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Obstetric Delivery Inpatient Stays Involving Substance Use Disorders and Related Clinical Outcomes, 2016

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Highlights

- In 2016, 91,800 obstetrical delivery inpatient stays had a substance use disorder (SUD) diagnosis (24.3 per 1,000 deliveries).
- SUD-related deliveries involving opioids (7.6 per 1,000 deliveries) were more common than those involving cocaine (1.5) and other stimulants (2.8).
- Compared with opioid-related deliveries, deliveries with a diagnosis of cocaine use or other stimulants use had higher rates of: preterm delivery (349.3 and 295.9 vs. 229.1 per 1,000 delivery stays), severe pre-eclampsia/eclampsia (58.7 and 80.1 vs. 38.4), placental abruption (69.3 and 60.2 vs. 36.8), and obstetric hemorrhage/ placenta accreta (52.4 and 53.6 vs. 42.4). These rates all were higher than those for deliveries with no SUD diagnosis.
- The rate of SUD-related deliveries was higher for patients from rural than from urban areas (35.7 vs. 22.5 per 1,000 stays).
- Among SUD-related deliveries, some adverse clinical outcomes were more common for patients residing in urban areas. For instance, among SUD-related deliveries, severe pre-eclampsia/eclampsia was more common for urban compared with rural residents (44.3 vs. 31.8 per 1,000 delivery stays).
- In contrast, rates of placental abruption were higher for rural compared with urban residents, and the difference was greatest among opioid-related delivery stays (41.6 vs. 35.7).

Introduction

In 2016 in the United States, approximately 20.1 million people aged 12 years or older had a substance use disorder (SUD) in the past year.[1] Higher rates of SUDs are reported by individuals between the ages of 18 and 25 years.[2] Thus, many women with an SUD are of reproductive age. In 2016, 6 percent of pregnant women reported illicit drug use and 8 percent reported alcohol use.[3]

Substance use during pregnancy is associated with specific risks for mothers and their infants. Other than cannabis, opioids and cocaine are the most common types of substance use diagnosed at delivery.[4] Opioid use during pregnancy may lead to neonatal abstinence syndrome (NAS), which is a constellation of signs and symptoms most commonly caused by abrupt cessation of prescription or illegal opioids at birth following repeated prenatal exposure.[5] Infants with NAS often have fussiness, breathing problems, difficulty feeding, and poor weight gain.[6] Babies born to mothers who use opioids or stimulants during pregnancy are often born prematurely and with low birth weights.[7,8] The long-term

[1] Ahrnsbrak R, Bose J, Hedden SL, Lipari RN, Park-Lee E. Key Substance Use and Mental Health Indicators in the United States: Results From the 2016 National Survey on Drug Use and Health. HHS Publication No. SMA 17-5044, NSDUH Series H-52. 2017. Center for Behavioral Health Statistics and Quality, Substance Abuse and Mental Health Services Administration. www.samhsa.gov/data/sites/default/files/NSDUH-FFR1-2016/NSDUH-FFR1-2016.htm. Accessed August 6, 2019.
[2] Merikangas KR, McClair VL. Epidemiology of substance use disorders. Human Genetics. 2012;131(6):779–89.
[3] McCance-Katz EF. The National Survey on Drug Use and Health: 2017. Substance Abuse and Mental Health Services Administration. www.samhsa.gov/data/sites/default/files/nsduh-ppt-09-2018.pdf. Accessed August 6, 2019.
[4] Fingar KR, Stocks C, Weiss AJ, Owens PL. Neonatal and Maternal Hospital Stays Related to Substance Use, 2006-2012. HCUP Statistical Brief #193. July 2015. Agency for Healthcare Research and Quality, Rockville, MD. www.hcup-us.ahrq.gov/reports/statbriefs/sb193-Neonatal-Maternal-Hospitalizations-Substance-Use.pdf. Accessed August 6, 2019.
[5] Hudak ML, Tan RC. The Committee on Drugs and the Committee on Fetus and Newborn. Neonatal drug withdrawal. Pediatrics. 2012;129:e540.
[6] Ibid.
[7] Ibid.
[8] Fingar KR et al., 2015. Op. cit.

care for these infants is very costly to hospitals and families. Use of cocaine and other stimulants during pregnancy can cause maternal migraines and seizures, as well as exacerbate cardiovascular changes during pregnancy, leading to hypertensive crises[9] and potentially to postpartum mortality.[10]

Compared with urban areas, rates of substance use during pregnancy are frequently higher in rural areas, which often have limited resources for prevention and treatment.[11,12] For instance, rates of opioid prescriptions are higher in rural than in urban areas[13] and prescription opioids are now the most common type of drug abused by rural pregnant women.[14] Despite these statistics, most research on the prevalence, prevention, and treatment of substance abuse during pregnancy has been conducted in urban areas.[15]

