



# H·CUP

HEALTHCARE COST AND UTILIZATION PROJECT

## HCUP Methods Series



Agency for Healthcare  
Research and Quality



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**Contact Information:**  
**Healthcare Cost and Utilization Project (HCUP)**  
**Agency for Healthcare Research and Quality**  
**540 Gaither Road**  
**Rockville, MD 20850**  
**<http://www.hcup-us.ahrq.gov>**

**For Technical Assistance with HCUP Products:**

**Email: [hcup@ahrq.gov](mailto:hcup@ahrq.gov)**

**or**

**Phone: 1-866-290-HCUP**

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## **EXECUTIVE SUMMARY**

### **Overview**

This report provides an overview of the contents and uses of the Healthcare Cost and Utilization Project (HCUP) Central Distributor (CD) 2007 State Ambulatory Surgery Database (SASD) and compares the SASD-CD database to the 2007 American Hospital Association (AHA) Annual Survey. The 16 states that provided data for the 2007 SASD-CD are included in this comparison: California, Colorado, Florida, Iowa, Kentucky, Maine, Maryland, Michigan, Nebraska, New Jersey, New York, North Carolina, South Carolina, Utah, Vermont, and Wisconsin. This report provides information about the volume of records coming from hospital-based and non-hospital based facilities and also explores the types of procedures performed that qualify as ambulatory surgery and the use of ICD-9-CM and CPT coding systems in the 2007 SASD-CD.

### **Key Findings**

The 2007 SASD-CD files contain 20,765,538 records from 16 HCUP states. Discharges with indications of outpatient surgery, according to AHRQ criteria, were classified as ambulatory surgeries. Of the total records contained in the SASD-CD, 67.6% (14,039,110) represent discharges for ambulatory surgery procedures.

A majority (63.2% or 1,880) of the facilities contributing data to the SASD-CD are hospital-based. California and Florida contained the greatest number of ambulatory surgery facilities in the 2007 SASD-CD.

Comparisons between the SASD-CD and the AHA Annual Survey for these 16 states demonstrate that the SASD-CD contains a greater number of facilities and surgical visits. The AHA data contain information on hospital-based ambulatory surgery facilities, whereas the SASD-CD includes data from non-hospital based facilities as well as hospital-based facilities. A clear advantage of the SASD-CD is that it contains information from both hospital-based and some non-hospital based facilities.

Another clear advantage of the SASD-CD over the AHA Annual Survey data is the ability to identify the types of surgical procedures performed during a surgical visit. This report demonstrates that the majority of ambulatory surgery is performed in one of five body systems: 58.1% of the total procedures in hospital based facilities are performed on the digestive, integumentary, musculoskeletal, cardiovascular, or eye systems (based on the ICD-9-CM coding system).

Two different coding systems are used in the SASD-CD; four states use only CPT codes, two states use only ICD-9-CM codes, and 10 states employ both codes. On average, the number of CPT procedure codes is higher (2.5 in the core file and 4.9 in the charge detail file) than the number of ICD-9-CM procedure codes (1.6) per record. Although there was general agreement between Clinical Classifications Software (CCS) categories for both systems, analysts should use caution when combining data across states which use different procedure coding systems.

## INTRODUCTION

### Motivation

The last two decades have witnessed a steep rise in the number of surgical centers performing ambulatory surgeries: these facilities have increased from 336 in 1985 to 2,976 in 2007.<sup>1</sup> In addition, ambulatory surgeries have become more common over the past two decades, with the number of ambulatory surgical centers in the U.S. rising in accord. For example, between 1988 and 2007, the number of ambulatory surgical centers reported by Colorado, New Jersey, and New York rose from 0.9 million to 2,475,511.<sup>2</sup> This dramatic growth in ambulatory surgeries and surgical centers was fueled by concern over rising health care costs and emerging medical technologies that made ambulatory surgery more practical.

Ambulatory surgery is defined herein as any surgical procedure performed on the same day a patient is admitted and released from a facility.<sup>3</sup> Ambulatory surgery facilities incorporate both hospital-based or non-hospital based surgical facilities.

In 1997, the Agency for Healthcare Research and Quality (AHRQ) began collecting ambulatory surgery (AS) data as part of the Healthcare Cost and Utilization Project (HCUP, pronounced “H-Cup”) and making public versions of these databases available via the HCUP Central Distributor (CD). The State Ambulatory Surgery Databases (SASD) are a powerful set of databases, from data organizations in participating States, that capture surgeries performed on the same day in which patients are admitted and released. The SASD-CD contains the ambulatory surgery encounter abstracts in participating States, translated into a uniform format to facilitate multi-state comparisons and analyses. All of the databases include abstracts from hospital-affiliated ambulatory surgery sites. Some contain the universe of ambulatory surgery encounter abstracts for that State, including records from both hospital-affiliated and non-hospital based facilities. This report also describes the composition of the 2007 SASD-CD with respect to ambulatory surgical facilities performing ambulatory surgery, both hospital-based and non-hospital based.

The SASD-CD contain a core set of clinical and non-clinical information on all patients, regardless of payer, including persons covered by Medicare, Medicaid, private insurance and the uninsured. The SASD-CD is well-suited for research that requires complete enumeration of hospital-based ambulatory surgery within market areas or States. Researchers and policymakers use the SASD-CD to compare inpatient surgery data with ambulatory surgery data, conduct market area research or small area variation analyses, and identify State-specific trends in ambulatory surgery utilization, access, charges, and outcomes.

The first part (Part I) of this report contains an overview of the 2007 SASD-CD and focuses on the contents of the database. This part includes a comparison of the records captured in both the SASD-CD and State Emergency Department Databases (SEDD). Part I also presents information about the origins of records defined as ambulatory surgery and an analysis of the types of procedures defined as ambulatory surgery. The second part (Part II) includes an evaluation of the completeness of the 2007 SASD-CD with respect to ambulatory surgical

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<sup>1</sup>Centers for Medicare & Medicaid Services. *2007 CMS Data Compendium*. December 2007. Accessed at [http://www.cms.hhs.gov/DataCompendium/17\\_2008\\_Data\\_Compendium.asp](http://www.cms.hhs.gov/DataCompendium/17_2008_Data_Compendium.asp) on December 1, 2009.

<sup>2</sup>Number of visits in HCUP SASD files 2007. Accessed at <http://www.hcup-us.ahrq.gov/>. Data from author's calculations on December 1, 2009.

<sup>3</sup>State Ambulatory Surgery Databases. Accessed at <http://www.hcup-us.ahrq.gov/sasdooverview.jsp> on December 1, 2009.

facilities. The method used to accomplish this evaluation was to compare the SASD-CD with the American Hospital Association (AHA) Annual Survey data. This part also discusses the coding systems used, including the frequencies of ambulatory surgeries contained in the SASD-CD by body system. The report concludes with recommendations regarding the usefulness and potential research value of the 2007 SASD-CD.

