospital	1	1.92%	$6,262	-	0.00%	$0
SW	Great Plains Regional Medical Center	2	2.41%	$12,524	5	4.03%	$25,720
SW	Jackson Co Mem Hosp	-	0.00%	$0	1	1.27%	$5,144
SW	Jefferson County Hospital	-	-	$0	-	-	$0
SW	Memorial Hospital & Physician Group	-	-	$0	-	-	$0
SW	Mercy Hospital Ardmore	6	3.90%	$37,572	-	-	$0
SW	Pauls Valley General Hospital	-	0.00%	$0	-	0.00%	$0
SW	Southwestern Medical Center	-	0.00%	$0	-	0.00%	$0
SW	The Physicians Hospital In Anadarko	-	-	$0	-	-	$0
Tulsa	AHS Claremore Regional Hosp, LLC	-	0.00%	$0	5	3.68%	$25,720
Tulsa	AHS Southcrest Hospital, LLC	-	0.00%	$0	2	0.77%	$10,288
Tulsa	Bailey Medical Center LLD	-	0.00%	$0	-	0.00%	$0
Tulsa	Claremore Ind Hsp	-	-	$0	-	-	$0
Tulsa	Claremore Regional Hosp	2	2.13%	$12,524	-	-	$0
Tulsa	Hillcrest Medical Center	-	0.00%	$0	2	0.36%	$10,288
Tulsa	OK State University Medical Center	1	1.33%	$6,262	1	0.78%	$5,144
Tulsa	Saint Francis Hospital	4	0.84%	$25,048	5	0.85%	$25,720
Tulsa	Saint Francis Hospital South	1	0.77%	$6,262	1	0.62%	$5,144
Tulsa	Southcrest Hospital	3	1.12%	$18,786	-	0.00%	$0
Tulsa	St John Med Ctr	1	0.93%	$6,262	1	0.66%	$5,144
Tulsa	St John Owasso	-	0.00%	$0	3	6.12%	$15,432
	Total			**$720,130**			**$498,968**

Quality

Lewin analyzed eight common measures of maternal and fetal health over the initiative period. The measures included maternal length of stay and readmissions, NICU admissions and length of stay, stillbirths, fetal demise, and pre-term births.

Length of Hospital Stay

The Newborns' Act currently requires that "plan coverage provide for at least a length of stay of 48 hours for a vaginal delivery or 96 hours for C-section."[10] In 2008, the mean length of stay at US community hospitals for a vaginal birth without complications was 2.1 days per stay with a mean cost of $2,900 per stay versus a C-section birth with a mean of 3.1 days per stay at $4,700 per stay.[8] Cost is not the only determinate related to maternal length of stay; readmission rates are also affected. Specific to C-sections, a length of stay less than 5 days can result in an increased risk of re-hospitalization.[11] After adjusting for maternal age, a Canadian study found that the risk of hospital readmission after C-section delivery significantly increased by 21%, 18%, and 10% for mothers with a length of hospital stay of <or=2, 3, and 4 days, respectively, compared with mothers with a length of hospital stay of 5 days.[12]

For hospital claims, the average maternal length of stay for vaginal deliveries significantly decreased from 2.24 days to 2.19 days, indicating that lowering the primary C-section rate did not lead to increased hospital stays for vaginal deliveries (Exhibit 23). The average maternal length of stay for primary C-sections decreased from 3.89 days to 3.84 days, but this change was not significant.

Exhibit 23. Average Length of Stay for Hospital Claims

SFY	Number of Births	Average Maternal LOS
Primary C-Sections		
2011	4,972	3.89 Days
2012	4,588	3.69 Days
2013	4,543	3.84 Days
Vaginal Deliveries		
2011	20,209	2.24 Days
2012	20,658	2.19 Days
2013	20,939	2.19 Days**

NICU Admits and Length of Stay

Neonatal Intensive Care Unit (NICU) admissions rates are an important measure of maternal and fetal quality. Although there are many uncontrollable factors that contribute to NICU admissions, early elective C-sections are related to pre-term births and low birth weight and ultimately NICU admissions.[6]

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[10] "Final Maternity Length-of-Stay Rules Published." *National Conference of State Legislatures*. Accessed from: http://www.ncsl.org/research/health/final-maternity-length-of-stay-rules-published.aspx

[11] Lydon-Rochelle, M., Holt, V., Martin, D., Easterling, T."Association between Method of Delivery and Maternal Rehospitalization." JAMA Vol.283, No. 18. *The Journal of the American Medical Association*. May 10, 2000. Accessed from: http://jama.jamanetwork.com/article.aspx?articleid=192686

[12] Liu, S., Hearnan, M., Demissie, K., Wen, S., Marcoux, S. "Length of Hospital Stay, Obstetric Conditions at Childbirth, and Maternal Readmission: a Population-Based Cohort Study." American Journal of Obstetrics & Gynecology. September 18, 2002. Accessed from: http://www.ncbi.nlm.nih.gov/pubmed/12237648

For hospital claims in table H in the Appendix II, the average infant NICU length of stay decreased from 15.62 days to 15.08 days, although this change was not significant. This population only included infants with a hospital NICU claim that matched to a mother with a hospital claim. For physician claims in table I in Appendix II, the average infant NICU length of stay decreased from 15.80 to 15.03 days, although this change was not significant.