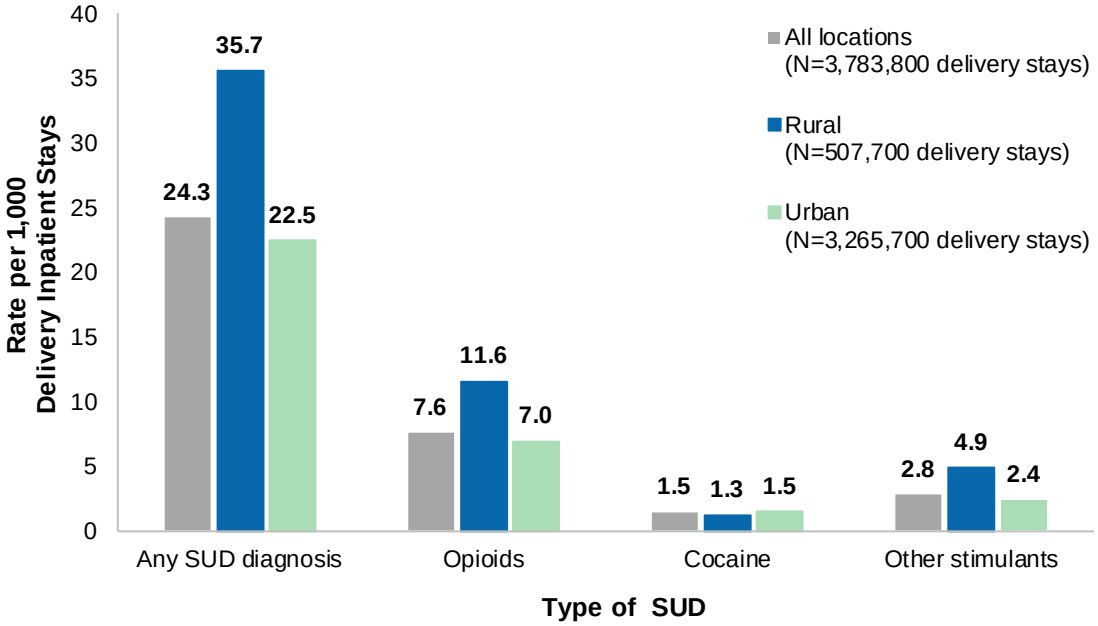
This Healthcare Cost and Utilization Project (HCUP) Statistical Brief presents statistics from the 2016 National Inpatient Sample (NIS) on delivery-related inpatient stays involving SUDs, overall and for select types of substances: opioids, cocaine, and other stimulants, as well as for both urban and rural areas. The definition of any substance use does not include tobacco use. Clinical outcomes at delivery are examined, including preterm delivery (birth before 37 weeks of gestation), severe pre-eclampsia/eclampsia (a condition marked by high blood pressure, protein in the urine, and/or organ dysfunction, which can progress to the onset of seizures), obstetric hemorrhage/placenta accreta (a condition in which the placenta grows too deeply into the uterine wall, causing severe blood loss after delivery), and placental abruption (early separation of the placenta from the uterus). These outcomes are compared across deliveries with and without an SUD diagnosis and by urban or rural location of the patient's residence. Because of the large sample size of the HCUP NIS, small differences can be statistically significant. Thus, only differences between groups greater than or equal to 10 percent are noted in the text.

[9] National Institute on Drug Abuse. What are the effects of maternal cocaine use? www.drugabuse.gov/publications/research-reports/cocaine/what-are-effects-maternal-cocaine-use. Accessed August 6, 2019.
[10] MacDorman MF, Declercq E, Cabral H, Morton C. Recent increases in the US maternal mortality rate: disentangling trends from measurement issues. Obstetrics & Gynecology, 2016;128(3):447–55.
[11] Rural Health Information Hub. Substance abuse in rural areas. www.ruralhealthinfo.org/topics/substance-abuse. Accessed September 11, 2019.
[12] Jumah, MA. Rural, Pregnant, and Opioid Dependent: A Systematic Review. Substance Abuse. 2016;10(Suppl 1):35–41.
[13] García MC, Heilig CM, Lee SH, Faul M, Guy G, Iademarco MF, et al. Opioid prescribing rates in nonmetropolitan and metropolitan counties among primary care providers using an electronic health record system — United States, 2014–2017. Morbidity and Mortality Weekly Report. 2019;68:25–30.
[14] Jumah, 2016. Op. cit.
[15] Ibid.

Findings

Rates of delivery inpatient stays involving SUDs, 2016
Figure 1 displays the rate of deliveries involving SUDs per 1,000 total delivery stays among patients who resided in rural versus urban counties in 2016. The rate is presented overall and for select types of SUD diagnoses.