## **PART I: OVERVIEW OF THE SASD-CD**

### **Introduction**

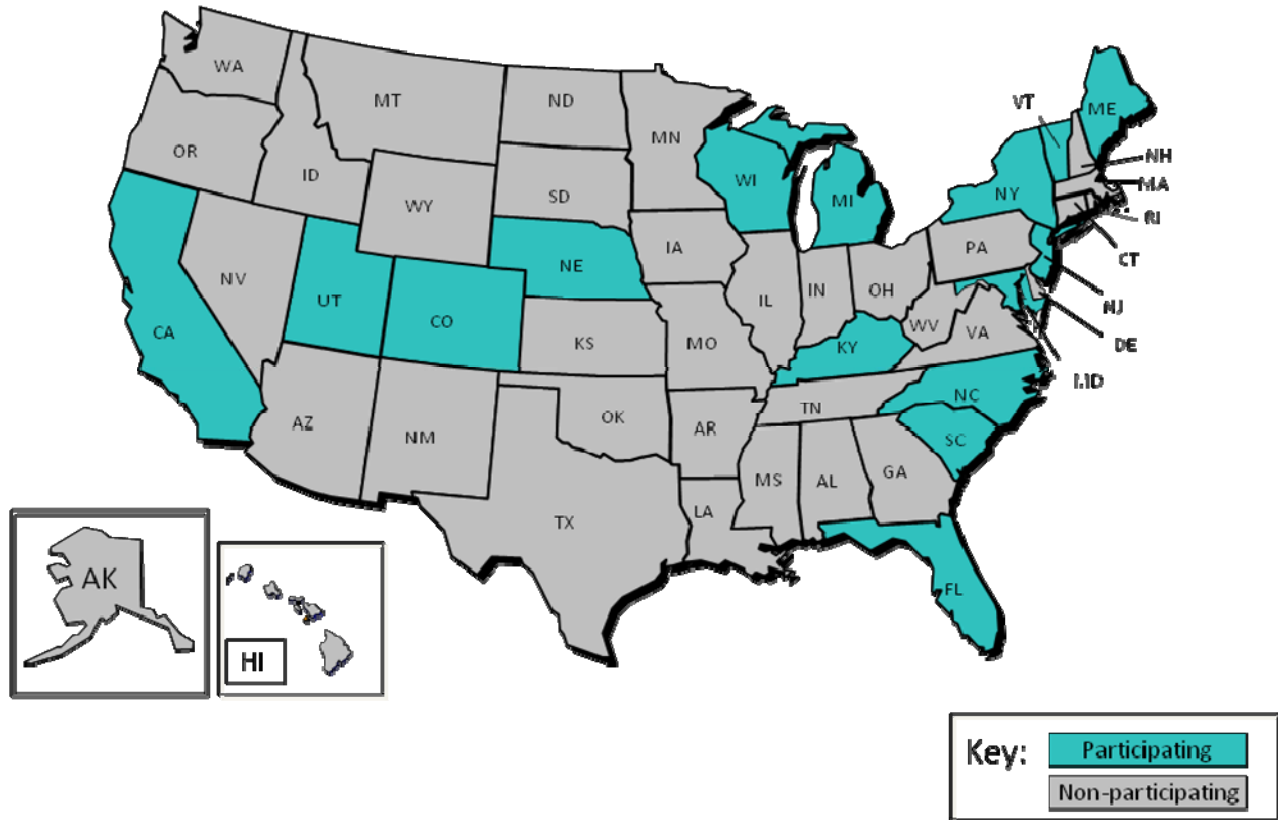
Part I discusses how the SASD-CD is constructed and its contents, including data sources, the definition of ambulatory surgery (not all of the records in the SASD-CD meet the criteria for ambulatory surgery), and comparisons of procedures performed in hospital-based and non-hospital based facilities. This section concludes with an analysis of the most common procedure categories that did not meet the ambulatory surgery criteria.

### **Data Sources**

For 2007, 16 standardized state databases were constructed and are available to the researchers via the HCUP Central Distributor. The 16 states that contributed data to the 2007 SASD-CD were California, Colorado, Florida, Iowa, Kentucky, Maine, Maryland, Michigan, Nebraska, New Jersey, New York, North Carolina, South Carolina, Utah, Vermont, and Wisconsin (Figure 1). Twelve states—Connecticut, Georgia, Hawaii, Indiana, Kansas, Minnesota, Missouri, New Hampshire, Ohio, Oklahoma, South Dakota, and Tennessee—participated in the 2007 SASD but did not release the data to the Central Distributor. Several other states currently collect AS data but did not participate in the 2007 SASD-CD: Illinois, Louisiana, Montana, Oregon, and Pennsylvania (supplied data for 1999-2001).



**Figure 1: HCUP States with 2007 SASD Databases Available Through the HCUP Central Distributor**



## Defining Ambulatory Surgery in the SASD-CD

Records in the 2007 SASD-CD are defined in the same way as data in the 2004 – 2006 SASD-CD, which differs substantially from previous years. In an attempt to create uniformly defined outpatient databases, AHRQ approved, starting with the 2004 data, screening the outpatient data provided by the HCUP Partners and assigning records to the SASD-CD or State Emergency Department Databases (SEDD) based on information coded on the record. Records identified as having emergency department services<sup>4</sup> were placed in the SEDD. All other records were placed in the SASD-CD. To ensure that all ambulatory surgery records were included in the SASD-CD, records satisfying the criteria for an ambulatory surgery were included in the SASD-CD files without regard to their origin in an ambulatory surgery or emergency department file. Those records that satisfied both ambulatory surgery and emergency department criteria were included in the SASD-CD files, as well as the SEDD files.

Records included in the 2007 SASD-CD are derived from the UB04/CMS1450 forms for hospital-based ambulatory centers and the CMS 1500 form for freestanding ambulatory surgery centers. Ambulatory surgery records (HCUP\_AS>0) are defined based on at least one of the following criteria:

- 1) ICD-9-CM ranges included codes 00.50-86.99 (excluded were procedure codes in the range 88.4-88.59),
- 2) CPT procedures codes indicating surgery (yearly updates can be downloaded from Centers for Medicare and Medicaid Services (CMS) and generally include 10121-69930, G0105, G0121, and G0260),
- 3) Presence of at least one revenue center code in the following range 036x (operating room services), 037x (anesthesia), or 049x (ambulatory surgical care), or
- 4) Presence of a UB04 bill type of 83 indicating outpatient services.

All records in the SASD-CD not meeting the criteria for ambulatory surgery were designated with HCUP\_AS=0.

## Hospital-Based and Non-Hospital Based Facilities

The method used to identify hospital-based and non-hospital based facilities was to compare the facility identifiers in the SASD-CD to the 2007 American Hospital Association (AHA) Annual Survey Database.

The AHA Annual Survey Database identifies hospital-associated ambulatory surgery facilities. These survey-based data include hospital descriptors and counts of outpatient surgeries from nearly all hospital-affiliated facilities nationwide. Annual updates are generally available toward the end of the year following the survey. AHA data do not include facilities such as freestanding outpatient surgical facilities lacking hospital affiliations and facilities originating from other sites such as physician offices.

