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Complicating Conditions Associated With Childbirth, by Delivery Method and Payer, 2011

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Introduction

Childbirth is the most prevalent reason for hospitalization in the United States.[1,2] Of the 4.1 million hospital stays in 2009 involving childbirth, 91.3 percent of vaginal and 99.9 percent of cesarean section deliveries had at least one complicating condition.[3] These conditions range in severity and may include those that are preexisting, such as mental health disorders; those that create risk factors, such as multiple gestation; and those that may lead to complications of care, such as an abnormality of fetal heart rate or rhythm.

In the United States, childbirth accounts for about 10 percent of all maternal hospital stays and $12.4 billion in hospitalization costs for live births; it represents, in the aggregate, one of the most costly conditions for inpatient hospital care.[4,5] The average cost of a vaginal birth in 2008 was $2,900 without complications and $3,800 with complications.[2] The average cost of a cesarean section was $4,700 without complications and $6,500 with complications.

A recent report from the Centers for Disease Control and Prevention analyzed and compared 2010 payment source data from U.S. birth certificates and the National Hospital Discharge Survey. Results showed that the most common payment source for deliveries was private insurance. However, in the past decade, privately insured deliveries have declined by 16 percent,

Highlights

- Among the 3.6 million hospital stays involving childbirth in 2011, cesarean section deliveries were 11 percent more likely among women who were covered by private insurance than among women covered by Medicaid. Mean length of stay and mean hospital costs were similar by payer type.
- Among women who delivered by cesarean section and were covered by Medicaid, 94.6 percent of discharges included a complicating condition.
- Overall, for discharges among women with vaginal deliveries covered by private insurance, the rate of cases with complications increased with age (75.5 per 100 for adolescents younger than 15 years versus 83.3 per 100 for women aged 40–44 years).
- For vaginal deliveries, second-degree perineal laceration rates were higher among women with private insurance than Medicaid.
- Compared with women covered by Medicaid, women with private insurance were more likely to have a cesarean section delivery when complicating conditions that may impede vaginal delivery were present.

[1] Hall MJ, DeFrances CJ, Williams SN, Golosinskiy A, Schwartzman A. National Hospital Discharge Survey: 2007 Summary. Natlonal Health Statistics Report No. 29. Hyattsville, MD: National Center for Health Statistics; October 2010.

[2] Podulka J, Stranges E, Steiner C. Hospitalizations Related to Childbirth, 2008. HCUP Statistical Brief #110. April 2011. Agency for Healthcare Research and Quality. Rockville, MD.

[3] Stranges E, Wier LM, Elixhauser A. Complicating Conditions of Vaginal Deliveries and Cesarean Sections, 2009. HCUP Statistical Brief #131. May 2012. Agency for Healthcare Research and Quality. Rockville, MD.

[4] Torio CM, Andrews RM. National Inpatient Hospital Costs: The Most Expensive Conditions by Payer, 2011. HCUP Statistical Brief #160. August 2013. Agency for Healthcare Research and Quality. Rockville, MD.

[5] Rank order of major diagnostic category by aggregate costs, 2011. HCUPnet. Agency for Healthcare Research and Quality. Rockville, MD. http://hcupnet.ahrq.gov/HCUPnet.jsp?Id=91F4FF04DC11B623&Form=SelPAT&JS=Y&Action=%3E%3ENext%3E%3E&_InPatChar=Yes&_InHospChar=Yes&_PatChar. Accessed February 5, 2014.

while Medicaid-covered deliveries have increased by 40 percent.[6] Type of insurance may influence the prevalence of interventions (e.g., induction of labor, cesarean section) associated with a complicating condition and mode of delivery.[6,7]

This Statistical Brief presents data from the Healthcare Cost and Utilization Project (HCUP) Nationwide Inpatient Sample (NIS) on the source of payment for pregnancy and childbirth hospitalizations with complicating conditions versus without complicating conditions by mode of delivery in 2011. We examine stays for vaginal and cesarean section deliveries and compare rates of complicating conditions by expected payer type (Medicaid versus private insurance). All data are reported from the maternal perspective (i.e., reflecting the experience of the mother, not the newborn) among women who had a hospital delivery in 2011.

Patient characteristics, hospital utilization, and source of payment for hospital stays are presented for hospital stays involving complicated and uncomplicated vaginal and cesarean section deliveries. Differences between women who were primiparous (giving birth for the first time) and multiparous (giving birth for the second or more times) were not analyzed because the data do not provide this level of detail. During an individual stay, multiple complicating conditions may be identified through the principal diagnosis or through secondary diagnoses that may influence the course of care. Because of limitations in the data, this Statistical Brief does not explicitly distinguish between preexisting conditions and complications of care. Furthermore, we acknowledge that there are known limitations in the accuracy of capturing perinatal conditions and complications through hospital coding.[8,9]

All differences between estimates noted in the text and tables are statistically significant at the 0.05 level or better. Clinical significance was also considered for reporting and presentation.

[6] Curtin SC, Osterman MJ, Uddin SF, Sutton SR, Reed PR. Source of Payment for the Delivery: Births in a 33-State and District of Columbia Reporting Area, 2010. National Vital Statistics Reports, Vol. 62, No. 5. Hyattsville, MD: National Center for Health Statistics; December 2013.

[7] Kozhimannil KB, Shippee TP, Adegoke O, Vemig BA. Trends in hospital-based childbirth care: the role of health insurance. Am J Manag Care. 2013 Apr;19(4):e125–32.