Figure 1. Rates of delivery stays involving SUDs among patients residing in rural versus urban counties, overall and for select types of SUD diagnoses, 2016



Abbreviation: SUD, substance use disorder

Note: The number of delivery stays among patients from rural and urban areas does not sum to the total number of delivery stays because of missing data on location of patient's residence.

Source: Agency for Healthcare Research and Quality (AHRQ), Healthcare Cost and Utilization Project (HCUP), National Inpatient Sample (NIS), 2016

- **In 2016, the rate of SUD diagnoses among delivery inpatient stays for patients from rural areas was 59 percent higher than the rate for patients from urban areas.**

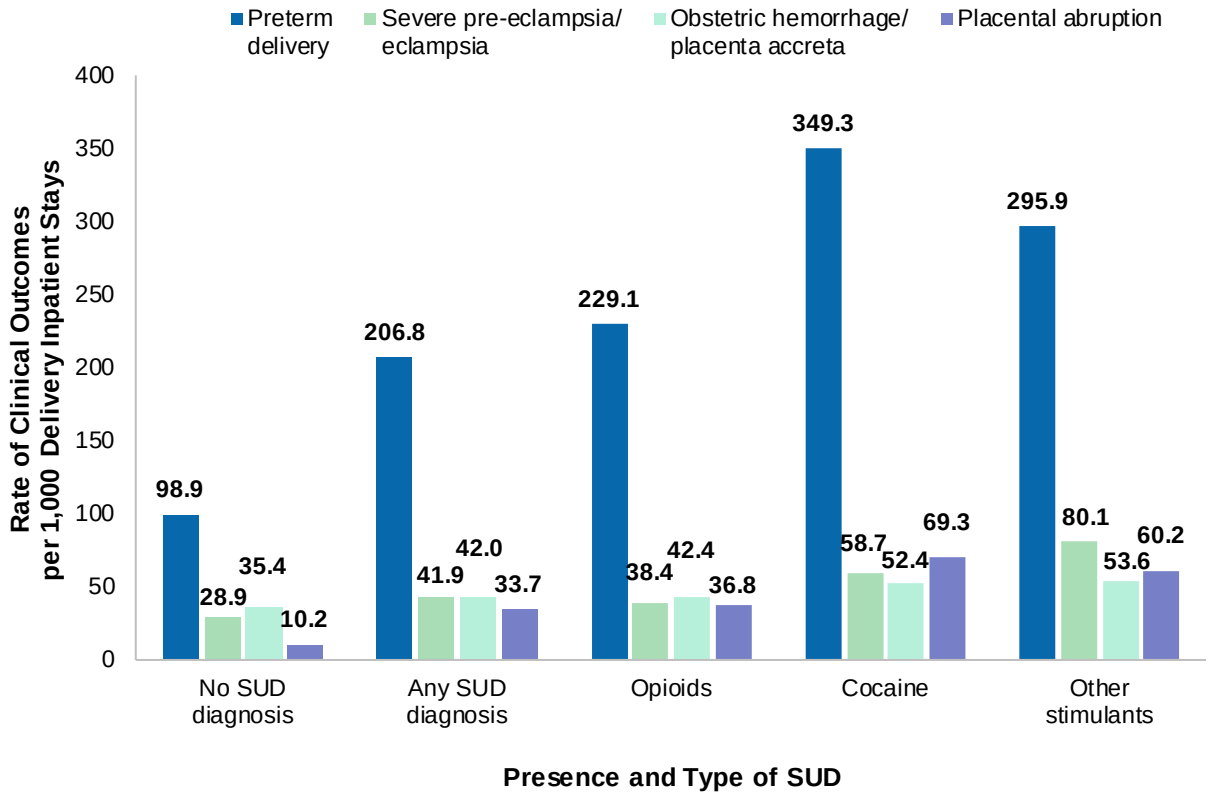
  In 2016, the overall rate of any SUD diagnosis was 24.3 per 1,000 deliveries, which corresponds to 91,800 SUD-related delivery stays (not shown). The rate of SUD diagnoses among deliveries was 59 percent higher for patients residing in rural areas compared with patients residing in urban areas (35.7 vs. 22.5 SUD-related deliveries per 1,000 delivery stays). Rural delivery stays totaled 507,700, constituting about 13 percent of all delivery stays.

- **The rate of delivery stays with an opioid- or stimulant-related diagnosis was higher for patients from rural areas compared with those from urban areas.**

  The rate of delivery-related stays with an opioid use diagnosis was 66 percent higher for patients residing in rural areas than for those from urban areas (11.6 vs. 7.0 per 1,000 delivery stays). The rate of stimulant use diagnoses (other than cocaine) among delivery stays for patients from rural areas was double the rate among patients from urban areas (4.9 vs. 2.4 per 1,000 delivery stays). The rate of cocaine use diagnoses among delivery stays, however, was higher among patients from urban areas compared with patients from rural areas (1.5 vs. 1.3 per 1,000 delivery stays).