The AHA Annual Survey database contains only summarized, facility-level data and does not contain visit-level data, but it does provide information on several types of ambulatory surgery facilities, as shown in Table 1. In this table, ambulatory surgery facilities are defined as *hospital-based* only if they are physically connected to main hospital facilities.

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<sup>4</sup> Emergency department services met at least one of the following criteria: 1) emergency department revenue code of 450-459, 2) positive emergency department charge, when revenue center codes were not available, or 3) emergency department CPT code of 99281-99285.

**Table 1: Types of Ambulatory Surgery (AS) Facilities in the AHA Database**

Type of Facility	AHA
AS facility – hospital-based and controlled	Yes
AS facility – hospital-based with third-party control	Yes
AS facility – non-hospital based with hospital affiliation	Yes
AS facility – non-hospital based with no hospital affiliation	No
Services originating at other sites, such as physician offices	No

Facilities in the SASD-CD were categorized as either hospital-based or non-hospital based (lacking a hospital affiliation). Facilities classified as hospital-based, including freestanding facilities with a hospital affiliation, were matched to a facility in the 2007 AHA Annual Survey Database. Facilities not matched to the AHA Survey were classified as non-hospital based, as they do not have a hospital indicator in the AHA survey data. AHRQ recommends caution when using the SASD-CD to investigate ambulatory surgery records in non-hospital based facilities because the data may not contain the universe of records from these types of facilities. In addition, some procedures included in the non-hospital affiliated facilities do not meet definitions of ambulatory surgeries.

The types of facilities contained in the SASD-CD varied across states. All states supplied ambulatory surgery records from hospital-based and hospital-affiliated ambulatory surgery facilities, while select states included records from non-hospital based facilities. Additional facilities included rehabilitation and osteopathic hospitals, radiation therapy centers, lithotripsy centers, cardiac catheterization laboratories, and providers of radiation therapy. In addition, states included both surgical and non-surgical procedures in their data files.

Using the AHRQ definition of ambulatory surgery, in the 2007 SASD-CD, there were 1,880 (63.2%) ambulatory surgical facilities that were hospital-based and 1,096 (36.8%) that were non-hospital based facilities (Table 2). Consistent with 2006, the two states with the greatest number of non-hospital based ambulatory surgical facilities in the 2007 SASD-CD were California and Florida. The two states with the greatest number of hospital-based ambulatory surgical facilities in the 2007 SASD-CD were California and New York.

As is observable in Table 2, the states included in the SASD-CD contributed a range of facilities and number of records. California had the largest number of contributing facilities (852) and Vermont the fewest (14).

While Maine contributes only 38 facilities, all of which are hospital-based, it provided the largest number of records (3,485,720). However, only 7.6% were ambulatory surgeries. Therefore, Maine's data likely includes a large number of outpatient services/procedures that do not meet the HCUP criteria for ambulatory surgery. Vermont contributed the fewest records with 111,791, of which 97.1% met the ambulatory surgery definition.

Of the hospital-based facilities included in the 2007 SASD-CD, 61.1% records met the criteria for ambulatory surgeries (HCUP\_AS>0), with the rest of the records not meeting the criteria for ambulatory surgeries (HCUP\_AS = 0).

However, the proportion of records from hospital-based facilities that qualified as ambulatory services varied by state. In 12 states: California, Colorado, Florida, Iowa, Michigan, New

Jersey, New York, North Carolina, South Carolina, Utah, Vermont and Wisconsin, over 90% of the records from hospital-based facilities met the criteria for ambulatory surgery, whereas 7.6% (lowest proportion) of records from hospital-based facilities in Maine qualified as ambulatory services.

In contrast, the percentage of AS qualifying records from non-hospital-based facilities was consistently high (>95%) across all States that contributed non-hospital-based data, with the exception of Kentucky. Further, for the States that contributed non-hospital-based data, the percentage of hospital-based records that met the criteria for ambulatory surgery was also consistently high (>90%)

**Table 2: Number of Hospital-Based and Non-Hospital Based Facilities by State Available through the HCUP Central Distributor, 2007 SASD-CD**

All SASD-CD			Hospital Based Facilities				Non-Hospital Based Facilities			
State	Total Number of Facilities	Number of Records	% of Total records	% records HCUP_AS = 0*	% records HCUP_AS > 0*	Total Number of Facilities	% of Total Records	% records HCUP_AS = 0*	% records HCUP_AS > 0*	Total Number of Facilities
California	852	2,998,825	59.9%	8.9%	91.1%	372	40.1%	2.7%	97.3%	480
Colorado	75	382,057	100.0%	0.6%	99.4%	75	0.0%	0.0%	0.0%	0
Florida	572	3,094,804	53.2%	7.8%	92.2%	221	46.8%	1.0%	99.0%	351
Iowa	118	421,244	100.0%	8.6%	91.4%	118	0.0%	0.0%	0.0%	0
Kentucky	104	768,054	98.8%	19.5%	80.5%	101	1.2%	19.6%	80.4%	3
Maine	38	3,485,720	100.0%	92.4%	7.6%	38	0.0%	0.0%	0.0%	0
Maryland	52	2,002,783	100.0%	74.6%	25.4%	52	0.0%	0.0%	0.0%	0
Michigan	137	1,686,988	98.0%	6.8%	93.2%	135	2.0%	2.3%	97.7%	2
Nebraska	85	180,184	100.0%	12.5%	87.5%	85	0.0%	0.0%	0.0%	0
New Jersey	83	394,249	100.0%	4.5%	95.5%	83	0.0%	0.0%	0.0%	0
New York	299	1,797,083	82.4%	5.3%	94.7%	223	17.6%	0.0%	100.0%	76
North Carolina	149	1,454,259	90.8%	4.4%	95.6%	116	9.2%	0.0%	100.0%	33
South Carolina	155	734,135	72.4%	0.0%	100.0%	71	27.6%	0.5%	99.5%	84
Utah	62	296,596	78.3%	0.2%	99.8%	47	21.7%	2.7%	97.3%	15
Vermont	14	111,791	100.0%	2.9%	97.1%	14	0.0%	0.0%	0.0%	0
Wisconsin	181	956,766	80.8%	5.9%	94.1%	129	19.2%	0.5%	99.5%	52
<b>Total</b>	<b>2,976</b>	<b>20,765,538</b>	<b>82.7%</b>	<b>32.2%</b>	<b>61.1%</b>	<b>1,880</b>	<b>17.3%</b>	<b>1.5%</b>	<b>98.5%</b>	<b>1,096</b>

\*These percentages are within group (e.g., records from hospital-based facilities or non-hospital-based facilities).

Note: This table includes all records contained in the SASD-CD, including records meeting the definition for ambulatory surgery (HCUP\_AS>0) and those not meeting the definition for ambulatory surgery (HCUP\_AS=0).