For hospital claims in table J in Appendix II, the NICU admission rate decreased from 8.31% to 8.02%, although this was not a significant change. For physician claims in table K in Appendix II, the NICU admission rate decreased from 8.43% to 8.10%, although this change was not significant.

Fetal Demise

For hospital claims in table L in Appendix II, the fetal demise rate decreased from 0.51% to 0.48%, although this change was not significant. For physician claims in table M in Appendix II, the fetal demise rate decreased from 0.53% to 0.42%, although this change was not significant.

Pre-Term Births

Pre-term birth is birth before 37 weeks gestation and can lead to significant health problems. Although more than 1 in 10 babies are born pre-term across the United States, the highest rates are in lower income, Medicaid eligible women. Pre-term birth is a risk factor for a multitude of health problems as well as increase infant mortality. Infants born prematurely are likely to have a low quality of life with conditions like, cerebral palsy, hearing loss, respiratory problems and neurological disabilities. One factor contributing to premature births is an increase in births by elective C-section. [13]

For hospital claims in table N in Appendix II, the pre-term birth rate decreased from 8.16% to 7.90%, although this change was not significant. For physician claims in table O in Appendix II, the pre-term rate decreased from 8.38% to 7.98%, although this change was not significant.

Readmission Rates

For hospital claims in table P in Appendix II, the maternal readmission rate increased from 0.18% to 0.21%, although this increase was not significant. For hospital claims in table Q in Appendix II, the infant readmission rate increased from 2.96% to 3.12%, although this was not a significant change. For physician claims in table R in Appendix II, the infant readmission rate increased from 2.94% to 3.14%, although this change was not significant.

Stillbirth

Stillbirth is defined as the death of a baby at or after 20th week of pregnancy and occurs in 1 out of 160 pregnancies in the United States. For physician claims in Exhibit 24, the stillbirth rate significantly decreased from 0.68% to 0.53%. This indicates that lowering the primary C-section rate did not negatively impact the quality of infant health. This population included mothers

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[13] "Statewide Medical Home Program for Low-Income Pregnant Women Enhances Access to Comprehensive Prenatal Care and Case Management, Improves Outcomes." *Agency for Healthcare Research and Quality*. December 18, 2013. Accessed from: http://innovations.ahrq.gov/content.aspx?id=3778

with a physician claim. For hospital claims in table S in Appendix II, the stillbirth rate increased from 0.58% to 0.63%, although this change was not significant.

Exhibit 24. Stillbirth Rate for Physician Claims

SFY	Stillbirths	Number of Births	Stillbirth Rate
2011	199	29,324	0.68%
2012	181	29,531	0.61%
2013	159	30,276	0.53%*

Summary and Considerations

Lewin's evaluation indicates that the OHCA initiative was successful in reducing medically unnecessary C-sections among SoonerCare mothers. The implications of the initiative on quality are more difficult to assess given the small numbers and short period of study; however, Lewin's evaluation of several quality measures indicates that there is no negative impact on quality and no reduction in maternal hospital length of stay. Last, while not a primary objective, the initiative resulted in cost savings for the SoonerCare program.

Lewin identified several considerations for OHCA's future efforts. Specifically there may be merit is pursuing an initiative to reduce early inductions, improve accuracy of birth claims, review the medical necessity of all providers, not just those who do not met the 18 percent threshold, and establishing medical necessity codes for birth claims to support auto adjudication and reduce the amount of manual chart review.

Induction

Research has demonstrated that induced labor for early elective deliveries can result in pre-term babies, short term neonatal morbidity, C-section deliveries, higher NICU admits and increased costs.[14] Compared to spontaneous labor, elective inductions result in more C-Section deliveries and longer maternal length of stay. Numerous federal agencies and states are developing programs to address this trend. For example, Ohio reduced non-medically necessary inductions by 3% which resulted in $10 million in annual savings. [15]

Claims

When reviewing hospital and physician claims, Lewin noticed that some mothers had more than one delivery claim in a short period of time, indicating that the claims were not for separate deliveries. In some cases, these claims indicate different methods of delivery. OHCA may want to develop a methodology to count only one claim per birth with the correct delivery method in both the hospital and physician claims for future analysis. OHCA may also consider auditing delivery claims for program integrity purposes.

Providers under the 18 Percent Threshold

When reviewing charts for medical necessity, OHCA only reviewed hospital claims for providers that had a primary C-section rate of over 18% in SFY 2011. Reviewing all C-section claims may provide a more complete picture of the incidence of medical necessity among Medicaid C-sections.

