

**Supplemental Table 1: ICD-9 codes for procedures/surgeries**

<b>Category</b>	<b>Code</b>	<b>Procedure description</b>
Cesarean	74	Cesarean Section And Removal Of Fetus
Cesarean	74.0	Classical cesarean section
Cesarean	74.1	Low cervical cesarean section
Cesarean	74.2	Extraperitoneal cesarean section
Cesarean	74.3	Removal of extratubal ectopic pregnancy
Cesarean	74.4	Cesarean section of other specified type
Cesarean	74.9	Cesarean Section Of Unspecified Type
Cesarean	74.91	Hysterectomy to terminate pregnancy
Cesarean	74.99	Other cesarean section of unspecified type
Hysterectomy	68.31	Laparoscopic supracervical hysterectomy [LSH]
Hysterectomy	68.39	Other and unspecified subtotal abdominal hysterectomy
Hysterectomy	68.41	Laparoscopic total abdominal hysterectomy
Hysterectomy	68.49	Other and unspecified total abdominal hysterectomy
Hysterectomy	68.51	Laparoscopically assisted vaginal hysterectomy (LAVH)
Hysterectomy	68.59	Other and unspecified vaginal hysterectomy
Hysterectomy	68.61	Laparoscopic radical abdominal hysterectomy
Hysterectomy	68.69	Other and unspecified radical abdominal hysterectomy
Hysterectomy	68.71	Laparoscopic radical vaginal hysterectomy [LRVH]
Hysterectomy	68.79	Other and unspecified radical vaginal hysterectomy
Hysterectomy	68.9	Other and unspecified hysterectomy
Hysterectomy	69.19	Other excision or destruction of uterus and supporting structures

*NOTE: Equivalent ICD-10 codes were determined by using CMS's ICD-9 to ICD-10 general equivalence mapping ([www.cms.gov](http://www.cms.gov)).*

**Supplemental Table 2: Full demographics and baseline characteristics for cesarean section surgery patients.**

Variable	IV APAP (N= 4512)	%	Oral APAP (N= 24,612)	%
<b>Age (mean, SD)</b>	30.9 (6.0)		29.6 (5.9)	
<b>Imputed BMI (mean, SD)</b>	33.3 (6.8)		33.8 (7.0)	
<b>Race</b>				
Caucasian	2181	48.3%	17,180	69.8%
African American	1656	36.7%	3127	12.7%
Asian/Other	465	10.3%	3006	12.2%
Hispanic	54	1.2%	960	3.9%
Missing/Unknown	156	3.5%	339	1.4%
<b>Insurance Type</b>				
Commercial	1530	33.9%	11,818	48.0%
Medicaid	1043	23.1%	8253	33.5%
Medicare	22	0.5%	209	0.9%
Other	204	4.5%	2079	8.4%
Self-pay	33	0.7%	186	0.8%
Unknown	1680	37.2%	2067	8.4%
<b>Marital Status</b>				
Married	2607	57.8%	13,892	56.4%
Single	1774	39.3%	9182	37.3%
Divorced	98	2.2%	738	3.0%
Widowed	3	0.1%	20	0.1%
Unknown	30	0.7%	780	3.2%

<b>Admission Source</b>				
Emergency	1717	38.1%	109	0.4%
Healthcare Facility	844	18.7%	137	0.6%
Non-Healthcare Facility	1559	34.6%	20,245	82.3%
Other	56	1.2%	2170	8.8%
Unknown	336	7.5%	1951	7.9%
<b>Admission type</b>				
Emergency	1785	39.6%	415	1.7%
Urgent	520	11.5%	3806	15.5%
Elective	1980	43.9%	18,430	74.9%
Other	4	0.1%	677	2.8%
Unknown	223	4.9%	1284	5.2%
<b>Patient type</b>				
Inpatient	3827	84.8%	23,777	96.6%
Other	681	15.1%	824	3.4%
Outpatient	3	0.1%	10	0.0%
Unknown	1	0.0%	1	0.0%
<b>Drugs on the Day of Surgery or Prior</b>				
Oral APAP Prior to Day 0	267	5.9%	1779	7.2%
IV APAP Prior to Day 0	58	1.3%	0	0.0%
Oral Opioids on Day 0	3967	87.9%	22,050	89.6%
IV Opioids on Day 0	4135	91.6%	19,689	80.0%
Oral NSAIDS on Day 0	3728	82.6%	18,277	74.3%
IV NSAIDS on Day 0	2636	58.4%	16,387	66.6%