[8] Heisler CA, Melton LJ, 3rd, Weaver AL, Gebhart JB. Determining perioperative complications associated with vaginal hysterectomy: code classification versus chart review. J Am Coll Surg. 2009 Jul;209(1):119–22.

[9] Yasmeen S, Romano PS, Schembri ME, Keyzer JM, Gilbert WM. Accuracy of obstetric diagnoses and procedures in hospital discharge data. Am J Obstet Gynecol. 2006 Apr;194(4):992–1001.

Findings

Characteristics of childbirth hospital stays, 2011
Table 1 reports select characteristics of vaginal and cesarean section deliveries for Medicaid versus private insurance in 2011.

Table 1. Selected characteristics of childbirth hospital stays by payer and delivery method, 2011*

Characteristic	Medicaid		Private insurance	
	Vaginal	Cesarean section	Vaginal	Cesarean section
Total number of discharges	1,129,100	520,400	1,256,800	677,500
Childbirth stays, %	29.6	13.6	33.0	17.8
Delivery type by payer, %	68.5	31.5	65.0	35.0
Mean length of stay, days	2.2	3.4	2.2	3.6
Mean hospital costs, $	3,400	5,900	3,400	5,900
Aggregate costs, billion $	3.8	3.1	4.3	4.0
Mean patient age, years	25	27	29	31
Multiple gestation, n	4,900	15,000	8,100	28,800
Multiple gestation stays, %	8.1	25.0	13.6	48.0
Multiple gestation delivery type by payer, %	24.6	75.4	22.0	78.0

* Approximately 6 percent of childbirth stays were among women who were uninsured or covered by Medicare. Percentages do not total 100 because these data were not included.

Source: Agency for Healthcare Research and Quality (AHRQ), Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project (HCUP), Nationwide Inpatient Sample (NIS), 2011

- **Cesarean section deliveries were more common among women with private insurance than among those covered by Medicaid.**

  There were 3.6 million hospital stays involving childbirth among all ages of females who were covered by Medicaid or private insurance in 2011. More childbirth stays occurred among women with private insurance than among those covered by Medicaid (1.9 million versus 1.6 million stays). Cesarean section deliveries were 11 percent more likely among women with private insurance compared with women covered by Medicaid (35.0 percent versus 31.5 percent).

- **Mean length of stay and mean hospital costs were similar by payer type.**

  For both payer types, maternal stays for cesarean section deliveries were more than 1 day longer than stays for vaginal births. Mean costs were also higher for women with cesarean section deliveries, regardless of payer type. In aggregate, maternal stays for childbirth cost $15.1 billion among women who were covered by Medicaid and private insurance: $6.9 billion for Medicaid-covered stays and $8.3 billion for privately insured stays.

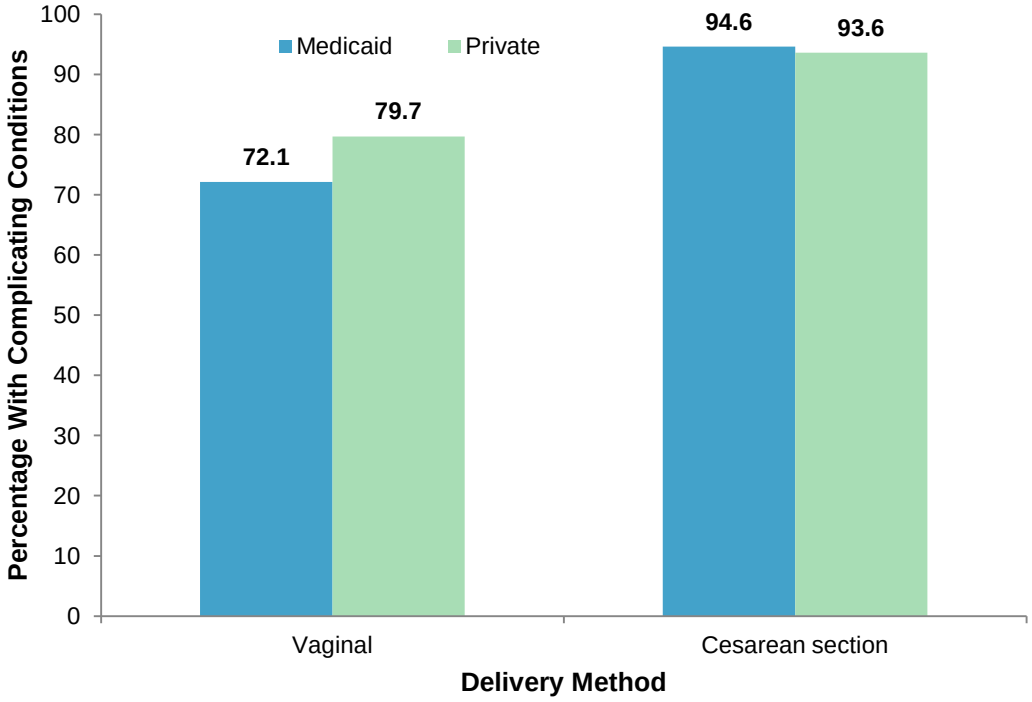
- **Pregnant women with private insurance were older and more likely to have multiple gestation than women covered by Medicaid.**

  On average, women with private insurance were 4 years older than those covered by Medicaid for both delivery types (29 years versus 25 years for vaginal births; 31 years versus 27 years for cesarean section deliveries). For both payer types, women with a cesarean section delivery were, on average, 2 years older than women with a vaginal birth. Women with private insurance were more likely to have multiple gestation than those covered by Medicaid (13.6 percent of women with private insurance versus 8.1 percent of women covered by Medicaid for vaginal births; 48.0 percent of

women with private insurance versus 25.0 percent of women covered by Medicaid for cesarean section deliveries).