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[14] Johnson, Elizabeth. "Elective Induction of Labor and Early Term Delivery." *Journal of Learning*. Accessed from: http://rnjournal.com/journal-of-nursing/elective-induction-of-labor-and-early-term-delivery

[15] "Reducing Early Elective Deliveries in Medicaid and CHIP." Accessed from: http://www.medicaid.gov/Medicaid-CHIP-Program-Information/By-Topics/Quality-of-Care/Downloads/EED-Brief.pdf

Auto Adjudication

Given the success of this initiative, OHCA will likely want to continue to adjust payments for medically unnecessary C-sections. OHCA might consider more automated processed for reviewing claims. This could include mandating that providers indicate a modifier for medical necessity, including codes for the condition that makes the C-section necessary on claims. For example, in New Mexico Medicaid, the provider's claim must include the ICD9 diagnosis code indicating the complication or necessity, i.e. 640.xx to 649.xx or 651.xx to 676.xx, and continue to bill the modifier VI on the CPT procedure code for the C-section in order to identify the medical necessity on the claim. By using the modifier VI with these codes, the provider is indicating the C-section was medically necessary and that the recipient's medical record supports the physician's conclusion for the medical necessity of the services. Another suggestion could be to flag claims in the system if there is an obvious code for a condition indicating medical necessity, like previous C-section or multiple gestation. Only the remaining C-section claims that aren't flagged as medically necessary would require manual chart review.

Appendices

Appendix I: Methodology

Lewin began development of the study with analysis of the claims data submitted by OHCA. The files contained records providing demographic, Medicaid eligibility category, geographic regions, maternal birth data, infant birth data, and claims that were reviewed for medical necessity for the three year initiative period, July 1, 2010 through June 30, 2013. These dates correspond with the Oklahoma state fiscal year.

Lewin received a list of reviewed claims to determine medically unnecessary C-sections. According to OHCA, if the DRG on the claim changed to 0774, then the C-section is deemed medically unnecessary and down coded to a vaginal birth with complications. If the DRG on the claim indicated a C-section, then the claim is deemed medically necessary. Only hospital claims were reviewed by Lewin. The review process started in SFY 2012, and while there were 14 claims reviewed in SFY 2011, none were deemed unnecessary.

Lewin followed logic supplied by OHCA to flag claims as primary C-section, secondary C-section, or vaginal births. For physician claims, identified by claim type of M, Lewin identified secondary C-sections as having a CPT procedure code of 59510, 59514, 59515, 59618, 59620, or 59622, an ICD-9 diagnosis code on the same claim billed as 654.2, 654.20, 654.21, or 654.23, and modifiers different from AS, 80, 81, or 82. Primary C-sections are identified on claims that have a CPT procedure code of 59510, 59514, 59515, 59618, 59620, or 59622, modifiers different from AS, 80, 81, or 82, and excluding the list of secondary C-sections. Vaginal deliveries are identified on claims that have a CPT procedure code of 59400, 59409, 59410, 59610, 59612, or 59614, modifiers different from AS, 80, 81, or 82, and excluding the list of secondary C-sections.

Indian Health Services Hospitals

For hospital claims, identified by claim type A or I, there was a separate logic for deliveries at an Indian Health Services (IHS) hospital, determined by the billing specialty code of 016. For non-IHS hospitals, Lewin identified secondary C-sections as having a DRG code of 0765 or 0766 or an ICD-9 surgical code of 74, 740, 741, 742, 744, or 7499, and an ICD-9 diagnosis code on the same claim billed as 654.2, 654.20, 654.21, or 654.23. Primary C-sections are identified on claims that have a DRG code of 0765 or 0766 or ICD-9 surgical code of 74, 740, 741, 742, 744, or 7499, and excluding the list of secondary C-sections. Vaginal deliveries are identified on claims that have a DRG code of 0767, 0768, 0774, or 0775 and excluding the list of secondary C-sections.

For IHS hospital claims, identified by claim type A or I and billing specialty code of 016, Lewin identified births as having an ICD-9 diagnosis code of V27.0, V27.1, V27.2, V27.3, V27.4, V27.5, V27.6, V27.7, or V27.9 or an ICD-9 surgical code of 74, 740, 741, 742, 744, or 7499. Secondary C-sections are identified on claims that have an ICD-9 surgical code of 74, 740, 741, 742, 744, or 7499, and an ICD-9 diagnosis code on the same claim billed as 654.2, 654.20, 654.21, or 654.23. Primary C-sections are identified on claims that have an ICD-9 surgical code of 74, 740, 741, 742, 744, or 7499 and excluding the list of secondary C-sections. Vaginal deliveries were identified as all other births.

Maternal Length of Stay

Lewin calculated length of stay as last date of service – first date of service on inpatient maternal claims.

Maternal Readmissions

Lewin identified a maternal inpatient stay as a readmission if the first date of service on the inpatient claim was within 30 days of the last date of service on the inpatient claim associated with delivery.

Infant Readmissions

Lewin identified an infant inpatient stay as a readmission if the first date of service on the inpatient claim was within 30 days of the last date of service on the inpatient claim associated with delivery.

Stillbirths

Lewin identified stillbirths during the data analysis by isolating primary and secondary ICD-9 diagnosis codes of V27.1, V27.3, V27.4, V27.6, and V27.7 on maternal claims.

Fetal Demise Status

Lewin captured fetal demise by pulling maternal claims with primary and secondary ICD-9 diagnosis codes 656.4, 656.40, 656.41, 656.42, 656.43, 768.0, and 768.1.

NICU Admissions

Lewin identified a NICU admission by capturing infant claims with a provider specialty code of 323 – Neonatologist. A NICU length of stay is calculated as the last date of service – first date of service for the NICU claim.

Pre-Term Birth Status

Lewin captured preterm births by using ICD-9 diagnosis codes 765.21-765.28 on infant claims.