Table 3 compares the number of records from both hospital-based and non-hospital based facilities that were found both in the SASD-CD and the SEDD, which represents 5.5% of the total SASD-CD records. All of the records in both databases came from hospital-based facilities. Of the records that were found both in the SASD-CD and SEDD, 66.8% overall were classified as ambulatory surgery records. This percent varied by state; the records from Colorado, Kentucky, North Carolina, and Utah were almost entirely ambulatory surgeries, and from South Carolina were entirely ambulatory surgeries. However, fewer records (50% or fewer) from Maine, Maryland, New Jersey, and Vermont were ambulatory surgeries.

**Table 3: Number of Records in Both the 2007 SASD-CD and SEDD by State and Proportion of Ambulatory Surgeries in Both Databases**

State	Total Number of Records in Both SASD-CD and SEDD		Percent of Total Records from Hospital-Based Facilities Matched to SEDD in the SASD-CD	Number of Both SASD-CD and SEDD Records Identified as AS Surgeries*	Percent of Both SASD-CD and SEDD Records Identified as AS Surgeries*
	Number of Records from Hospital-Based Facilities	Number of Records from Non-Hospital Based Facilities			
California	5,515	0	0.2%	2,893	52.5%
Colorado	80,371	0	21.2%	80,316	99.9%
Florida	52,855	0	1.8%	39,378	74.5%
Iowa	45	0	0.0%	26	57.8%
Kentucky	69,814	0	11.3%	69,198	99.1%
Maine	33,040	0	12.4%	3,769	11.4%
Maryland	88,340	0	17.4%	27,002	30.6%
Michigan	284,691	0	18.1%	210,115	73.8%
Nebraska	5,723	0	3.6%	3,779	66.0%
New Jersey	19,551	0	14.0%	9,707	49.6%
New York	35,799	0	9.5%	22,415	62.6%
North Carolina	313,343	0	18.2%	281,664	89.9%
South Carolina	65,292	0	16.9%	65,288	100.0%
Utah	4,867	0	0.7%	4,864	99.9%
Vermont	1,212	0	0.4%	303	25.0%
Wisconsin	82,292	0	75.8%	62,819	76.3%
<b>Total</b>	<b>1,142,750</b>	<b>0</b>	<b>13.8%</b>	<b>883,536</b>	<b>66.8%</b>

\*HCUP\_AS>0

## Understanding Records Not Classified as Ambulatory Surgery

Understanding the types of procedures that are not classified as ambulatory surgery is important for research using the on SASD-CD data. Table 4 is an analysis of the top procedure categories for records not classified as ambulatory surgery according to the aforementioned definition of ambulatory surgery<sup>5</sup> (coded as HCUP\_AS=0) was conducted to learn more about these procedures. Because some states use both the ICD-9-CM and CPT coding system, AHRQ's Clinical Classification Software (CCS) was employed in this analysis. The two versions of the CCS classifications, one for ICD-9-CM procedure codes and another for CPT procedure codes, are reported. The ICD-9-CM CCS program aggregates procedure codes into 231 mutually exclusive procedure categories. The CPT CCS program aggregates procedure codes into the same 231 categories plus 13 additional, CPT-specific categories.

Table 4 presents the top CCS procedure categories, coded using the ICD-9-CM coding system, that did not qualify as ambulatory surgeries (HCUP\_AS=0) by type of facility. The top CCS procedure categories for non-ambulatory surgery in hospital-based facilities were: 182: *Mammography*, 227: *Other diagnostic procedures (interview; evaluation; consultation)*, 193: *Diagnostic ultrasound of heart (echocardiogram)*, 231: *Diagnostic therapeutic procedures*, and 224: *Cancer chemotherapy*. The CCS procedure category 231: *Diagnostic therapeutic procedures* includes miscellaneous diagnostic or therapeutic procedures such as therapeutic ultrasounds, insulin injections, allergy immunizations, light therapy, and acupuncture.

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<sup>5</sup> Ambulatory surgery services met at least one of the following criteria: 1) ICD-9-CM ranges included codes 00.50-86.99 (excluded were procedure codes in the range 88.4-88.59), 2) CPT procedures codes indicating surgery (yearly updates can be downloaded from Centers for Medicare and Medicaid Services (CMS) and generally include 10121-69930, G0105, G0121, and G0260), 3) presence of at least one revenue center code in the following range 036x (operating room services), 037x (anesthesia), or 049x (ambulatory surgical care), or 4) presence of a UB04 bill type of 83 indicating outpatient services.

**Table 4: Top 20 Procedure Categories (CCS) from ICD-9-CM Codes for Non-Ambulatory Surgeries in Hospital-Based and Non-Hospital Based Facilities, 2007 SASD-CD**

CCS Procedure Category	Number Occurring in Hospital-Based Facilities	Number Occurring in Non Hospital-Based Facilities
182: Mammography	107,534	1,753
227: Other diagnostic procedures (interview; evaluation; consultation)	68,270	185
193: Diagnostic ultrasound of heart (echocardiogram)	61,777	0
231: Other therapeutic procedures	50,522	323
224: Cancer chemotherapy	7,822	20
202: Electrocardiogram	6,497	0
191: Arterio- or venogram (not heart and head)	5,310	0
201: Cardiac stress tests	4,881	0
228: Prophylactic vaccinations and inoculations	4,433	0
206: Microscopic examination (bacterial smear; culture; toxicology)	4,285	1
47: Diagnostic cardiac catheterization; coronary arteriography	4,011	0
225: Conversion of cardiac rhythm	3,208	3
226: Other diagnostic radiology and related techniques	3,186	54
188: Cerebral arteriogram	3,136	0
198: Magnetic resonance imaging	3,011	905
222: Blood transfusion	2,959	5
197: Other diagnostic ultrasound	2,463	0
217: Other respiratory therapy	2,412	0
213: Physical therapy exercises; manipulation; and other procedures	2,239	1
183: Routine chest X-ray	2,113	0

Note: Non-ambulatory surgery records are records where HCUP\_AS=0. The Invalid or Inconsistent and HCPCS CCS procedure categories are not included.

Similar to Table 4, Table 5 presents the top CCS procedure categories by frequency, coded using the CPT coding system, that did not qualify as ambulatory surgeries (HCUP\_AS=0). The CPT coded records tended to differ from those coded by the ICD-9-CM coding system. The top procedure categories for CPT coding in hospital-based facilities were: 233: *Laboratory – Chemistry and Hematology*, 227: *Other diagnostic procedures (interview; evaluation; consultation)*, 231: *Other therapeutic procedures*, 235: *Other laboratory*, and 206: *Microscopic examination (bacterial smear; culture; toxicology)*, while 47: *Diagnostic cardiac catheterization; coronary arteriography*, 226: *Other diagnostic radiology and related techniques*, 243: *DME and supplies*, 240: *Medications (Injections, infusions and other forms)*, and 182: *Mammography* were the most common procedure categories in non-hospital based facilities. Some of the top CCS procedure categories found in the ICD-9-CM codes did not appear in the CPT codes, such as 224: *Cancer chemotherapy*, 191: *Arterio- or venogram (not heart and head)*, 201: *Cardiac stress tests*, 225: *Conversion of cardiac rhythm*, 188: *Cerebral arteriogram*, 198: *Magnetic resonance imaging*, 222: *Blood transfusion*, and 217: *Other respiratory therapy*. Likewise, some of the top CCS procedure categories coded using the CPT coding system did not appear in the top procedure categories captured by the ICD-9-CM coding system.