Complicating conditions by payer and delivery method, 2011
Figure 1 presents the distribution of discharges with complicating conditions by payer type and delivery method.

Figure 1. Percentage of stays with presence of complicating conditions, by payer and delivery method, 2011



Source: Agency for Healthcare Research and Quality (AHRQ), Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project (HCUP), Nationwide Inpatient Sample (NIS), 2011

- **Complicating conditions were more commonly associated with cesarean section deliveries than vaginal births.**

  Among patients covered by Medicaid, women with a cesarean section delivery were 31 percent more likely to have a complicating condition than those with a vaginal delivery (94.6 percent versus 72.1 percent). Among patients with private insurance, women with a cesarean section delivery were 17 percent more likely to have a complicating condition than those with a vaginal delivery (93.6 percent versus 79.9 percent).

- **Complicating conditions differed by delivery type and payer.**

  For vaginal deliveries, women with private insurance were more likely to have complicating conditions (79.7 percent) than those covered by Medicaid (72.1 percent). There were no meaningful differences in overall complication rates by payer for cesarean section deliveries.

Rates of complicating conditions by maternal age and payer, 2011
Table 2 shows the number and rate of complications among hospital childbirth stays by maternal age, payer, and delivery method.

Table 2. Number and rate (per 100 discharges) of hospital childbirth stays with complicating conditions by maternal age, payer, and delivery method, 2011

Maternal age, years	Discharges with complications							
	Medicaid				Private insurance			
	Vaginal		Cesarean section		Vaginal		Cesarean section	
	n	Rate	n	Rate	n	Rate	n	Rate
All ages	814,600	72.1	492,200	94.6	1,001,600	79.7	634,200	93.6
<15	1,700	72.6	600	88.0	500	75.5	100	94.1
15–17	41,100	75.6	12,500	90.5	13,100	76.8	3,800	89.5
18–24	381,300	72.0	190,900	93.3	171,200	76.7	74,700	91.6
25–29	210,600	70.6	139,600	95.5	309,200	78.7	170,100	93.2
30–34	119,700	73.0	91,500	96.1	331,000	81.0	222,700	94.3
35–39	48,300	74.5	45,000	95.7	146,200	82.2	126,700	94.4
40–44	11,200	75.9	11,300	94.4	28,700	83.3	33,200	93.4
>44	500	72.3	700	97.3	1,400	81.8	2,800	91.7

Note: Principal and secondary diagnoses were examined.

Source: Agency for Healthcare Research and Quality (AHRQ), Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project (HCUP), Nationwide Inpatient Sample (NIS), 2011

- **Complicating conditions for vaginal births were more common among privately insured than Medicaid-covered deliveries, regardless of maternal age.**

  Women in every age category who had vaginal births covered by private insurance experienced higher rates of complicating conditions than women covered by Medicaid. For example, among women aged 25–29 years with private insurance, 78.7 per 100 discharges had complications versus 70.6 per 100 discharges among those covered by Medicaid.

  For women with private insurance who had vaginal deliveries, the rate of complicating conditions generally increased with age (e.g., 75.5 complications per 100 for adolescents younger than 15 years to 83.3 per 100 for women aged 40–44 years).

Common complicating conditions by delivery method and payer, 2011

Table 3 provides the rate per 1,000 deliveries for the 10 most common complicating conditions associated with childbirth stays by payer and delivery method. Conditions are sorted by frequency for patients covered by Medicaid. (Detailed tables on complicating conditions by payer and delivery type are provided in the Appendix.)

Table 3. Rates of the 10 most common complicating conditions by delivery method and payer, 2011

Medicaid			Private insurance		
Rank	**Complicating condition**	**Rate per 1,000 discharges**	**Rank**	**Complicating condition**	**Rate per 1,000 discharges**
Vaginal deliveries					
1	First-degree perineal laceration	232	2	First-degree perineal laceration	241
2	Second-degree perineal laceration	178	1	Second-degree perineal laceration	314
3	Anemia	127	5	Anemia	73
4	Post-term pregnancy	127	3	Post-term pregnancy	130
5	Abnormality in fetal heart rate or rhythm	122	4	Abnormality in fetal heart rate or rhythm	120
6	Preeclampsia	58	6	Preeclampsia	57
7	Mental disorders	51	10	Mental disorders	31
8	Premature rupture of membranes	39	7	Premature rupture of membranes	43
9	Precipitate labor	33			
10	Other immediate postpartum hemorrhage	27			
			8	Thyroid dysfunction	34
			9	Third-degree perineal laceration	32
Cesarean section deliveries					
1	Previous cesarean section	488	1	Previous cesarean section	434
2	Abnormality in fetal heart rate or rhythm	202	2	Abnormality in fetal heart rate or rhythm	180
3	Anemia	186	3	Anemia	128
4	Preeclampsia	100	4	Preeclampsia	105
5	Post-term pregnancy	93	7	Post-term pregnancy	91
6	Other malposition and malpresentation	89	5	Other malposition and malpresentation	104
7	Breech	76	6	Breech	94
8	Mental disorders	59			
9	Fetopelvic disproportion	45	9	Fetopelvic disproportion	48
10	Excessive fetal growth	41	8	Excessive fetal growth	58
			10	Thyroid dysfunction	48

Note: Principal and secondary diagnoses were examined.