Appendix II: Data Tables

A. Comparison of Hospital Claims by Hospital for SFY 2011

SFY	Region	Hospital	Lewin		OHCA	
			Primary C-Section Rate	Overall C-Section Rate	Primary C-Section Rate	Overall C-Section Rate
2011	Central	Deaconess Hospital	18.55%	35.83%	18.30%	35.70%
2011	Central	Integris Baptist Medical CT	22.40%	36.06%	22.60%	36.20%
2011	Central	Integris Canadian Valley Hospital	23.80%	37.76%	24.00%	37.80%
2011	Central	Integris Southwest Medical	22.19%	37.41%	21.80%	36.70%
2011	Central	Kingfisher Reg Hospital	22.50%	36.73%	22.50%	36.70%
2011	Central	Lakeside Women's CT	21.51%	31.78%	21.70%	32.10%
2011	Central	Medical CT Hospitals	17.53%	30.92%	16.30%	29.70%
2011	Central	Mercy El Reno Hospital Corporation	20.00%	32.39%	19.40%	31.50%
2011	Central	Mercy Health CT	30.72%	43.42%	30.00%	43.10%
2011	Central	Midwest City Regional Hospital	15.27%	27.62%	15.60%	27.80%
2011	Central	Norman Regional Hospital	21.15%	34.83%	21.20%	34.90%
2011	Central	Purcell Mun Hsp	20.00%	37.50%	26.30%	41.70%
2011	Central	St Anthony Hospital	13.92%	30.84%	16.90%	30.90%
2011	Central	Unity Health CT	13.92%	21.23%	14.10%	21.60%
2011	NE	Adair County HC Inc.	27.69%	37.33%	29.00%	38.90%
2011	NE	Blackwell Regional Hospital	13.04%	41.18%	13.60%	40.60%
2011	NE	Cherokee Nation - WW Hastings	21.70%	37.36%	21.30%	36.50%
2011	NE	Craig General Hospital	10.34%	28.77%	10.50%	25.00%
2011	NE	Cushing Regional Hospital	30.11%	45.09%	29.50%	44.30%
2011	NE	Epic Medical Center	0.00%	0.00%	0.00%	0.00%
2011	NE	Integris Baptist Regional Health	15.77%	27.76%	15.90%	27.60%
2011	NE	Integris Grove Hospital	26.92%	39.44%	26.30%	39.10%
2011	NE	Jane Phillips EP Hospital	12.18%	24.12%	12.30%	24.30%
2011	NE	Mayes County Medical CT	22.77%	38.10%	23.00%	37.90%
2011	NE	Muskogee Community Hospital	100.00%	100.00%	100.00%	100.00%
2011	NE	Muskogee Regional Medical CT	27.84%	41.79%	27.50%	41.10%
2011	NE	Ponca City Medical CT	23.83%	38.62%	24.30%	39.30%
2011	NE	Stillwater Medical CT	21.62%	33.21%	21.20%	32.70%
2011	NE	Tahlequah City Hospital	20.00%	33.60%	19.50%	33.20%
2011	NW	Harper Co Community Hospital	0.00%	16.67%	0.00%	14.30%
2011	NW	Integris Bass Memorial Baptist	19.32%	30.66%	19.50%	30.90%
2011	NW	Integris Clinton Regional Hospital	7.38%	25.66%	9.80%	28.10%
2011	NW	Memorial Hospital	21.86%	37.00%	22.50%	38.80%
2011	NW	Newman Memorial Hospital	16.87%	33.01%	17.10%	32.70%

SFY	Region	Hospital	Lewin		OHCA	
			Primary C-Section Rate	Overall C-Section Rate	Primary C-Section Rate	Overall C-Section Rate
2011	NW	St Mary's Regional CT	23.93%	40.38%	26.40%	42.10%
2011	NW	Watonga Hospital Trust Authority	0.00%	0.00%	0.00%	0.00%
2011	NW	Weatherford Hospital Authority	20.14%	33.53%	19.40%	33.70%
2011	NW	Woodward Regional Hospital	24.36%	40.40%	26.30%	41.60%
2011	SE	Arbuckle Memorial Hospital	0.00%	0.00%	0.00%	0.00%
2011	SE	Chickasaw Nation Medical CT	15.24%	29.08%	13.60%	25.50%
2011	SE	Choctaw Nation - Talihina	8.33%	16.50%	9.50%	17.60%
2011	SE	Eastern Oklahoma Medical CT	22.39%	41.24%	22.70%	41.20%
2011	SE	McAlester Regional	33.89%	47.20%	33.90%	46.80%
2011	SE	McCurtain Memorial Hospital	19.91%	32.23%	19.90%	32.00%
2011	SE	Medical CT of SE Oklahoma	16.31%	29.68%	16.10%	29.80%
2011	SE	Valley View Regional Hospital	24.18%	39.67%	23.10%	38.70%
2011	SW	Comanche Co Memo Hospital	12.68%	26.64%	12.30%	26.20%
2011	SW	Duncan Regional Hospital	17.36%	29.59%	17.70%	29.90%
2011	SW	Elkview Gen Hospital	0.00%	0.00%	0.00%	0.00%
2011	SW	Grady Memorial Hospital	16.32%	29.33%	15.50%	28.50%
2011	SW	Great Plains Regional Medical CT	31.08%	48.83%	31.50%	49.30%
2011	SW	Jackson Co Memorial Hospital	14.07%	22.60%	14.60%	23.30%
2011	SW	Memorial Hospital & Physician Group	0.00%	0.00%	0.00%	0.00%
2011	SW	Mercy Memorial Health CT	22.06%	35.76%	22.00%	36.10%
2011	SW	Paul’s Valley General Hospital	25.58%	40.74%	23.80%	39.60%
2011	SW	Southwestern Medical Center	19.01%	33.85%	19.10%	34.00%
2011	Tulsa	Bailey Medical CT LLC	10.45%	18.37%	10.50%	17.40%
2011	Tulsa	Claremore Indian Hospital	29.58%	43.82%	25.00%	38.80%
2011	Tulsa	Claremore Regional Hospital	29.94%	41.65%	30.20%	41.70%
2011	Tulsa	Hillcrest Medical CT	16.81%	30.07%	16.40%	29.80%
2011	Tulsa	OSU Medical CT	14.32%	28.28%	14.30%	28.50%
2011	Tulsa	Saint Francis Hospital	20.41%	31.95%	20.40%	32.20%
2011	Tulsa	Saint Francis Hospital South	13.80%	28.32%	13.50%	27.90%
2011	Tulsa	South crest Hospital	16.91%	31.54%	16.80%	31.60%
2011	Tulsa	St John Medical CT	37.31%	50.61%	36.50%	50.20%
2011	Tulsa	St John Owasso	21.37%	32.68%	20.80%	30.90%