<b>Elixhauser Comorbidities (8 Oral APAP and 5 IV APAP patients had missing Elixhauser data)</b>				
Congestive Heart Failure	15	0.3%	34	0.1%
Valvular Disease	23	0.5%	173	0.7%
Pulmonary Circulation Disease	7	0.2%	31	0.1%
Peripheral Vascular Disease	8	0.2%	39	0.2%
Chronic Pulmonary Disease	334	7.4%	2291	9.3%
Paralysis	2	0.0%	41	0.2%
Neurological Disorders	50	1.1%	387	1.6%
Diabetes without Complications	175	3.9%	1010	4.1%
Diabetes with Complications	19	0.4%	126	0.5%
Hypothyroidism	175	3.9%	1503	6.1%
Renal Failure	9	0.2%	62	0.3%
Liver Disease	25	0.6%	160	0.7%
Peptic Ulcer Disease/bleeding	1	0.0%	1	0.0%
AIDS	7	0.2%	45	0.2%
Lymphoma	0	0.0%	30	0.1%
Metastatic Cancer	3	0.1%	15	0.1%
Solid Tumor	21	0.5%	93	0.4%

Rheumatoid Arthritis/Collagen Disease	27	0.6%	187	0.7%
Coagulopathy	270	6.0%	753	3.1%
Obesity	380	8.4%	3789	15.4%
Weight Loss	18	0.4%	107	0.4%
Fluid and Electrolyte Disorders	175	3.9%	1142	4.6%
Chronic Blood Loss Anemia	735	16.3%	5281	21.5%
Deficiency Anemia	506	11.2%	3611	14.7%
Alcohol Abuse	20	0.4%	177	0.7%
Drug Abuse	89	2.0%	911	3.7%
Psychoses	59	1.3%	617	2.5%
Depression	116	2.6%	1583	6.4%
Hypertension	325	7.2%	1811	7.4%
<b>Hospital Characteristics</b>				
Urban	1497	33.2%	18,716	76.0%
Teaching Hospital (missing 111 patients)	3793	84.2%	14,651	59.8%
<b>Bed Size</b>				
<200	345	7.7%	7282	29.6%
200 to 299	618	13.7%	2991	12.2%
300 to 499	831	18.4%	7540	30.6%
500+	2718	60.2%	6799	27.6%
<b>Census Region</b>				

Midwest	490	10.9%	6977	28.4%
Northeast	2852	63.2%	8448	34.3%
South	739	16.4%	5970	24.3%
West	431	9.6%	3217	13.1%
<b>Year</b>				
2011	225	5.0%	3482	14.2%
2012	1322	29.3%	3219	13.1%
2013	1259	27.9%	5359	21.8%
2014	1175	26.0%	6811	27.7%
2015	531	11.8%	5741	23.3%

A total of 29,124 cesarean section surgery patients were included in the analysis.

**Supplemental Table 3: Full demographics and baseline characteristics for hysterectomy surgery patients.**

Variable	IV APAP (N = 4181)	%	Oral APAP (N = 5586)	%
<b>Age (mean, SD)</b>	47.4 (12.0)		47.1 (11.5)	
<b>Imputed BMI (mean, SD)</b>	30.9 (7.7)		30.8 (7.4)	
<b>Race</b>				
Caucasian	2833	67.8%	4013	71.8%
African American	1009	24.1%	1069	19.4%
Asian/Other	265	6.3%	369	6.6%
Hispanic	18	0.4%	79	1.4%
Missing/Unknown	56	1.3%	56	1.0%
<b>Insurance Type</b>				
Commercial	2117	50.6%	2958	53.0%
Medicaid	412	9.9%	589	10.5%
Medicare	418	10.0%	572	10.2%
Other	397	9.5%	905	16.2%
Self-pay	69	1.7%	103	1.8%
Unknown	768	18.4%	459	8.22%
<b>Marital Status</b>				
Married	2407	57.6%	3217	57.6%
Single	988	23.6%	1177	21.1%
Divorced	543	13.0%	767	13.7%
Widowed	194	4.6%	223	4.0%

Unknown	49	1.2%	202	3.6%
<b>Admission Source</b>				
Emergency	31	0.7%	11	0.2%
Healthcare Facility	10	0.2%	10	0.2%
Non-Healthcare Facility	3448	82.5%	4939	88.4%
Other	141	3.4%	95	1.7%
Unknown	246	5.9%	531	9.5%
<b>Admission type</b>				
Emergency	165	4.0%	136	2.4%
Urgent	56	1.3%	149	2.7%
Elective	3833	91.7%	5213	93.3%
Other	85	2.0%	2	0.04%
Unknown	42	1.0%	86	1.5%
<b>Patient type</b>				
Inpatient	2448	58.6%	3125	55.9%
Other	1175	28.1%	2016	36.1%
Outpatient	538	12.9%	419	7.5%
Unknown	20	0.5%	26	0.5%
<b>Drugs on the Day of Surgery</b>				
Oral APAP Prior to Day 0	33	0.8%	81	1.5%
IV APAP Prior to Day 0	13	0.3%	0	0.0%
Oral Opioids on Day 0	2764	66.1%	4731	84.7%
IV Opioids on Day 0	3727	89.1%	4968	88.9%
Oral NSAIDS on Day 0	1272	30.4%	2732	48.9%
IV NSAIDS on Day 0	2242	53.6%	2848	51.0%