**Table 5: Top 20 Procedure Categories (CCS) from CPT Codes for Non-Ambulatory Surgeries in Hospital Based and Non-hospital based Facilities, 2007 SASD-CD**

CCS Procedure Category	Number Occurring in Hospital-based Facilities	Number Occurring in Non Hospital-Based Facilities
233: Laboratory - Chemistry and Hematology	5,307,401	571
227: Other diagnostic procedures (interview; evaluation; consultation)	1,810,682	1,127
231: Other therapeutic procedures	1,603,811	879
235: Other laboratory	1,219,443	1
206: Microscopic examination (bacterial smear; culture; toxicology)	850,502	7
213: Physical therapy exercises; manipulation; and other procedures	681,738	0
226: Other diagnostic radiology and related techniques	556,322	6,547
240: Medications (Injections, infusions and other forms)	404,498	3,593
47: Diagnostic cardiac catheterization; coronary arteriography	388,809	42,699
193: Diagnostic ultrasound of heart (echocardiogram)	299,670	39
182: Mammography	293,567	1,746
218: Psychological and psychiatric evaluation and therapy	261,649	445
197: Other diagnostic ultrasound	220,123	50
202: Electrocardiogram	210,130	459
228: Prophylactic vaccinations and inoculations	192,916	2
183: Routine chest X-ray	178,475	2
200: Nonoperative urinary system measurements	172,871	0
243: DME and supplies	164,087	4,059
211: Therapeutic radiology for cancer treatment	153,416	2
234: Pathology	141,164	700

Note: Non-ambulatory surgery records are records where HCUP\_AS=0. The Invalid or Inconsistent and HCPCS CCS procedure categories are not included.

## **PART II: UNDERSTANDING AMBULATORY SURGERY RECORDS CONTAINED IN THE 2007 SASD-CD**

### **Introduction**

Part II presents comparisons between the SASD-CD and AHA Annual Survey Database and examines the types of procedure categories that are captured in the 2007 SASD-CD, limited to ambulatory surgeries only. This section also investigates the most common types of procedure categories in hospital-based facilities and in non-hospital based facilities and the extent to which the two coding systems (ICD-9-CM and CPT) are used in the States contributing to the 2007 SASD-CD. Additionally, this section demonstrates the research utility of AHRQ's Clinical Classification Software (CCS) for aggregating ICD-9-CM or CPT procedure codes into mutually exclusive procedure categories. In the 2007 SASD-CD, the most common procedures tend to be concentrated in a few major body system procedure categories.

### **Comparative Ambulatory Surgery Database**

In order to describe the completeness of the 2007 SASD-CD, the database was compared with the Annual Survey Database, fielded and maintained by the American Hospital Association (AHA). This database contains only summarized, facility-level data and does not contain visit-level data. The AHA Annual Survey Database provides information on several types of ambulatory surgery facilities, as discussed in Part I and shown in Table 1.

### **Comparisons between the SASD-CD and the AHA Annual Survey Data**

Table 6 compares 2007 SASD-CD surgical visit<sup>6</sup> counts from the 2007 AHA data for 16 states. These counts are limited to the subset of visits that meet the criteria for ambulatory surgery (HCUP\_AS>0). For each state, the table presents the number of facilities and the number of surgical visits for each combination of data sources, stratified by type of facility.<sup>7</sup> The facility types considered are based on the AHA definitions of hospital-based facilities and freestanding facilities with a hospital association (Table 1). Facilities not matched to the AHA Annual Survey data were classified as non-hospital based facilities (Table 6).

Note that Table 6 separately identifies hospital-based facilities and freestanding facilities with a hospital affiliation. Further, hospital-based facilities include both of the following AHA categories: 1) hospital-based and controlled and 2) hospital-based with third party control. In contrast, Table 2 combines hospital-based facilities and freestanding facilities with a hospital affiliation into the hospital-based facilities category. See Table 1 for the complete list of AHA categories.

As an example, for California, the first row shows that 219 hospital-based facilities were present in both data sources, while 75 were present in the AHA database only. Of the freestanding facilities with a hospital affiliation, 145 were present in both data sources and 10 were in the AHA database only. There were 482 non-hospital based facilities in CA in the SASD-CD. For hospital-based facilities in California, the SASD-CD reported 731,582 surgical visits, and the AHA reported 657,856 surgical visits, of which 45,572 (6.9%) were reported in the AHA

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<sup>6</sup> The term "surgical visit" is used instead of surgeries because multiple surgeries may be performed in one ambulatory surgery visit.

<sup>7</sup> Matching between facilities in the SASD-CD and AHA was not necessarily one-to-one, and many-to-many matching may have occurred. Each facility in the AHA is assigned an IDNUMBER, while hospital identifiers in the SASD-CD (DSHOSPID) are provided by the data source. In rare occasions, multiple DSHOSPIDs in the SASD-CD may be matched to the same AHA IDNUMBER, such as hospitals in a health system, or multiple AHA IDNUMBERS may also be corresponding to the same SASD-CD DSHOSPID due to hospital mergers and divisions.

database only. For freestanding facilities with a hospital affiliation, 889,926 surgical visits were reported in the SASD-CD, and the AHA reported 650,403, with 10,075 (1.5%) of the reported surgical visits only recorded by AHA. The SASD-CD reported 1,184,473 surgical visits from non-hospital based facilities in California.

The “Total” portion of Table 6 also demonstrates how the SASD-CD and the AHA files compare. For hospital-based facilities matched between these two files (the row labeled “SASD-CD+AHA” within the “Total” section at the bottom of the table), a greater number of SASD-CD surgical visit counts (3,965,132) than AHA surgical visit counts (2,937,581) were noted. Again, for freestanding facilities with hospital affiliations, the matched SASD-CD surgical visit counts (7,012,522) were greater than the matched AHA surgical visit counts (4,578,089). Table 6 shows a total of 3,596,929 ambulatory surgical visits from non-hospital-based facilities were recorded in the SASD-CD. New Jersey had more AHA surgical visit counts than the SASD-CD counts in hospital-based and freestanding facilities with a hospital affiliation. Maine, Michigan, North Carolina, and Vermont exhibited more than twice the number of SASD-CD surgical visits than AHA surgical visits for hospital-based and freestanding facilities with a hospital affiliation combined.

Between SASD-CD and AHA, 1,048 hospital-based and 801 freestanding facilities matched for a total of 1,849 matching facilities. Within the SASD-CD, 1,048 facilities were hospital-based (36%), 801 were freestanding with hospital affiliations (27%) and 1,093 were non-hospital based facilities (37%). Within the SASD-CD, 27% (3,965,132) of the surgical visits came from hospital-based facilities. The freestanding facilities with a hospital affiliation performed 48% of the surgical visits contained in the SASD-CD (7,012,522), and non-hospital based facilities provided 25% (3,596,929) of the ambulatory surgical visits. Of the 14,574,583 ambulatory surgical visits in the SASD-CD, 75% were contained in the 1,849 facilities matched to the AHA file (Table 6).<sup>8</sup> It is important to note that, while records in the SASD-CD can be categorized based on the HCUP\_AS>0 ambulatory surgery definition, the AHA provides aggregate counts of surgeries.