Clinical outcomes of delivery inpatient stays involving SUDs, 2016
Figure 2 displays the rate of deliveries with select clinical outcomes per 1,000 delivery stays involving SUDs in 2016, compared with deliveries with no SUD diagnosis. Rates are shown for delivery stays with any SUD diagnosis and for deliveries involving specific types of substances.

Figure 2. Comparison of clinical outcomes among delivery stays with and without an SUD diagnosis, 2016



Abbreviation: SUD, substance use disorder

Source: Agency for Healthcare Research and Quality (AHRQ), Healthcare Cost and Utilization Project (HCUP), National Inpatient Sample (NIS), 2016

- **Overall in 2016, the rates of all four clinical outcomes examined were higher for delivery stays with than without an SUD diagnosis.**

  Preterm deliveries were over twice as common for stays with an SUD diagnosis compared with stays with no SUD diagnosis (206.8 vs. 98.9 per 1,000 delivery stays).

  Compared with the rate for stays with no SUD diagnosis, the rate of placental abruption for stays involving an SUD was more than 3 times higher (33.7 vs. 10.2 per 1,000 delivery stays), the rate of severe pre-eclampsia/eclampsia for stays involving an SUD was 45 percent higher (41.9 vs. 28.9 per 1,000 delivery stays), and the rate of obstetric hemorrhage/placenta accrete for stays involving an SUD was 19 percent higher (42.0 vs. 35.4 per 1,000 delivery stays).

- **Rates of all four clinical outcomes examined were higher for stays with a cocaine or other stimulant diagnosis than for opioid-related deliveries.**

  The rate of preterm deliveries was highest for delivery stays with a cocaine use diagnosis (349.3 per 1,000 delivery stays), which was 253 percent, 52 percent, and 18 percent higher than the preterm delivery rate for deliveries involving no SUD diagnosis (98.9), an opioid use diagnosis (229.1), or a diagnosis of other stimulant use (295.9), respectively.

The rate of severe pre-eclampsia/eclampsia for stimulant-related stays (other than cocaine) was more than double the rate for stays involving an opioid use diagnosis (80.1 vs. 38.4 per 1,000 delivery stays) and was 36 percent higher than the rate for deliveries with a cocaine use diagnosis (58.7 per 1,000 delivery stays). These rates were 33–177 percent higher than for delivery stays with no SUD diagnosis (28.9 per 1,000 delivery stays).

The rate of obstetric hemorrhage/placenta accreta was higher for deliveries involving cocaine and other stimulant use than for those with an opioid use diagnosis (52.4 and 53.6 vs. 42.4 per 1,000 delivery stays, respectively). These rates were 20–51 percent higher than the rate for deliveries with no SUD diagnosis (35.4 stays per 1,000 delivery stays).

The rate of placental abruption also was higher for delivery stays involving a diagnosis of cocaine or other stimulant use, by 64–88 percent, compared with stays with an opioid use diagnosis (69.3 and 60.2 vs. 36.8 per 1,000 delivery stays). In comparison, for delivery stays with no SUD diagnosis, placental abruption was reported in only 10.2 per 1,000 delivery stays.

Table 1 presents the rate of deliveries involving select clinical outcomes per 1,000 delivery stays involving SUDs in 2016, by location of patient residence (urban vs. rural). Rates are compared across deliveries with and without an SUD diagnosis.

Table 1. Comparison of clinical outcomes among delivery stays with and without an SUD diagnosis, by location of patient residence, 2016

Location of patient residence and clinical outcomes	SUD type				
	No SUD diagnosis	Any SUD diagnosis	Opioids	Cocaine	Other stimulants
Urban					
Total delivery inpatient stays, N	3,192,300	73,400	22,800	4,900	8,000
Rate of clinical outcomes per 1,000 delivery stays					
Preterm delivery	98.2	209.1	239.6	354.3	298.8
Severe pre-eclampsia/eclampsia	29.2	44.3	41.2	59.7	86.6
Placenta accreta/postpartum hemorrhage	35.8	42.4	42.8	56.7	55.9
Placental abruption	10.2	31.7	35.7	69.8	59.0
Rural					
Total delivery inpatient stays, N	489,600	18,100	5,900	600	2,500
Rate of clinical outcomes per 1,000 delivery stays					
Preterm delivery	103.6	195.0	187.4	299.2	278.8
Severe pre-eclampsia/eclampsia	27.0	31.8	27.1	47.2	58.6
Placenta accreta/postpartum hemorrhage	33.3	40.9	41.6	23.6	48.5
Placental abruption	10.5	41.4	41.6	70.9	62.6

Abbreviation: SUD, substance use disorder

Notes: Numbers were rounded to the nearest hundred. Rates are based on unrounded values.