<b>Elixhauser Comorbidities (3 Oral APAP and 31 IV APAP patients had Missing Elixhauser Data)</b>				
Congestive Heart Failure	48	1.2%	41	0.7%
Valvular Disease	131	3.2%	134	2.4%
Pulmonary Circulation Disease	33	0.8%	39	0.7%
Peripheral Vascular Disease	60	1.5%	70	1.3%
Chronic Pulmonary Disease	579	14.0%	742	13.3%
Paralysis	26	0.6%	19	0.3%
Neurological Disorders	164	4.0%	210	3.8%
Diabetes without Complications	514	12.4%	608	10.9%
Diabetes with Complications	86	2.1%	60	1.1%
Hypothyroidism	483	11.6%	681	12.2%
Renal Failure	83	2.0%	78	1.4%
Liver Disease	90	2.2%	107	1.9%
Peptic Ulcer Disease/Bleeding	0	0.0%	1	0.0%
AIDS	12	0.3%	10	0.2%
Lymphoma	13	0.3%	15	0.3%
Metastatic Cancer	90	2.2%	81	1.5%
Solid Tumor	336	8.1%	310	5.6%
Rheumatoid Arthritis/Collagen Disease	85	2.1%	130	2.3%
Coagulopathy	57	1.4%	134	2.4%
Obesity	808	19.5%	1009	18.1%
Weight Loss	44	1.1%	68	1.2%
Fluid and Electrolyte Disorders	262	6.3%	393	7.0%

Chronic Blood Loss Anemia	185	4.5%	254	4.6%
Deficiency Anemia	825	19.9%	1048	18.8%
Alcohol Abuse	53	1.3%	59	1.1%
Drug Abuse	85	2.1%	110	2.0%
Psychoses	164	4.0%	223	4.0%
Depression	537	12.9%	867	15.5%
Hypertension	1478	35.6%	1737	31.1%
<b>Procedure Type</b>				
Laparoscopic	1933	46.2%	2817	50.4%
Total Vaginal Hysterectomy	638	15.3%	1010	18.1%
Total Abdominal Hysterectomy	1508	36.1%	1702	30.5%
<b>Hospital Characteristics</b>				
Urban	2690	64.3%	5056	90.5%
Teaching Hospital (22 patients missing)	2962	71.2%	3317	59.4%
<b>Bed Size</b>				
<200	848	20.3%	1389	24.9%
200 to 299	763	18.3%	1120	20.1%
300 to 499	1533	36.7%	1539	27.6%
500+	1037	24.8%	1538	27.5%
<b>Census Region</b>				
Midwest	957	22.9%	1298	23.2%
Northeast	1046	25.0%	2047	36.7%
South	1507	36.0%	1668	29.9%

West	671	16.1%	573	10.3%
<b>Year</b>				
2011	237	5.7%	1068	19.1%
2012	783	18.7%	953	17.1%
2013	1252	29.9%	967	17.3%
2014	1181	28.3%	1448	25.9%
2015	728	17.4%	1150	26.6%

A total of 29,124 cesarean section surgery patients were included in the analysis.

#### Supplemental Table 4: Unadjusted Outcomes

##### Cesarean Section:

<b>Variable</b>	<b>IV APAP (N = 4512)</b>	<b>Oral APAP (N = 24,612)</b>
Length of Stay	3.6 Days (3.1)	3.7 Days (3.6)
Total Morphine Consumption (MME) Per Day, Over Day 0 to Day 3, Mean (SD)	7.2 mg (9.7)	8.1 mg (12.6)
Admission to the ICU, N(%)	19 (0.4%)	83 (0.3%)
Total Pharmacy Costs (Winsorized at 2.5%), Mean (SD)	\$2844 (4059)	\$2685 (3644)
ORADE rate, N(%)	41 (0.9%)	297 (1.2%)

##### Hysterectomy:

<b>Variable</b>	<b>IV APAP (N = 4181)</b>	<b>Oral APAP (N = 5586)</b>
Length of Stay	2.0 Days (2.5)	2.1 Days (3.7)
Total Morphine Consumption (MME) Per Day, Over Day 0 to Day 3, Mean (SD)	13.4 mg (26.4)	13.3 mg (27.4)
Admission to the ICU, N(%)	39 (0.9%)	55 (1.0%)
Total Pharmacy Costs (Winsorized at 2.5%), Mean (SD)	\$3712 (6695)	\$3336 (6065)
ORADE rate, N(%)	196 (4.7%)	200 (3.6%)