The total number of facilities reported in Table 6 (3,438) exceeds the number of SASD-CD facilities reported in Table 2 (2,976), since there are three types of facilities: those that match between SASD-CD and the AHA (1,849), those in the SASD-CD only (1,093), and those in the AHA only (496). It is also important to recognize that the facility and discharge totals might possibly double-count some units contained in both files that could not be matched for an unknown reason.

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<sup>8</sup> For the remaining 34 states plus Washington D.C. and the U.S. territories, the AHA survey contained 4,581 AS facilities and 7,821,653 ambulatory surgical visits.

**Table 6: Number of Facilities and Surgical Visits by State and Data Source Available through the HCUP Central Distributor, 2007 SASD-CD Ambulatory Surgeries**

State	Data Source	Total Number of Facilities			Number of SASD-CD Surgeries			Number of AHA Surgeries		
		Hospital-Based	Non-Hospital Based with Hospital Affiliation	Non-Hospital Based	Hospital-Based	Free-standing with Hospital Affiliation	Non-Hospital Based	Hospital-Based	Free-standing with Hospital Affiliation	Non-Hospital Based
California	SASD-CD + AHA	219	145	0	731,582	889,926	0	612,284	640,328	0
	SASD-CD only	0	0	482	0	0	1,184,473	0	0	0
	AHA only	75	10	0	0	0	0	45,572	10,075	0
	<b>Total</b>	<b>294</b>	<b>155</b>	<b>482</b>	<b>731,582</b>	<b>889,926</b>	<b>1,184,473</b>	<b>657,856</b>	<b>650,403</b>	<b>0</b>
Colorado	SASD-CD + AHA	43	31	0	142,289	237,520	0	75,189	109,017	0
	SASD-CD only	0	0	1	0	0	57	0	0	0
	AHA only	18	4	0	0	0	0	7,294	7,735	0
	<b>Total</b>	<b>61</b>	<b>35</b>	<b>1</b>	<b>142,289</b>	<b>237,520</b>	<b>57</b>	<b>82,483</b>	<b>116,752</b>	<b>0</b>
Florida	SASD-CD + AHA	111	106	0	583,483	923,899	0	351,151	448,985	0
	SASD-CD only	0	0	351	0	0	1,444,306	0	0	0
	AHA only	59	4	0	0	0	0	25,055	2,192	0
	<b>Total</b>	<b>170</b>	<b>110</b>	<b>351</b>	<b>583,483</b>	<b>923,899</b>	<b>1,444,306</b>	<b>376,206</b>	<b>451,177</b>	<b>0</b>
Iowa	SASD-CD + AHA	98	20	0	204,409	180,601	0	166,659	171,098	0
	SASD-CD Only	0	0	0	0	0	0	0	0	0
	AHA only	7	1	0	0	0	0	3,206	2,312	0
	<b>Total</b>	<b>105</b>	<b>21</b>	<b>0</b>	<b>204,409</b>	<b>180,601</b>	<b>0</b>	<b>169,865</b>	<b>173,410</b>	<b>0</b>
Kentucky	SASD-CD + AHA	65	34	0	265,123	345,410	0	160,033	214,770	0
	SASD-CD only	0	0	3	0	0	7,925	0	0	0
	AHA only	27	6	0	0	0	0	12,740	5,071	0
	<b>Total</b>	<b>92</b>	<b>40</b>	<b>3</b>	<b>265,123</b>	<b>345,410</b>	<b>7,925</b>	<b>172,773</b>	<b>219,841</b>	<b>0</b>

State	Data Source	Total Number of Facilities			Number of SASD-CD Surgeries			Number of AHA Surgeries		
		Hospital-Based	Non-Hospital Based with Hospital Affiliation	Non-Hospital Based	Hospital-Based	Free-standing with Hospital Affiliation	Non-Hospital Based	Hospital-Based	Free-standing with Hospital Affiliation	Non-Hospital Based
Maine	SASD-CD + AHA	21	16	0	98,776	167,235	0	44,362	84,569	0
	SASD-CD Only	0	0	0	0	0	0	0	0	0
	AHA only	3	2	0	0	0	0	0	2,613	0
	<b>Total</b>	<b>24</b>	<b>18</b>	<b>0</b>	<b>98,776</b>	<b>167,235</b>	<b>0</b>	<b>44,362</b>	<b>87,182</b>	<b>0</b>
Maryland	SASD-CD + AHA	15	34	0	97,030	409,648	0	75,892	274,876	0
	SASD-CD only	0	0	1	0	0	1,372	0	0	0
	AHA only	20	5	0	0	0	0	9,593	1,659	0
	<b>Total</b>	<b>35</b>	<b>39</b>	<b>1</b>	<b>97,030</b>	<b>409,648</b>	<b>1,372</b>	<b>85,485</b>	<b>276,535</b>	<b>0</b>
Michigan	SASD-CD + AHA	54	79	0	312,914	1,223,939	0	136,828	583,548	0
	SASD-CD only	0	0	4	0	0	37,690	0	0	0
	AHA only	39	11	0	0	0	0	23,220	5,760	0
	<b>Total</b>	<b>93</b>	<b>90</b>	<b>4</b>	<b>312,914</b>	<b>1,223,939</b>	<b>37,690</b>	<b>160,048</b>	<b>589,308</b>	<b>0</b>
Nebraska	SASD-CD + AHA	76	9	0	85,472	72,236	0	85,932	53,782	0
	SASD-CD Only	0	0	0	0	0	0	0	0	0
	AHA only	10	1	0	0	0	0	7,394	0	0
	<b>Total</b>	<b>86</b>	<b>10</b>	<b>0</b>	<b>85,472</b>	<b>72,236</b>	<b>0</b>	<b>93,326</b>	<b>53,782</b>	<b>0</b>
New Jersey	SASD-CD + AHA	39	39	0	147,979	214,926	0	150,954	229,701	0
	SASD-CD only	0	0	5	0	0	13,724	0	0	0
	AHA only	29	2	0	0	0	0	5,449	0	0
	<b>Total</b>	<b>68</b>	<b>41</b>	<b>5</b>	<b>147,979</b>	<b>214,926</b>	<b>13,724</b>	<b>156,403</b>	<b>229,701</b>	<b>0</b>