Source: Agency for Healthcare Research and Quality (AHRQ), Healthcare Cost and Utilization Project (HCUP), National Inpatient Sample (NIS), 2016

- **Overall in 2016, among SUD-related deliveries, patients residing in urban areas had a higher rate of severe pre-eclampsia/eclampsia, but a lower rate of placental abruption, than patients living in rural areas.**

  Among delivery stays with any SUD diagnosis, compared with patients in rural areas, those residing in urban areas had a higher rate of severe pre-eclampsia/eclampsia (44.3 vs. 31.8 per 1,000 delivery stays) but a lower rate of placental abruption (31.7 vs. 41.4 per 1,000 delivery stays). In contrast, rates were similar across urban/rural status for deliveries without an SUD diagnosis (27–29 deliveries with severe pre-eclampsia/eclampsia and 10–11 deliveries with placental abruption, per 1,000 delivery stays).

- **The rate of preterm delivery also was higher for patients residing in urban than in rural areas for deliveries involving cocaine and opioid use.**

  The rate of preterm delivery was higher among stays for patients residing in urban areas compared with stays for patients residing in rural areas when a diagnosis of opioid use was present (239.6 vs. 187.4 per 1,000 delivery stays). This also was true among stays with a cocaine use diagnosis (354.3 vs. 299.2 per 1,000 delivery stays).

- **The rate of severe pre-eclampsia/eclampsia was higher for patients residing in urban than in rural areas across all three substance use categories.**

  Among delivery stays with an opioid use diagnosis, the rate of severe pre-eclampsia/eclampsia was 41.2 per 1,000 delivery stays for patients residing in urban areas versus 27.1 among stays for patients residing in rural areas. Among delivery stays with a cocaine use diagnosis, the rate of severe pre-eclampsia/eclampsia was 59.7 among stays for patients from urban areas versus 47.2 among stays for patients from rural areas. Among delivery stays with a stimulant use diagnosis (other than cocaine), severe pre-eclampsia/eclampsia also was more prevalent for patients residing in urban areas compared with patients residing in rural areas (86.6 vs. 58.6 per 1,000 delivery stays).

- **The rate of obstetric hemorrhage/placenta accreta was higher for patients residing in urban than in rural areas for deliveries involving cocaine and other stimulant use.**

  The rate of placenta accreta/postpartum hemorrhage among delivery stays for patients residing in urban areas with a cocaine-related diagnosis was more than double the rate for patients from rural areas with the same diagnosis (56.7 vs. 23.6 per 1,000 delivery stays) and was 15 percent higher for stays with a stimulant use diagnosis other than cocaine (55.9 vs. 48.5 per 1,000 delivery stays).

- **The rate of placental abruption was higher for patients residing in rural than in urban areas for deliveries involving opioid use.**

  As summarized above, rates of most clinical outcomes among SUD-related deliveries were higher among stays for patients from urban than from rural areas. However, the rate of placental abruption among opioid-related delivery stays was higher among patients from rural compared with urban areas (41.6 vs. 35.7 per 1,000 delivery stays).

About Statistical Briefs

Healthcare Cost and Utilization Project (HCUP) Statistical Briefs provide basic descriptive statistics on a variety of topics using HCUP administrative healthcare data. Topics include hospital inpatient, ambulatory surgery, and emergency department use and costs, quality of care, access to care, medical conditions, procedures, and patient populations, among other topics. The reports are intended to generate hypotheses that can be further explored in other research; the reports are not designed to answer in-depth research questions using multivariate methods.

Data Source

The estimates in this Statistical Brief are based upon data from the HCUP 2016 National Inpatient Sample (NIS).

Definitions

Diagnoses, procedures, ICD-10-CM/PCS, 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. *All-listed diagnoses* include the principal diagnosis plus these additional secondary conditions.

All-listed procedures include all procedures performed during the hospital stay, whether for definitive treatment or for diagnostic or exploratory purposes. The *first-listed procedure* is the procedure that is listed first on the discharge record. Inpatient data define this as the *principal procedure*—the procedure that is performed for definitive treatment rather than for diagnostic or exploratory purposes (i.e., the procedure that was necessary to take care of a complication).

ICD-10-CM/PCS is the International Classification of Diseases, Tenth Revision, Clinical Modification/Procedure Coding System. In October 2015, ICD-10-CM/PCS replaced the ICD-9-CM diagnosis and procedure coding system with the ICD-10-CM diagnosis coding system for most inpatient and outpatient medical encounters and the ICD-10-PCS procedure coding system for inpatient hospital procedures. There are over 70,000 ICD-10-CM diagnosis codes. There are over 75,000 ICD-10-PCS procedure codes.

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 (procedure), age, and other relevant criteria. Each hospital stay has one assigned DRG.