B. Comparison of Hospital Claims by Hospital for SFY 2012

SFY	Region	Hospital	Lewin		OHCA	
			Primary C-Section Rate	Overall C-Section Rate	Primary C-Section Rate	Overall C-Section Rate
2012	Central	Deaconess Hospital	18.70%	33.92%	18.20%	33.70%
2012	Central	Integris Baptist Medical CT	17.66%	32.32%	15.00%	31.00%
2012	Central	Integris Canadian Valley Hospital	19.06%	33.15%	18.20%	32.70%
2012	Central	Integris Health Edmond, Inc.	20.51%	34.04%	16.20%	31.10%
2012	Central	Integris Southwest Medical	19.88%	35.96%	17.40%	34.50%
2012	Central	Kingfisher Reg Hospital	0.00%	33.33%	0.00%	33.30%
2012	Central	Lakeside Women's CT	24.79%	33.58%	24.60%	34.10%
2012	Central	Medical CT Hospitals	16.30%	28.83%	14.50%	27.60%
2012	Central	Mercy El Reno Hospital Corporation*	15.79%	23.81%	16.70%	25.00%
2012	Central	Mercy Health CT	28.34%	41.46%	23.80%	38.90%
2012	Central	Midwest City Regional Hospital	4.98%	14.80%	5.30%	15.10%
2012	Central	Norman Regional Hospital	17.35%	32.24%	16.20%	31.20%
2012	Central	Purcell Mun Hospital	16.00%	25.00%	28.60%	41.20%
2012	Central	St Anthony Hospital	15.38%	28.99%	11.70%	26.90%
2012	Central	St. Anthony Shawnee Hospital	14.98%	24.79%	14.80%	24.50%
2012	NE	Adair County HC Inc.	24.19%	35.62%	23.30%	34.30%
2012	NE	Blackwell Regional Hospital	0.00%	0.00%	0.00%	0.00%
2012	NE	Cherokee Nation - WW Hastings	23.12%	39.13%	21.60%	36.50%
2012	NE	Craig General Hospital	7.14%	31.58%	5.00%	33.30%
2012	NE	Cushing Regional Hospital	20.44%	36.99%	18.00%	35.10%
2012	NE	Integris Baptist Regional Health	18.70%	30.84%	18.50%	31.20%
2012	NE	Integris Grove Hospital	21.59%	34.32%	20.00%	32.80%
2012	NE	Jane Phillips EP Hospital	12.57%	24.88%	12.90%	25.20%
2012	NE	Mayes County Medical CT	41.18%	56.52%	41.20%	56.50%
2012	NE	Muskogee Community Hospital	100.00%	100.00%	100.00%	100.00%
2012	NE	Muskogee Regional Medical CT	29.63%	42.03%	27.50%	39.90%
2012	NE	Ponca City Medical CT	23.29%	38.02%	22.30%	37.50%
2012	NE	Stillwater Medical CT	21.76%	35.33%	19.40%	34.10%
2012	NE	Tahlequah City Hospital	26.64%	38.91%	24.20%	37.10%
2012	NW	Integris Bass Memorial Baptist	13.99%	25.90%	12.10%	24.30%
2012	NW	Integris Clinton Regional Hospital	14.46%	31.07%	14.10%	33.70%
2012	NW	Memorial Hospital	17.30%	35.98%	18.00%	35.40%
2012	NW	Newman Memorial Hospital	12.90%	21.74%	14.30%	21.70%
2012	NW	St Mary's Regional CT	18.90%	37.56%	17.60%	37.00%
2012	NW	Weatherford Hospital Authority	13.51%	33.79%	10.50%	32.40%
2012	NW	Woodward Regional Hospital	18.94%	35.93%	18.20%	35.70%
2012	SE	Chickasaw Nation Medical CT	13.96%	31.12%	12.30%	28.80%