Source: Agency for Healthcare Research and Quality (AHRQ), Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project (HCUP), Nationwide Inpatient Sample (NIS), 2011

- **Mental disorders were more common for childbirth stays covered by Medicaid than private insurance.**

  Mental disorders were among the top 10 most common complicating conditions for women covered by Medicaid (51 per 1,000 for vaginal births and 59 per 1,000 for cesarean section deliveries). In contrast, the rates of mental disorders among women with private insurance were 31 and 38 per 1,000 for vaginal and cesarean section deliveries, respectively (shown in Appendix).

- **Anemia was more common for childbirth stays covered by Medicaid than private insurance.**

  Rates of anemia were higher for women who were covered by Medicaid than for those with private insurance. Among vaginal delivery stays, anemia occurred in 127 per 1,000 Medicaid-covered discharges versus 73 per 1,000 privately insured discharges. Similarly, among stays for cesarean section deliveries, anemia occurred in 186 per 1,000 discharges covered by Medicaid versus 128 per 1,000 discharges covered by private insurance.

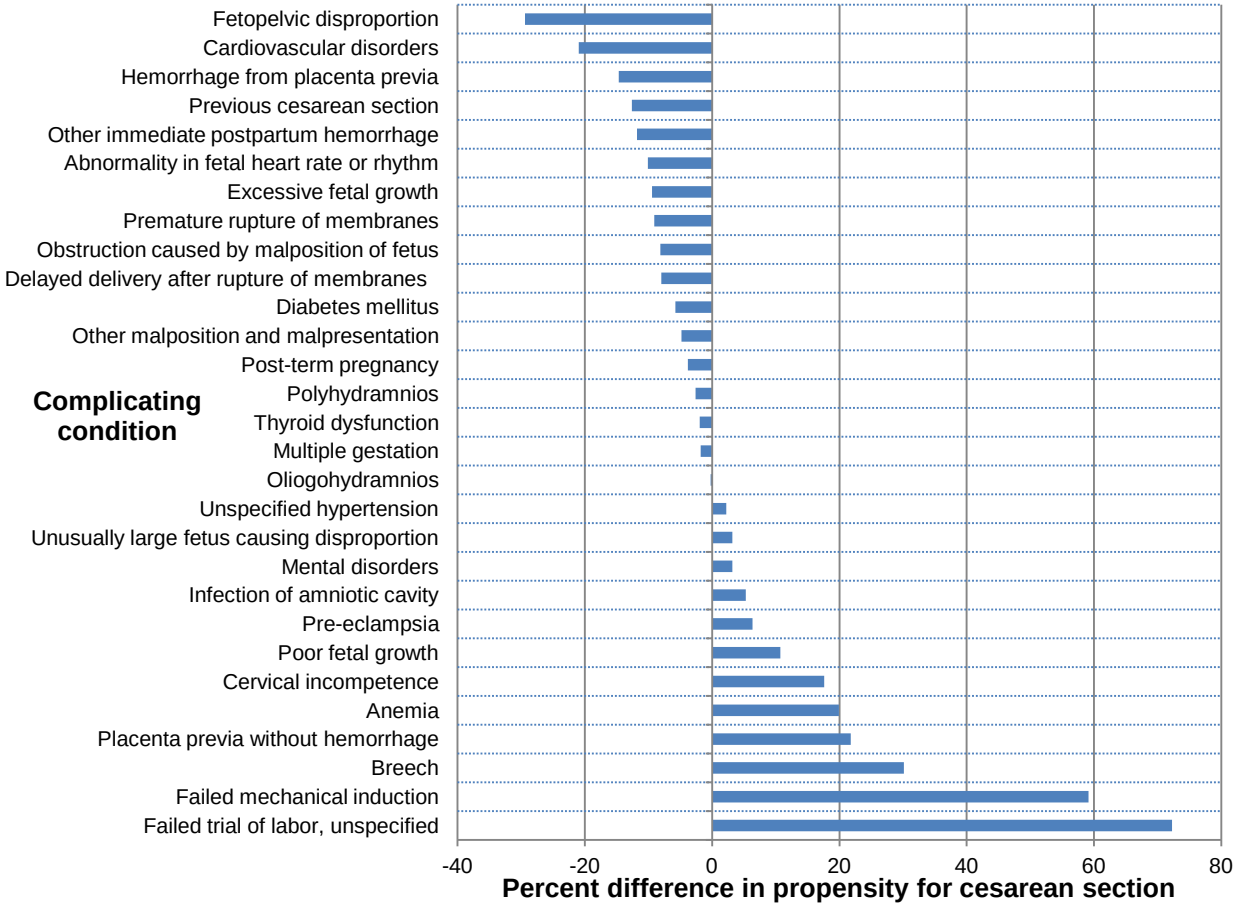
- **For vaginal deliveries, second-degree perineal laceration rates were higher among women with private insurance than among women covered by Medicaid.**

  Second-degree perineal laceration occurred at a rate of 314 per 1,000 privately insured discharges versus 178 per 1,000 Medicaid-covered discharges. Moreover, first- and second-degree perineal lacerations were the most common complicating conditions for vaginal deliveries among both payer types.