Case definition
The ICD-10-CM/PCS and DRG codes defining deliveries, substance use disorders (SUDs), and the clinical outcomes examined are provided in Table 2. Note that deliveries were excluded if they had any code indicating an abortive outcome. ICD-10-CM/PCS codes can be up to 7 digits in length. If fewer digits are listed, it indicates that any value in a subsequent position was included, except for the poisoning-related codes (i.e., T-codes). Poisonings included all codes in the series except for underdosing (sixth digit equal to 6) and sequela (seventh digit equal to S).

Table 2. Codes defining deliveries, substance use disorders, and clinical outcomes

Code Type	Code	Description
Deliveries		
ICD-10-CM	Z37	Outcome of delivery
ICD-10-CM	O80	Encounter for full-term uncomplicated delivery
ICD-10-CM	O82	Encounter for cesarean delivery without indication
DRG	765	Cesarean section with complicating conditions/major complicating conditions

Code Type	Code	Description
DRG	766	Cesarean section without complicating conditions/major complicating conditions
DRG	767	Vaginal delivery with sterilization and/or dilation and curettage
DRG	768	Vaginal delivery with operating room procedure except for sterilization and/or dilation and curettage
DRG	774	Vaginal delivery with complicating diagnoses
DRG	775	Vaginal delivery without complicating diagnoses
ICD-10-PCS	10D00Z	Extraction of products of conception, open approach
ICD-10-PCS	10D07Z	Extraction of products of conception, via natural or artificial opening
Abortive outcomes		
ICD-10-CM	O00	Ectopic pregnancy
ICD-10-CM	O01	Hydatidiform mole
ICD-10-CM	O02	Other abnormal products of conception
ICD-10-CM	O03	Spontaneous abortion
ICD-10-CM	O04	Complications following (induced) termination of pregnancy
ICD-10-CM	O07	Failed attempted termination of pregnancy
ICD-10-CM	O08	Complications following ectopic and molar pregnancy
ICD-10-PCS	10A0	Abortion of products of conception
Opioids		
ICD-10-CM	F111	Opioid abuse
ICD-10-CM	F112	Opioid dependence
ICD-10-CM	F119	Opioid use, unspecified
ICD-10-CM	T400[a]	Poisoning by and adverse effect of opium
ICD-10-CM	T401[a]	Poisoning by and adverse effect of heroin
ICD-10-CM	T402[a]	Poisoning by and adverse effect of other opioids
ICD-10-CM	T403[a]	Poisoning by and adverse effect of methadone
ICD-10-CM	T404[a]	Poisoning by and adverse effect of synthetic narcotics
ICD-10-CM	T406[a]	Poisoning by and adverse effect of unspecified narcotics
Cocaine		
ICD-10-CM	F141	Cocaine abuse
ICD-10-CM	F142	Cocaine dependence
ICD-10-CM	F149	Cocaine use, unspecified
ICD-10-CM	T405[a]	Poisoning by and adverse effect of cocaine
Other stimulants		
ICD-10-CM	F151	Other stimulant abuse
ICD-10-CM	F152	Other stimulant dependence
ICD-10-CM	F159	Other stimulant use, unspecified
ICD-10-CM	T436[a]	Poisoning by and adverse effect of psychostimulants
All other substances		
ICD-10-CM	F101	Alcohol abuse
ICD-10-CM	F102	Alcohol dependence
ICD-10-CM	F109	Alcohol use, unspecified
ICD-10-CM	F121	Cannabis abuse
ICD-10-CM	F122	Cannabis dependence
ICD-10-CM	F129	Cannabis use, unspecified
ICD-10-CM	F131	Sedative, hypnotic or anxiolytic abuse
ICD-10-CM	F132	Sedative, hypnotic or anxiolytic dependence
ICD-10-CM	F139	Sedative, hypnotic or anxiolytic use, unspecified
ICD-10-CM	F161	Hallucinogen abuse
ICD-10-CM	F162	Hallucinogen dependence