SFY	Region	Hospital	Lewin		OHCA	
			Primary C-Section Rate	Overall C-Section Rate	Primary C-Section Rate	Overall C-Section Rate
2012	SE	Choctaw Nation - Talihina	8.81%	20.93%	8.40%	20.50%
2012	SE	Eastern Oklahoma Medical CT	25.61%	42.45%	23.20%	41.50%
2012	SE	McAlester Regional	26.56%	42.71%	24.40%	41.20%
2012	SE	Mccurtain Memorial Hospital	15.49%	29.26%	15.30%	29.30%
2012	SE	Medical Ctr of SE Oklahoma	16.99%	31.20%	16.90%	31.50%
2012	SE	Valley View Regional Hospital	18.27%	34.78%	17.80%	35.00%
2012	SW	Comanche Co Mem Hospital	13.04%	26.87%	12.20%	26.60%
2012	SW	Duncan Regional Hospital	11.88%	23.50%	10.10%	22.50%
2012	SW	Elkview Gen Hospital	0.00%	0.00%	0.00%	0.00%
2012	SW	Grady Memorial Hospital	13.15%	29.12%	12.40%	28.40%
2012	SW	Great Plains Regional Medical Ctr	20.63%	42.75%	20.70%	42.70%
2012	SW	Jackson Co Memorial Hospital	17.33%	27.30%	15.20%	25.60%
2012	SW	Memorial Hospital & Physician Group	0.00%	0.00%	0.00%	0.00%
2012	SW	Mercy Memorial Health Ctr	19.45%	32.37%	16.10%	30.10%
2012	SW	Pauls Valley General Hospital	24.53%	35.48%	14.90%	28.60%
2012	SW	Southwestern Medical Center	27.78%	42.95%	27.00%	42.20%
2012	SW	The Physicians Hospital in Anadarko	0.00%	0.00%	0.00%	0.00%
2012	Tulsa	AHS Claremore Regional Hospital	37.10%	45.07%	4.30%	18.50%
2012	Tulsa	AHS Southcrest Hospital, LLC	55.56%	70.00%	0.00%	0.00%
2012	Tulsa	Bailey Medical Ctr Llc	9.47%	23.12%	9.10%	22.70%
2012	Tulsa	Claremore Indian Hospital	22.47%	33.65%	19.80%	28.90%
2012	Tulsa	Claremore Regional Hospital	20.67%	35.33%	17.70%	32.90%
2012	Tulsa	Hillcrest Medical Ctr	16.40%	29.95%	15.50%	29.50%
2012	Tulsa	OSU Medical Ctr	10.75%	25.06%	10.70%	25.20%
2012	Tulsa	Saint Francis Hospital	19.12%	30.38%	18.20%	30.10%
2012	Tulsa	Saint Francis Hospital South	15.72%	29.84%	15.10%	29.50%
2012	Tulsa	Southcrest Hospital	15.71%	28.74%	15.00%	28.40%
2012	Tulsa	St John Medical Ctr	25.60%	38.10%	23.20%	35.90%
2012	Tulsa	St John Owasso	23.97%	36.11%	22.60%	35.50%

C. Comparison of Hospital Claims by Hospital for SFY 2013

SFY	Region	Hospital	Lewin		OHCA	
			Primary C-Section Rate	Overall C-Section Rate	Primary C-Section Rate	Overall C-Section Rate
2013	Central	Deaconess Hosp	17.91%	32.46%	17.60%	31.70%
2013	Central	Integris Baptist Medical Ctr	15.61%	31.81%	15.10%	31.30%
2013	Central	Integris Canadian Valley Hospital	20.33%	36.77%	19.90%	36.50%
2013	Central	Integris Health Edmond, Inc.	12.50%	25.66%	12.80%	26.10%
2013	Central	Integris Southwest Medical	16.27%	34.06%	16.30%	34.00%
2013	Central	Lakeside Women's Center of OK City	22.73%	34.25%	22.70%	34.30%
2013	Central	Medical Center Hospitals	17.53%	30.93%	16.10%	29.50%
2013	Central	Mercy Health Center	24.43%	39.73%	21.70%	38.40%
2013	Central	Midwest City Regional Hospital	6.55%	14.44%	6.60%	14.30%
2013	Central	Norman Regional Hospital	19.74%	32.94%	19.30%	32.70%
2013	Central	St Anthony Hsp	14.70%	28.32%	14.10%	28.00%
2013	Central	St. Anthony Shawnee Hospital	15.55%	26.49%	15.70%	26.50%
2013	NE	Adair County HC Inc	25.00%	29.69%	23.70%	28.60%
2013	NE	Cherokee Nation - WW Hastings	17.72%	31.67%	16.40%	29.60%
2013	NE	Craig General Hospital	16.39%	34.62%	16.10%	34.20%
2013	NE	Cushing Regional Hospital	20.30%	37.28%	19.50%	36.70%
2013	NE	Integris Baptist Regional Health	19.42%	35.43%	18.80%	35.20%
2013	NE	Integris Grove Hospital	20.30%	36.69%	19.20%	36.10%
2013	NE	Jane Phillips EP Hosp	19.37%	32.78%	18.80%	32.20%
2013	NE	Muskogee Regional Medical Center	29.55%	43.01%	27.80%	41.80%
2013	NE	Ponca City Medical Center	20.76%	37.90%	19.80%	37.20%
2013	NE	Stillwater Medical Center	21.29%	38.26%	20.50%	37.20%
2013	NE	Tahlequah City Hosp	24.02%	42.00%	24.10%	41.80%
2013	NW	Clinton HMA LLC	12.57%	31.70%	11.90%	31.10%
2013	NW	Integris Bass Mem Bap	12.50%	25.04%	12.60%	24.70%
2013	NW	Memorial Hospital of Texas County	17.33%	32.11%	15.70%	31.10%
2013	NW	Newman Memorial Hosp	14.29%	28.81%	14.90%	29.80%
2013	NW	St Mary's Regional Ctr	14.81%	32.75%	13.70%	31.50%
2013	NW	Weatherford Hospital Authority	19.53%	33.97%	19.70%	34.60%
2013	NW	Woodward Regional Hospital	14.81%	32.35%	13.70%	31.20%
2013	SE	Chickasaw Nation Medical Center	19.42%	31.29%	15.70%	26.60%
2013	SE	Choctaw Nation - Talihina	12.59%	25.79%	12.30%	26.00%
2013	SE	Eastern Oklahoma Medical Center	18.30%	36.42%	18.00%	35.70%
2013	SE	McAlester Regional	18.77%	39.13%	17.40%	38.90%
2013	SE	McCurtain Mem Hosp	16.34%	30.17%	16.30%	30.20%
2013	SE	Medical Center of Southeastern OK	14.00%	29.05%	13.80%	29.00%
2013	SE	Valley View Reg Hosp	16.31%	32.38%	14.70%	31.20%