We also examined differences in prevalence rates among less common complicating conditions (see Appendix). Overall, there were very few differences in the rate of these conditions between Medicaid and private insurance for vaginal or cesarean section deliveries. There were two exceptions: thyroid dysfunction and delayed delivery after artificial rupture of membranes were each three times more common among private-payer discharges than among Medicaid-covered discharges for both types of deliveries.

Propensity for cesarean section delivery comparing payer, by complicating condition, 2011
Figure 2 presents the percent difference in the propensity for having a cesarean section delivery for privately insured versus Medicaid-covered stays by complicating condition.

Figure 2. Propensity for cesarean section delivery, comparing privately insured versus Medicaid-covered deliveries by complicating condition



Note: Principal and secondary diagnoses were examined. Conditions with a rate of at least 5 per 1000 for cesarean section delivery are shown.

Source: Agency for Healthcare Research and Quality (AHRQ), Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project (HCUP), Nationwide Inpatient Sample (NIS), 2011

- **Privately insured women were more likely to have a cesarean section delivery than women covered by Medicaid when complicating conditions that may impede vaginal delivery were recorded. Compared with women covered by Medicaid, women with private insurance were:**

  - 72 percent more likely to have a cesarean section delivery if they experienced a failed trial of labor
  - 59 percent more likely to have a cesarean section delivery if they experienced a failed mechanical induction
  - 30 percent more likely to receive a cesarean section delivery when breech presentation was noted on the record

- **Privately insured women were *more likely* to have a cesarean section delivery than women covered by Medicaid when the following conditions were recorded:**

  - Placenta previa without hemorrhage (women who were privately insured were 22 percent more likely to receive a cesarean section than women who were covered by Medicaid)
  - Anemia (20 percent more likely)

- Cervical incompetence (18 percent more likely)
- Poor fetal growth (11 percent more likely)

- **Women with private insurance were *less likely* to receive a cesarean section delivery than women covered by Medicaid when the following conditions were recorded:**

    - Fetopelvic disproportion (privately insured women were 29 percent less likely to receive a cesarean section)
    - Cardiovascular disease (21 percent less likely)
    - Hemorrhage from placenta previa (15 percent less likely)
    - Previous cesarean section (13 percent less likely)
    - Other postpartum hemorrhage (12 percent less likely)
    - Abnormality in fetal heart rate or rhythm (10 percent less likely)

Appendix. Rates of specific complicating conditions of childbirth by delivery method and payer, 2011

Complicating condition	Rate per 1,000 discharges			
	Medicaid		Private insurance	
	Vaginal	Cesarean section	Vaginal	Cesarean section
Complications mainly related to pregnancy				
Antepartum hemorrhage, abruptio placentae, and placenta previa				
Placenta previa without hemorrhage	0.9	5.8	1.1	8.4
Hemorrhage from placenta previa	0.3	6.3	0.4	7.1
Other antepartum hemorrhage	0.3	0.7	0.3	0.7
Unspecified antepartum hemorrhage	2.0	3.0	1.7	2.7
Hypertension complicating pregnancy, childbirth, and the puerperium				
Other preexisting hypertension complicating pregnancy childbirth and the puerperium	0.3	0.8	0.3	0.8
Preeclampsia	58.3	99.7	57.4	104.5
Eclampsia	0.4	1.6	0.3	1.1
Unspecified hypertension complicating pregnancy childbirth or the puerperium	4.8	8.1	4.8	8.3
Late pregnancy				
Post-term pregnancy	126.5	92.7	129.8	91.4
Prolonged pregnancy	1.1	1.2	0.8	1.0
Other current conditions in the mother				
Diabetes mellitus	5.3	20.3	4.6	16.7
Thyroid dysfunction	12.5	17.7	34.4	47.6
Anemia	127.4	186.1	73.3	128.3
Mental disorders	50.9	59.2	31.3	37.5
Cardiovascular disorders	4.0	8.1	5.3	8.5

Complicating condition	Rate per 1,000 discharges			
	Medicaid		Private insurance	
	Vaginal	Cesarean section	Vaginal	Cesarean section
Normal delivery and other indications for care in pregnancy, labor, and delivery				
Multiple gestation				
Multiple gestation	4.3	28.8	6.5	42.5
Malposition and malpresentation of fetus				
Breech	3.6	75.8	3.4	94.0
Other malposition and malpresentation	14.3	88.5	17.7	104.1
Disproportion				
Fetopelvic disproportion	0.2	44.6	0.2	48.2
Unusually large fetus causing disproportion	0.2	4.7	0.2	5.1
Abnormality of organs and soft tissues of pelvis				
Previous cesarean section	23.8	488.2	24.2	434.3
Cervical incompetence	3.5	5.4	3.7	6.7
Other known or suspected fetal and placental				
Fetal distress	0.9	2.3	1.0	2.2
Intrauterine death	5.2	3.0	4.2	2.0
Poor fetal growth	21.6	35.0	17.4	31.1
Excessive fetal growth	10.8	40.6	17.0	57.7
Polyhydramnios				
Polyhydramnios	4.9	14.2	5.9	16.5
Other problems associated with amniotic cavity				
Oliogohydramnios	25.4	40.3	22.8	36.0
Premature rupture of membranes	39.1	39.7	43.2	39.9
Delayed delivery after spontaneous or unspecified rupture of membranes	11.0	14.2	11.3	13.5
Delayed delivery after artificial rupture of membranes	0.3	0.3	0.7	0.9
Infection of amniotic cavity	17.0	29.1	14.3	25.8
Other indications for care or intervention related				
Failed mechanical induction	0.3	36.1	0.2	37.1
Abnormality in fetal heart rate or rhythm	121.6	202.4	120.4	180.2