State	Data Source	Total Number of Facilities			Number of SASD-CD Surgeries			Number of AHA Surgeries		
		Hospital-Based	Non-Hospital Based with Hospital Affiliation	Non-Hospital Based	Hospital-Based	Free-standing with Hospital Affiliation	Non-Hospital Based	Hospital-Based	Free-standing with Hospital Affiliation	Non-Hospital Based
New York	SASD-CD + AHA	99	123	0	536,289	863,159	0	492,994	835,886	0
	SASD-CD only	0	0	77	0	0	319,568	0	0	0
	AHA only	56	7	0	0	0	0	43,043	7,774	0
	<b>Total</b>	<b>155</b>	<b>130</b>	<b>77</b>	<b>536,289</b>	<b>863,159</b>	<b>319,568</b>	<b>536,037</b>	<b>843,660</b>	<b>0</b>
North Carolina	SASD-CD + AHA	59	56	0	344,660	909,953	0	166,152	381,763	0
	SASD-CD only	0	0	34	0	0	140,960	0	0	0
	AHA only	28	6	0	0	0	0	16,596	7,195	0
	<b>Total</b>	<b>87</b>	<b>62</b>	<b>34</b>	<b>344,660</b>	<b>909,953</b>	<b>140,960</b>	<b>182,748</b>	<b>388,958</b>	<b>0</b>
South Carolina	SASD-CD + AHA	39	31	0	216,475	314,975	0	120,262	156,801	0
	SASD-CD only	0	0	83	0	0	201,636	0	0	0
	AHA only	24	6	0	0	0	0	5,691	6,092	0
	<b>Total</b>	<b>63</b>	<b>37</b>	<b>83</b>	<b>216,475</b>	<b>314,975</b>	<b>201,636</b>	<b>125,953</b>	<b>162,893</b>	<b>0</b>
Utah	SASD-CD + AHA	32	15	0	138,223	93,681	0	74,097	65,440	0
	SASD-CD only	0	0	15	0	0	62,537	0	0	0
	AHA only	9	3	0	0	0	0	2,340	1,878	0
	<b>Total</b>	<b>41</b>	<b>18</b>	<b>15</b>	<b>138,223</b>	<b>93,681</b>	<b>62,537</b>	<b>76,437</b>	<b>67,318</b>	<b>0</b>
Vermont	SASD-CD + AHA	10	4	0	47,382	61,206	0	24,848	19,952	0
	SASD-CD Only	0	0	0	0	0	0	0	0	0
	AHA only	1	2	0	0	0	0	0	1,075	0
	<b>Total</b>	<b>11</b>	<b>6</b>	<b>0</b>	<b>47,382</b>	<b>61,206</b>	<b>0</b>	<b>24,848</b>	<b>21,027</b>	<b>0</b>

State	Data Source	Total Number of Facilities			Number of SASD-CD Surgeries			Number of AHA Surgeries		
		Hospital-Based	Non-Hospital Based with Hospital Affiliation	Non-Hospital Based	Hospital-Based	Free-standing with Hospital Affiliation	Non-Hospital Based	Hospital-Based	Free-standing with Hospital Affiliation	Non-Hospital Based
Wisconsin	SASD-CD + AHA	68	59	0	278,169	449,618	0	199,944	307,573	0
	SASD-CD only	0	0	52	0	0	182,681	0	0	0
	AHA only	16	5	0	0	0	0	9,218	0	0
	<b>Total</b>	<b>84</b>	<b>64</b>	<b>52</b>	<b>278,169</b>	<b>449,618</b>	<b>182,681</b>	<b>209,162</b>	<b>307,573</b>	<b>0</b>
Total	SASD-CD + AHA	1,048	801	0	3,965,132	7,012,522	0	2,937,581	4,578,089	0
	SASD-CD only	0	0	1,093	0	0	3,596,929	0	0	0
	AHA only	421	75	0	0	0	0	216,411	61,431	0
	<b>Total</b>	<b>1,469</b>	<b>876</b>	<b>1,093</b>	<b>3,965,132</b>	<b>7,012,522</b>	<b>3,596,929</b>	<b>5,875,162</b>	<b>4,639,520</b>	<b>0</b>

Note: This table represents only HCUP\_AS>0 records. Therefore, the counts of facilities may not be the same as those presented in Table 1, which includes facilities that contribute HCUP\_AS = 0 records.

## Types of Procedure Categories Defined as Ambulatory Surgery in the 2007 SASD-CD

An important consideration when using the SASD-CD is the using the SASD-CD is the alignment of surgeries reported using two different coding systems, ICD-9-CM and CPT. Tables 7 and 8 address this consideration, using the 16 major body systems. As discussed above, this classification was accomplished using AHRQ's Clinical Classification Software (CCS). There are two versions of the software, one for ICD-9-CM procedure codes and another for CPT procedure codes. As mentioned previously, the ICD-9-CM CCS program aggregates procedure codes into 231 mutually exclusive procedure categories. The CPT CCS program aggregates procedure codes into the same 231 categories plus 13 additional, CPT-specific categories. For this table, these categories were grouped into 16 major body systems for records in the SASD-CD that met the HCUP\_AS>0 ambulatory surgery criteria. For both coding systems, all listed procedures are examined (i.e., this table includes all procedures on any record that meets the HUCP AS definition). This may include procedures that, alone, would not qualify as an ambulatory surgery (e.g., diagnostic procedures). Missing values are ignored.

As shown in Table 7, the rank orderings of the surgery categories for hospital-based facilities are similar, with notable exceptions. One exception, *Miscellaneous Diagnostics and Therapeutic* procedures, represented 15.5% of the ICD-9-CM procedures compared to 57.1% of the CPT procedures. Also, the number of *Invalid or Inconsistent* category was less for ICD-9-CM CCS codes (0.7%) compared to CPT CCS (3.0%).

Table 7 also demonstrates that ambulatory surgery was concentrated in treatments for only a few body systems in hospital-based facilities. For instance, digestive system-related surgeries accounted for 21.2% of the ICD-9-CM based procedures and 10.6% of the CPT based procedures. The top three body systems, not counting the *Miscellaneous Diagnostics and Therapeutic* category, *Digestive System*, *Integumentary System*, and *Musculoskeletal System* accounted for 43.5% of ICD-9-CM based procedures and 21.4% of all CPT based procedures, and the top five *Digestive*, *Integumentary*, *Musculoskeletal*, *Cardiovascular* and *Eye* systems accounted for 58% of procedures with ICD-9-CM based procedures and 28.4% of the CPT coded procedures.



**Table 7: Number of ICD-9-CM and CPT Procedure Codes by CCS Hospital-Based Facilities, 2007 SASD-CD Ambulatory Surgery Records**

CCS Description	Number of ICD-9-CM Procedure Codes		Number of CPT Procedure Codes	
	Count	Percent	Count	Percent
Digestive System	2,871,610	21.2%	3,763,884	10.6%
Miscellaneous Diagnostics and Therapeutic*	2,102,186	15.5%	20,175,252	57.1%
Integumentary System	1,534,342	11.3%	2,018,282	5.7%
Musculoskeletal System	1,493,130	11.0%	1,810,375	5.1%
Cardiovascular System	1,060,729	7.8%	1,616,806	4.6%
Eye	909,761	6.7%	854,722	2.4%
Nervous System	796,758	5.9%	1,033,751	2.9%
Female Genital System	653,500	4.8%	703,426	2.0%
Nose, Mouth, and Pharynx	645,925	4.8%	642,466	1.8%
Urinary System	509,729	3.8%	565,219	1.6%
Ear	249,683	1.8%	240,667	0.7%
Respiratory System	172,345	1.3%	271,138	0.8%
Obstetrical	152,686	1.1%	230,235	0.7%
Male Genital System	139,794	1.0%	180,544	0.5%
Heme and Lymphatic System	100,065	0.7%	104,391	0.3%
Invalid or Inconsistent**	96,401	0.7%	1,056,820	3.0%
Endocrine System	49,210	0.4%	39,444	0.1%
HCPCS***	0	0.0%	38,697	0.1%
<b>Total</b>	<b>13,537,854</b>	<b>100.0%</b>	<b>35,346,119</b>	<b>100.0%</b>

\*This category refers to codes that have CCS values of 176 to 231. Such procedures captured in this range include other organ transplant, mammography, magnetic resonance imaging, blood transfusion, and cancer chemotherapy.