Code Type	Code	Description
ICD-10-CM	F169	Hallucinogen use, unspecified
ICD-10-CM	F181	Inhalant abuse
ICD-10-CM	F182	Inhalant dependence
ICD-10-CM	F189	Inhalant use, unspecified
ICD-10-CM	F191	Other psychoactive substance abuse
ICD-10-CM	F192	Other psychoactive substance dependence
ICD-10-CM	F199	Other psychoactive substance use, unspecified
ICD-10-CM	G312	Degeneration of nervous system due to alcohol
ICD-10-CM	G621	Alcoholic polyneuropathy
ICD-10-CM	I426	Alcoholic cardiomyopathy
ICD-10-CM	K292	Alcoholic gastritis
ICD-10-CM	K70	Alcoholic liver disease
ICD-10-CM	O354	Maternal care for (suspected) damage to fetus from alcohol
ICD-10-CM	O355	Maternal care for (suspected) damage to fetus by drugs
ICD-10-CM	O9931	Alcohol use complicating pregnancy, childbirth, and the puerperium
ICD-10-CM	O9932	Drug use complicating pregnancy, childbirth, and the puerperium
ICD-10-CM	T407[a]	Poisoning by and adverse effect of cannabis
ICD-10-CM	T408[a]	Poisoning by and adverse effect of lysergide (LSD)
ICD-10-CM	T4090[a]	Poisoning by and adverse effect of unspecified psychodysleptics (hallucinogens)
ICD-10-CM	T4099[a]	Poisoning by and adverse effect of other psychodysleptics (hallucinogens)
ICD-10-CM	T410X2[a]	Poisoning by and adverse effect of inhaled anesthetics, intentional self-harm
Preterm delivery		
ICD-10-CM	O601	Preterm labor with preterm delivery
ICD-10-CM	Z3A1–36	Week of gestation <37 weeks
ICD-10-CM	O4201	Preterm premature rupture of membranes, onset of labor within 24 hours of rupture
Severe pre-eclampsia and eclampsia		
ICD-10-CM	O11	Pre-existing hypertension with pre-eclampsia
ICD-10-CM	O141	Severe pre-eclampsia
ICD-10-CM	O142	HELLP syndrome
ICD-10-CM	O15	Eclampsia
Placental abruption		
ICD-10-CM	O45002	Premature separation of placenta with coagulation defect, unspecified, second trimester
ICD-10-CM	O45003	Premature separation of placenta with coagulation defect, unspecified, third trimester
ICD-10-CM	O45009	Premature separation of placenta with coagulation defect, unspecified, unspecified trimester
ICD-10-CM	O45012	Premature separation of placenta with afibrinogenemia, second trimester
ICD-10-CM	O45013	Premature separation of placenta with afibrinogenemia, third trimester
ICD-10-CM	O45019	Premature separation of placenta with afibrinogenemia, unspecified trimester
ICD-10-CM	O45022	Premature separation of placenta with disseminated intravascular coagulation, second trimester
ICD-10-CM	O45023	Premature separation of placenta with disseminated intravascular coagulation, third trimester
ICD-10-CM	O45029	Premature separation of placenta with disseminated intravascular coagulation, unspecified trimester

Code Type	Code	Description
ICD-10-CM	O45092	Premature separation of placenta with other coagulation defect, second trimester
ICD-10-CM	O45093	Premature separation of placenta with other coagulation defect, third trimester
ICD-10-CM	O45099	Premature separation of placenta with other coagulation defect, unspecified trimester
ICD-10-CM	O458X2	Other premature separation of placenta, second trimester
ICD-10-CM	O458X3	Other premature separation of placenta, third trimester
ICD-10-CM	O458X9	Other premature separation of placenta, unspecified trimester
ICD-10-CM	O4590	Premature separation of placenta, unspecified, unspecified trimester
ICD-10-CM	O4592	Premature separation of placenta, unspecified, second trimester
ICD-10-CM	O4593	Premature separation of placenta, unspecified, third trimester
Obstetric hemorrhage/placenta accreta		
ICD-10-CM	O43.212	Placenta accreta, second trimester
ICD-10-CM	O43.213	Placenta accreta, third trimester
ICD-10-CM	O43.219	Placenta accreta, unspecified trimester
ICD-10-CM	O43.222	Placenta increta, second trimester
ICD-10-CM	O43.223	Placenta increta, third trimester
ICD-10-CM	O43.229	Placenta increta, unspecified trimester
ICD-10-CM	O43.232	Placenta percreta, second trimester
ICD-10-CM	O43.233	Placenta percreta, third trimester
ICD-10-CM	O43.239	Placenta percreta, unspecified trimester
ICD-10-CM	O72.0	Third-stage hemorrhage
ICD-10-CM	O72.1	Other immediate postpartum hemorrhage
ICD-10-CM	O72.2	Delayed and secondary postpartum hemorrhage
ICD-10-CM	O72.3	Postpartum coagulation defects
ICD-10-CM	O46.002	Antepartum hemorrhage with coagulation defect, unspecified, second trimester
ICD-10-CM	O46.003	Antepartum hemorrhage with coagulation defect, unspecified, third trimester
ICD-10-CM	O46.009	Antepartum hemorrhage with coagulation defect, unspecified, unspecified trimester
ICD-10-CM	O46.012	Antepartum hemorrhage with afibrinogenemia, second trimester
ICD-10-CM	O46.013	Antepartum hemorrhage with afibrinogenemia, third trimester
ICD-10-CM	O46.019	Antepartum hemorrhage with afibrinogenemia, unspecified trimester
ICD-10-CM	O46.022	Antepartum hemorrhage with disseminated intravascular coagulation, second trimester
ICD-10-CM	O46.023	Antepartum hemorrhage with disseminated intravascular coagulation, third trimester
ICD-10-CM	O46.029	Antepartum hemorrhage with disseminated intravascular coagulation, unspecified trimester
ICD-10-CM	O46.092	Antepartum hemorrhage with other coagulation defect, second trimester
ICD-10-CM	O46.093	Antepartum hemorrhage with other coagulation defect, third trimester
ICD-10-CM	O46.099	Antepartum hemorrhage with other coagulation defect, unspecified trimester
ICD-10-CM	O46.8X2	Other antepartum hemorrhage, second trimester
ICD-10-CM	O46.8X3	Other antepartum hemorrhage, third trimester
ICD-10-CM	O46.8X9	Other antepartum hemorrhage, unspecified trimester
ICD-10-CM	O46.92	Antepartum hemorrhage unspecified, second trimester
ICD-10-CM	O46.93	Antepartum hemorrhage unspecified, third trimester