Complicating condition	Rate per 1,000 discharges			
	Medicaid		Private insurance	
	Vaginal	Cesarean section	Vaginal	Cesarean section
Complications occurring mainly during the course of labor and delivery				
Obstructed labor				
Obstruction caused by malposition of fetus	0.6	19.4	0.7	20.2
Shoulder dystocia	21.3	0.6	20.9	0.7
Failed trial of labor, unspecified	0.1	6.8	0.0	5.7
Other causes of obstructed labor	0.1	0.2	0.0	0.2
Unspecified obstructed labor	0.3	0.4	0.4	0.5
Abnormality of forces of labor				
Precipitate labor	33.4	0.3	27.7	0.3
Long labor				
Prolonged first stage	1.1	0.7	1.4	1.1
Prolonged second stage	4.0	2.1	7.3	3.7
Prolonged labor, unspecified	1.9	1.7	1.8	1.6
Trauma to perineum and vulva during delivery				
First-degree perineal laceration	232.2	0.6	240.6	0.8
Second-degree perineal laceration	177.9	0.3	313.5	0.7
Third-degree perineal laceration	16.1	0.1	31.5	0.1
Fourth-degree perineal laceration	4.8	0.0	6.8	0.0
Postpartum hemorrhage				
Third-stage hemorrhage	3.0	1.5	3.2	1.5
Other immediate postpartum hemorrhage	26.7	21.6	22.9	16.3
Delayed and secondary postpartum	3.2	0.7	3.3	0.5
Complications of the puerperium				
Obstetrical pulmonary embolism				
Obstetrical air embolism	0.0	0.0	0.0	0.0
Amniotic fluid embolism	0.0	0.1	0.0	0.1
Obstetrical blood-clot embolism	0.1	0.3	0.1	0.2
Other pulmonary embolism	0.0	.	.	0.0

Data Source

The estimates in this Statistical Brief are based upon data from the HCUP 2011 Nationwide Inpatient Sample (NIS).

Definitions

Diagnoses, ICD-9-CM, Clinical Classifications Software (CCS), and Diagnosis-Related Groups (DRGs)
The *principal diagnosis* is that condition established after study to be chiefly responsible for the patient's admission to the hospital. *Secondary diagnoses* are concomitant conditions that coexist at the time of admission or develop during the stay.

ICD-9-CM is the International Classification of Diseases, Ninth Revision, Clinical Modification, which assigns numeric codes to diagnoses. There are approximately 14,000 ICD-9-CM diagnosis codes.

CCS categorizes ICD-9-CM diagnoses into a manageable number of clinically meaningful categories.[10] This "clinical grouper" makes it easier to quickly understand patterns of diagnoses. CCS categories identified as "Other" typically are not reported; these categories include miscellaneous, otherwise unclassifiable diagnoses that may be difficult to interpret as a group.

DRGs comprise a patient classification system that categorizes patients into groups that are clinically coherent and homogeneous with respect to resource use. DRGs group patients according to diagnosis, type of treatment (procedures), age, and other relevant criteria. Each hospital stay has one assigned DRG.

For the purpose of this Brief, "complicating conditions" includes *selected* ICD-9-CM diagnosis codes that are in the ICD-9-CM code section titled "Complications of Pregnancy, Childbirth, and the Puerperium."[11] The specific ICD-9-CM diagnosis codes used to identify each type of complicating condition are provided in Table 4.

[10] HCUP Clinical Classifications Software (CCS). Healthcare Cost and Utilization Project (HCUP). U.S. Agency for Healthcare Research and Quality, Rockville, MD. Updated April 2014.
http://www.hcup-us.ahrq.gov/toolssoftware/ccs/ccs.jsp. Accessed April 18, 2014.
[11] Complications Mainly Related To Pregnancy (640–649); Normal Delivery and Other Indications for Care in Pregnancy, Labor, and Delivery (650–659); Complications Occurring Mainly in the Course of Labor and Delivery (660–669); and Complications of the Puerperium (670–677). See http://www.icd9data.com/2013/Volume1/630-679/default.htm. Accessed April 28, 2014.

Table 4. ICD-9-CM codes used to define complicating conditions[12]

Complicating condition	ICD-9-CM diagnosis codes
Complications mainly related to pregnancy (640–649)	Antepartum hemorrhage, abruptio placentae, and placenta previa (641) 641.0 placenta previa without hemorrhage 641.1 hemorrhage from placenta previa 641.8 other antepartum hemorrhage 641.9 unspecified antepartum hemorrhage Hypertension complicating pregnancy, childbirth, and the puerperium 642.2 other pre-existing hypertension complicating pregnancy, childbirth, and the puerperium 642.3, 642.4, and 642.5 preeclampsia 642.6 eclampsia 642.9 unspecified hypertension complicating pregnancy, childbirth, or puerperium Late pregnancy 645.1 post-term pregnancy 645.2 prolonged pregnancy Other current conditions in the mother classifiable elsewhere, but complicating pregnancy, childbirth, or the puerperium 648.0 diabetes mellitus 648.1 thyroid dysfunction 648.2 anemia 648.4 mental disorders 648.5 and 648.6 cardiovascular disorders
Normal delivery and other indications for care in pregnancy, labor, and delivery (650–659)	Multiple gestation 651.0, 651.1, and 651.2 multiple gestation Malposition and malpresentation of fetus 652.1 and 652.2 breech 652.0, 652.3, 652.4, 652.5, 652.6, 652.7, 652.8, and 652.9 other malposition and malpresentation Disproportion 653.4 fetopelvic disproportion 653.5 unusually large fetus causing disproportion Abnormality of organs and soft tissues of pelvis 654.2 previous cesarean delivery 654.5 cervical incompetence Other known or suspected fetal and placental problems affecting management of mother 656.3 fetal distress 656.4 intrauterine death 656.5 poor fetal growth 656.6 excessive fetal growth Polyhydramnios 657 polyhydramnios Other problems associated with amniotic cavity and membranes 658.0 oligohydramnios 658.1 premature rupture of membranes 658.2 delayed delivery after spontaneous or unspecified rupture of membranes 658.3 delayed delivery after artificial rupture of membranes 658.4 infection of amniotic cavity