SFY	Region	Hospital	Lewin		OHCA	
			Primary C-Section Rate	Overall C-Section Rate	Primary C-Section Rate	Overall C-Section Rate
2013	SW	Comanche County Memorial Hospital	10.41%	23.55%	9.50%	22.80%
2013	SW	Duncan Regional Hospital	11.84%	23.31%	11.70%	23.50%
2013	SW	Grady Memorial Hospital	16.15%	24.77%	16.40%	25.10%
2013	SW	Great Plains Regional Medical Center	33.18%	50.17%	33.80%	50.70%
2013	SW	Jackson Co Mem Hosp	14.62%	29.75%	11.30%	27.40%
2013	SW	Mercy Hospital Ardmore	19.01%	32.06%	16.20%	30.00%
2013	SW	Pauls Valley General Hospital	33.33%	39.13%	33.30%	39.10%
2013	SW	Southwestern Medical Center	21.59%	38.22%	18.80%	36.20%
2013	Tulsa	AHS Claremore Regional Hospital, LLC	23.04%	34.72%	23.40%	34.90%
2013	Tulsa	Bailey Medical Center LLC	6.92%	16.85%	6.90%	16.90%
2013	Tulsa	Claremore Ind Hosp	19.15%	32.14%	15.90%	28.00%
2013	Tulsa	Hillcrest Hospital South	N/A	N/A	14.60%	31.20%
2013	Tulsa	Hillcrest Medical Center	18.43%	31.06%	17.60%	30.70%
2013	Tulsa	Oklahoma State University Medical Ctr	21.37%	36.64%	19.60%	35.10%
2013	Tulsa	Saint Francis Hospital	18.94%	32.40%	18.00%	32.00%
2013	Tulsa	Saint Francis Hospital South	13.35%	26.05%	12.70%	25.50%
2013	Tulsa	St John Med Ctr	23.54%	34.93%	21.90%	34.00%
2013	Tulsa	St John Owasso	20.29%	34.52%	17.60%	32.50%

D. Comparison Hospital Claims by Region

SFY	Region	Lewin		OHCA	
		Primary C-Section Rate	Overall C-Section Rate	Primary C-Section Rate	Overall C-Section Rate
2011	Central	20.09%	33.61%	19.70%	33.20%
2012	Central	17.84%	31.35%	15.90%	30.10%
2013	Central	17.53%	31.65%	16.70%	30.90%
2011	NE	21.67%	35.56%	21.50%	35.20%
2012	NE	22.53%	36.60%	21.10%	35.40%
2013	NE	21.74%	37.23%	20.80%	36.30%
2011	NW	19.28%	33.49%	20.00%	34.40%
2012	NW	15.48%	31.28%	14.50%	30.60%
2013	NW	14.41%	29.56%	13.90%	29.00%
2011	SE	20.06%	34.06%	19.90%	33.70%
2012	SE	17.92%	33.24%	16.90%	32.60%
2013	SE	16.07%	31.68%	15.10%	30.70%

SFY	Region	Lewin		OHCA	
		Primary C-Section Rate	Overall C-Section Rate	Primary C-Section Rate	Overall C-Section Rate
2011	SW	18.20%	32.00%	18.20%	32.10%
2012	SW	17.13%	31.19%	15.40%	30.10%
2013	SW	16.98%	30.73%	15.50%	29.70%
2011	Tulsa	18.91%	31.98%	18.60%	31.80%
2012	Tulsa	17.67%	30.57%	16.30%	26.90%
2013	Tulsa	18.19%	31.52%	17.30%	30.90%