Code Type	Code	Description
ICD-10-CM	O46.90	Antepartum hemorrhage unspecified, unspecified trimester

Abbreviations: DRG, diagnosis-related group; HELLP, hemolysis, elevated liver enzymes, low platelet count; ICD-10-CM, International Classification of Diseases, Tenth Revision, Clinical Modification; ICD-10-PCS, International Classification of Diseases, Tenth Revision, Procedure Coding System

[a] Includes all codes in the series except for underdosing (sixth digit equal to 6) and sequela (seventh digit equal to S)

Types of hospitals included in the HCUP National (Nationwide) Inpatient Sample
The National (Nationwide) Inpatient Sample (NIS) 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). The NIS includes obstetrics and gynecology, otolaryngology, orthopedic, cancer, pediatric, public, and academic medical hospitals. Excluded are long-term care facilities such as rehabilitation, psychiatric, and alcoholism and chemical dependency hospitals. Beginning in 2012, long-term acute care hospitals are also excluded. However, if a patient received long-term care, rehabilitation, or treatment for a psychiatric or chemical dependency condition in a community hospital, the discharge record for that stay will be included in the 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 for a delivery multiple times in 1 year will be counted each time as a separate discharge from the hospital.

Location of patients' residence
Place of residence is based on the urban-rural classification scheme for U.S. counties developed by the National Center for Health Statistics (NCHS). For this Statistical Brief, we collapsed the NCHS categories into either urban or rural according to the following:

Urban:

- Large Central Metropolitan: includes metropolitan areas with 1 million or more residents
- Large Fringe Metropolitan: includes counties of metropolitan areas with 1 million or more residents
- Medium and Small Metropolitan: includes areas with 50,000 to 999,999 residents

Rural:

- Micropolitan and Noncore: includes nonmetropolitan counties (i.e., counties with no town greater than 50,000 residents).

About HCUP

The Healthcare Cost and Utilization Project (HCUP, pronounced "H-Cup") is a family of healthcare 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, and private data organizations (HCUP Partners) and the Federal government to create a national information resource of encounter-level healthcare data. 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 healthcare 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 Department of Health and Social Services
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
Delaware Division of Public Health
District of Columbia 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
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 State Department of Health
Missouri Hospital Industry Data Institute
Montana Hospital Association
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 Office of Health Analytics
Pennsylvania Health Care Cost Containment Council
Rhode Island Department of Health
South Carolina Revenue and Fiscal Affairs Office
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 Department of Health and Human Resources, West Virginia Health Care Authority
Wisconsin Department of Health Services
Wyoming Hospital Association

About the NIS

The HCUP National (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 includes all payers. 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. Over time, the sampling frame

for the NIS has changed; thus, the number of States contributing to the NIS varies from year to year. The NIS is intended for national estimates only; no State-level estimates can be produced. The unweighted sample size for the 2016 NIS is 7,135,090 (weighted, this represents 35,675,421 inpatient stays).

For More Information

For other information on pregnancy and childbirth, including maternal hospital stays related to substance use, refer to the HCUP Statistical Briefs located at www.hcup-us.ahrq.gov/reports/statbriefs/sb_pregnancy.jsp.

For additional HCUP statistics, visit:

- HCUP Fast Stats at www.hcup-us.ahrq.gov/faststats/landing.jsp for easy access to the latest HCUP-based statistics for healthcare information topics
- HCUPnet, HCUP's interactive query system, at www.hcupnet.ahrq.gov/

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

For a detailed description of HCUP and more information on the design of the National Inpatient Sample (NIS), please refer to the following database documentation:

Agency for Healthcare Research and Quality. Overview of the National (Nationwide) Inpatient Sample (NIS). Healthcare Cost and Utilization Project (HCUP). Rockville, MD: Agency for Healthcare Research and Quality. Updated August 2018. www.hcup-us.ahrq.gov/nisoverview.jsp. Accessed January 4, 2019.

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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 healthcare 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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