[12] The American College of Obstetricians and Gynecologists. Clinical Management Guidelines for Obstetricians and Gynecologists. Practice Bulletin; April 2014. http://www.acog.org/~/media/List%20of%20Titles/PBListOfTitles.pdf?dmc=1&ts=20140320T1329103747. Accessed April 1, 2014.

Complicating condition	ICD-9-CM diagnosis codes
Normal delivery and other indications for care in pregnancy, labor, and delivery (650–659)	Other Indications for Care or Intervention Related to Labor and Delivery 659.0 and 659.1 failed mechanical induction 659.7 abnormality in fetal heart rate or rhythm
Complications occurring mainly in the course of labor and delivery (660–669)	Obstructed labor 660.0 obstruction caused by malposition of fetus at onset of labor 660.4 shoulder dystocia 660.6 failed trial of labor, unspecified 660.8 other causes of obstructed labor 660.9 unspecified obstructed labor Abnormality of forces of labor 661.3 precipitate labor Long labor 662.0 prolonged first stage 662.1 prolonged labor, unspecified 662.2 prolonged second stage Trauma to perineum and vulva during delivery 664.0 first-degree perineal laceration 664.1 second-degree perineal laceration 664.2 third-degree perineal laceration 664.3 fourth-degree perineal laceration Postpartum hemorrhage 666.0 third-stage hemorrhage 666.1 other immediate postpartum hemorrhage 666.2 delayed and secondary postpartum hemorrhage
Complications of the puerperium (670–677)	Obstetrical pulmonary embolism 673.0 obstetrical air embolism 673.1 amniotic fluid embolism 673.2 obstetrical blood-clot embolism 673.8 other pulmonary embolism

Case definition
Analyses presented in this Statistical Brief were limited to childbirth-related hospital discharges that resulted in a delivery. Mode of delivery was defined by DRG as follows:

- Vaginal birth: 767–768 and 774–775
- Cesarean section delivery: 765–766

Types of hospitals included in HCUP
HCUP is based on data from community hospitals, which are defined as short-term, non-Federal, general, and other hospitals, excluding hospital units of other institutions (e.g., prisons). HCUP data include obstetrics and gynecology, otolaryngology, orthopedic, cancer, pediatric, public, and academic medical hospitals. Excluded are long-term care, rehabilitation, psychiatric, and alcoholism and chemical dependency hospitals. However, if a patient received long-term care, rehabilitation, or treatment for psychiatric or chemical dependency conditions in a community hospital, the discharge record for that stay will be included in the Nationwide Inpatient Sample (NIS).

Unit of analysis
The unit of analysis is the hospital discharge (i.e., the hospital stay), not a person or patient. This means that a person who is admitted to the hospital multiple times in one year will be counted each time as a separate "discharge" from the hospital.

Costs and charges
Total hospital charges were converted to costs using HCUP Cost-to-Charge Ratios based on hospital accounting reports from the Centers for Medicare & Medicaid Services (CMS).[13] *Costs* will reflect the actual expenses incurred in the production of hospital services, such as wages, supplies, and utility costs; *charges* represent the amount a hospital billed for the case. For each hospital, a hospital-wide cost-to-charge ratio is used. Hospital charges reflect the amount the hospital billed for the entire hospital stay and do not include professional (physician) fees. For the purposes of this Statistical Brief, costs are reported to the nearest hundred.

Payer
Payer is the expected primary payer for the hospital stay. To make coding uniform across all HCUP data sources, payer combines detailed categories into general groups:

- Medicare: includes patients covered by fee-for-service and managed care Medicare
- Medicaid: includes patients covered by fee-for-service and managed care Medicaid
- Private Insurance: includes Blue Cross, commercial carriers, and private health maintenance organizations (HMOs) and preferred provider organizations (PPOs)
- Uninsured: includes an insurance status of "self-pay" and "no charge"
- Other: includes Worker's Compensation, TRICARE/CHAMPUS, CHAMPVA, Title V, and other government programs.

Hospital stays billed to the State Children's Health Insurance Program (SCHIP) may be classified as Medicaid, Private Insurance, or Other, depending on the structure of the State program. Because most State data do not identify SCHIP patients specifically, it is not possible to present this information separately.

For this Statistical brief, approximately six percent of childbirth stays were from women who were uninsured or insured through Medicare or some other payer. These data were not included in the main sample (see additional information in Table 1).

When more than one payer is listed for a hospital discharge, the first-listed payer is used.