E. Comparison Physician Claims by Region

SFY	Region	Lewin		OHCA	
		Primary C-Section Rate	Overall C-Section Rate	Primary C-Section Rate	Overall C-Section Rate
2011	Central	22.21%	33.56%	22.20%	33.60%
2012	Central	20.25%	31.58%	20.20%	31.80%
2013	Central	20.76%	32.37%	20.70%	32.70%
2011	NE	24.93%	37.30%	25.40%	38.30%
2012	NE	24.88%	38.12%	25.00%	38.70%
2013	NE	24.73%	38.34%	25.30%	39.20%
2011	NW	22.88%	33.91%	23.00%	34.20%
2012	NW	18.22%	31.56%	19.10%	31.90%
2013	NW	18.78%	31.07%	19.30%	31.10%
2011	SE	19.44%	33.93%	19.90%	34.10%
2012	SE	16.89%	33.67%	17.50%	34.10%
2013	SE	16.75%	32.50%	17.20%	32.20%
2011	SW	18.75%	31.85%	18.70%	31.80%
2012	SW	18.24%	31.47%	18.20%	31.50%
2013	SW	18.59%	31.60%	18.50%	31.70%
2011	Tulsa	20.40%	31.97%	20.40%	32.20%
2012	Tulsa	19.68%	32.10%	19.20%	31.90%
2013	Tulsa	19.02%	31.82%	18.40%	31.20%

F. Hospital Medically Unnecessary C-Section Rates by Age

SFY	Age	Medically Unnecessary C-Sections	Reviewed C-Sections	Medically Unnecessary Rate
2011	<20	-	1	0.00%
2012	<20	27	681	3.96%
2013	<20	25	748	3.34%
2011	20-34	-	13	0.00%
2012	20-34	108	6,521	1.66%
2013	20-34	100	7,539	1.33%
2011	35-39	-	-	-
2012	35-39	7	564	1.24%
2013	35-39	5	669	0.75%
2011	40+	-	-	-
2012	40+	1	148	0.68%
2013	40+	1	221	0.45%

G. Total Cost of Delivery Analysis

SFY	Delivery Method	Births	Average Cost
2011	Primary C Section	4,350	$14,427
2012	Primary C Section	3,876	$12,689
2013	Primary C Section	4,019	$10,718
2011	Vaginal Birth	17,168	$6,521
2012	Vaginal Birth	17,199	$6,427
2013	Vaginal Birth	18,032	$5,574

H. Average NICU Length of Stay for Hospital Claims

SFY	Number of NICU Stays	Average NICU LOS
2011	2,165	15.62 Days
2012	1,820	16.21 Days
2013	2,149	15.08 Days

I. Average NICU Length of Stay for Physician Claims

SFY	Number of NICU Stays	Average NICU LOS
2011	2,138	15.80 Days
2012	1,821	16.38 Days
2013	2,135	15.03 Days

J. NICU Admittance Rate for Hospital Claims

SFY	NICU Admissions	Number of Births	NICU Rate
2011	2,165	26,056	8.31%
2012	1,820	25,427	7.16%
2013	2,149	26,793	8.02%

K. NICU Admittance Rate for Physician Claims

SFY	NICU Admissions	Number of Births	NICU Rate
2011	2,138	25,350	8.43%
2012	1,821	24,833	7.33%
2013	2,135	26,353	8.10%

L. Fetal Demise Rate for Hospital Claims

SFY	Fetal Demise	Number of Births	Fetal Demise Rate
2011	154	30,302	0.51%
2012	153	30,355	0.50%
2013	149	30,823	0.48%

M. Fetal Demise Rate for Physician Claims

SFY	Fetal Demise	Number of Births	Fetal Demise Rate
2011	154	29,324	0.53%
2012	141	29,531	0.48%
2013	126	30,276	0.42%

N. Pre-term Rate for Hospital Claims

SFY	Pre-terms	Number of Births	Pre-term Rate
2011	2,126	26,056	8.16%
2012	1,903	25,427	7.48%
2013	2,117	26,793	7.90%

O. Pre-term Rate for Physician Claims

SFY	Pre-terms	Number of Births	Pre-term Rate
2011	2,124	25,350	8.38%
2012	1,866	24,833	7.51%
2013	2,104	26,353	7.98%

P. Maternal Readmission Rate for Hospital Claims

SFY	Readmissions	Number of Births	Readmission Rate
2011	54	30,350	0.18%
2012	87	30,355	0.29%
2013	64	30,823	0.21%

Q. Infant Readmission Rate for Hospital Claims

SFY	Readmissions	Number of Births	Readmission Rate
2011	771	26,056	2.96%
2012	775	25,427	3.05%
2013	835	26,793	3.12%

R. Infant Readmission Rate for Physician Claims

SFY	Readmissions	Number of Births	Readmission Rate
2011	746	25,350	2.94%
2012	770	24,833	3.10%
2013	827	26,353	3.14%

S. Stillbirth Rate for Hospital Claims

SFY	Stillbirths	Number of Births	Stillbirth Rate
2011	175	30,302	0.58%
2012	208	30,355	0.69%
2013	193	30,823	0.63%