[13] HCUP Cost-to-Charge Ratio Files (CCR). Healthcare Cost and Utilization Project (HCUP). 2001–2009. U.S. Agency for Healthcare Research and Quality, Rockville, MD. Updated August 2013. http://www.hcup-us.ahrq.gov/db/state/costtocharge.jsp. Accessed January 29, 2013.

About HCUP

The Healthcare Cost and Utilization Project (HCUP, pronounced "H-Cup") is a family of health care databases and related software tools and products developed through a Federal-State-Industry partnership and sponsored by the Agency for Healthcare Research and Quality (AHRQ). HCUP databases bring together the data collection efforts of State data organizations, hospital associations, private data organizations, and the Federal government to create a national information resource of encounter-level health care data (HCUP Partners). HCUP includes the largest collection of longitudinal hospital care data in the United States, with all-payer, encounter-level information beginning in 1988. These databases enable research on a broad range of health policy issues, including cost and quality of health services, medical practice patterns, access to health care programs, and outcomes of treatments at the national, State, and local market levels.

HCUP would not be possible without the contributions of the following data collection Partners from across the United States:

Alaska State Hospital and Nursing Home Association
Arizona Department of Health Services
Arkansas Department of Health
California Office of Statewide Health Planning and Development
Colorado Hospital Association
Connecticut Hospital Association
Florida Agency for Health Care Administration
Georgia Hospital Association
Hawaii Health Information Corporation
Illinois Department of Public Health
Indiana Hospital Association
Iowa Hospital Association
Kansas Hospital Association
Kentucky Cabinet for Health and Family Services
Louisiana Department of Health and Hospitals
Maine Health Data Organization
Maryland Health Services Cost Review Commission
Massachusetts Center for Health Information and Analysis
Michigan Health & Hospital Association
Minnesota Hospital Association
Mississippi Department of Health
Missouri Hospital Industry Data Institute
Montana MHA - An Association of Montana Health Care Providers
Nebraska Hospital Association
Nevada Department of Health and Human Services
New Hampshire Department of Health & Human Services
New Jersey Department of Health
New Mexico Department of Health
New York State Department of Health
North Carolina Department of Health and Human Services
North Dakota (data provided by the Minnesota Hospital Association)
Ohio Hospital Association
Oklahoma State Department of Health
Oregon Association of Hospitals and Health Systems
Oregon Health Policy and Research
Pennsylvania Health Care Cost Containment Council
Rhode Island Department of Health
South Carolina Budget & Control Board
South Dakota Association of Healthcare Organizations
Tennessee Hospital Association
Texas Department of State Health Services

Utah Department of Health
Vermont Association of Hospitals and Health Systems
Virginia Health Information
Washington State Department of Health
West Virginia Health Care Authority
Wisconsin Department of Health Services
Wyoming Hospital Association

About Statistical Briefs

HCUP Statistical Briefs are descriptive summary reports presenting statistics on hospital inpatient and emergency department use and costs, quality of care, access to care, medical conditions, procedures, patient populations, and other topics. The reports use HCUP administrative health care data.

About the NIS

The HCUP Nationwide Inpatient Sample (NIS) is a nationwide database of hospital inpatient stays. The NIS is nationally representative of all community hospitals (i.e., short-term, non-Federal, nonrehabilitation hospitals). The NIS is a sample of hospitals and includes all patients from each hospital, regardless of payer. It is drawn from a sampling frame that contains hospitals comprising more than 95 percent of all discharges in the United States. The vast size of the NIS allows the study of topics at the national and regional levels for specific subgroups of patients. In addition, NIS data are standardized across years to facilitate ease of use.

For More Information

For more information about HCUP, visit http://www.hcup-us.ahrq.gov/.

For additional HCUP statistics, visit HCUPnet, our interactive query system, at http://hcupnet.ahrq.gov/.

For information on other hospitalizations in the United States, refer to the following HCUP Statistical Briefs located at http://www.hcup-us.ahrq.gov/reports/statbriefs/statbriefs.jsp:

- Statistical Brief #166, Overview of Hospital Stays in the United States, 2011
- Statistical Brief #168, Costs for Hospital Stays in the United States, 2011
- Statistical Brief #162, Most Frequent Conditions in U.S. Hospitals, 2011
- Statistical Brief #165, Most Frequent Procedures Performed in U.S. Hospitals, 2011

For a detailed description of HCUP, more information on the design of the Nationwide Inpatient Sample (NIS), and methods to calculate estimates, please refer to the following publications:

Introduction to the HCUP Nationwide Inpatient Sample, 2009. Online. May 2011. U.S. Agency for Healthcare Research and Quality. http://hcup-us.ahrq.gov/db/nation/nis/NIS_2009_INTRODUCTION.pdf. Accessed April 18, 2014.

Houchens R, Elixhauser A. Final Report on Calculating Nationwide Inpatient Sample (NIS) Variances, 2001. HCUP Methods Series Report #2003-2. Online. June 2005 (revised June 6, 2005). U.S. Agency for Healthcare Research and Quality. http://www.hcup-us.ahrq.gov/reports/CalculatingNISVariances200106092005.pdf. Accessed April 18, 2014.

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AHRQ welcomes questions and comments from readers of this publication who are interested in obtaining more information about access, cost, use, financing, and quality of health care in the United States. We also invite you to tell us how you are using this Statistical Brief and other HCUP data and tools, and to share suggestions on how HCUP products might be enhanced to further meet your needs. Please e-mail us at hcup@ahrq.gov or send a letter to the address below:

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