\*\*A validation algorithm is used to identify invalid codes based on logic identifying all valid codes in a certain time period.

Inconsistent codes are identified when comparing the nature of the codes to patient demographic characteristics.

\*\*\*Refers to CPT/ Healthcare Common Procedure Coding System (HCPCS) Level I codes that cannot be classified using the CCS system.

Note: Healthcare Common Procedure Coding System (HCPCS) National Level II codes are often used with CPT codes to enhance their scope. They are not used to categorize procedures in this table because no mapping to CCS exists at the present time.

As seen in Table 8, the rank orderings of surgery categories between coding systems for non-hospital based facilities were different than those for hospital-based facilities. The category *Miscellaneous Diagnostics and Therapeutic* was utilized in 4.8% of the ICD-9-CM procedures and 4.9% of the CPT procedures. Between the coding systems, the percentages of records for each CCS procedure category were more similar than in hospital-based facilities.

Similar to the hospital-based facilities, the top ranked surgery category was the *Digestive System* in non-hospital based facilities. However, the ensuing categories differed from the hospital-based facilities. For hospital-based facilities, *Integumentary System*, *Musculoskeletal System*, *Cardiovascular System*, and *Eye* were the second through fifth ranked surgery categories for the major organ systems in that order. However, for the non-hospital based facilities, *Eye*, *Musculoskeletal System*, *Nervous System*, and the *Nose, Mouth, and Pharynx* made up the second through fifth ranked surgery categories for the major organ systems. It appears that non-hospital based facilities were more focused on a small proportion of body systems, since overall, the top five most common surgical categories in non-hospital based facilities accounted for 81.2% of all surgeries performed, according to the ICD-9-CM coding system.

**Table 8: Number of ICD-9-CM and CPT Surgeries by CCS Procedure Category in Non-Hospital Based Facilities, 2007 SASD-CD Ambulatory Surgeries**

CCS Description	Number of ICD-9-CM Procedure Codes		Number of CPT Procedure Codes	
	Count	Percent	Count	Percent
Digestive System	681,902	30.0%	1,646,688	33.2%
Eye	394,574	17.4%	777,289	15.7%
Musculoskeletal System	343,256	15.1%	661,309	13.3%
Nervous System	324,986	14.3%	831,693	16.8%
Miscellaneous Diagnostics and Therapeutic*	109,807	4.8%	242,926	4.9%
Nose, Mouth, and Pharynx	100,420	4.4%	157,432	3.2%
Integumentary System	95,068	4.2%	228,499	4.6%
Urinary System	54,026	2.4%	80,300	1.6%
Ear	47,635	2.1%	62,276	1.3%
Female Genital System	43,710	1.9%	101,042	2.0%
Invalid or Inconsistent**	33,654	1.5%	82,370	1.7%
Male Genital System	22,233	1.0%	35,191	0.7%
Cardiovascular System	11,083	0.5%	34,961	0.7%
Respiratory System	6,305	0.3%	7,187	0.1%
Heme and Lymphatic System	2,850	0.1%	4,580	0.1%
Obstetrical	829	0.0%	3,360	0.1%
Endocrine System	252	0.0%	387	0.0%
HCPCS***	0	0.0%	261	0.0%
<b>Total</b>	<b>2,272,590</b>	<b>5.6%</b>	<b>4,957,751</b>	<b>5.6%</b>

\*This category refers to codes that have CCS values of 176 to 231. Such procedures captured in this range include other organ transplant, mammography, magnetic resonance imaging, blood transfusion, and cancer chemotherapy.

\*\*A validation algorithm is used to identify invalid codes based on logic identifying all valid codes in a certain time period. Inconsistent codes are identified when comparing the nature of the codes to patient demographic characteristics.

\*\*\*Refers to CPT/ Healthcare Common Procedure Coding System (HCPCS) Level I codes that cannot be classified using the CCS system.

Note: Healthcare Common Procedure Coding System (HCPCS) National Level II codes are often used with CPT codes to enhance their scope. They are not used to categorize procedures in this table because no mapping to CCS exists at the present time.

### Comparisons between ICD-9-CM Codes and CPT Codes

Appendix A provides additional information for analysts who are interested in working with SASD-CD data. Comparisons are made between the ICD-9-CM and CPT procedure codes, including direct, record-level comparisons for states that use both systems. The states that use each coding system are identified, and the numbers of SASD-CD surgical visit records (meeting the HCUP\_AS>0 ambulatory surgery criteria) using each system are presented. Similarities and differences between the ICD-9-CM and CPT procedure coding systems are illustrated by comparing CCS categories for both coding systems. The level of agreement between the two systems based on data from states that use both procedure coding systems is also evaluated. Therefore, the information presented in Appendix A also provides important information regarding which coding system to use to study ambulatory surgery and the extent to which ambulatory surgeries are dually coded in states that use both coding systems.

The number of procedure codes reported on a record depends on the file type from which they were obtained. The lowest average number of procedure codes on a surgical visit record was reported using the ICD-9-CM coding system. Overall, more CPT procedure codes were used on

a surgical visit record, with the average number being higher for the states where these codes were included in the line item charge detail files. These consist of files with surgical visit records providing detailed information about individual charges. For these states, there is no upper limit on the number of procedure codes per surgical visit record.

To obtain a complete view of the procedures performed during a visit, it is generally necessary to refer to both the ICD-9-CM and CPT procedure codes. In some states, including Kentucky and North Carolina, almost every surgical visit record with ICD-9-CM procedure codes also provides CPT procedure codes. For the remainder of the states providing codes in both systems, the coding frequencies are mixed: some surgical visit records contain only ICD-9-CM procedure codes or only CPT procedure codes, while some records contain both types of procedure codes.

Appendix A presents a comparison of the two coding systems by body system within each state to demonstrate which coding system or states should be used in a research project, depending on the body system or states of interest. Appendix A also contains additional details on the states that use both coding systems.

When ICD-9-CM and CPT procedure codes are both present on a surgical visit record, they often provide different information. The frequency with which the information provided in the two systems translates to the same set of CCS categories varies widely, ranging from 2.4% to 72.1% based on the CPT coding system, depending on the state (Table A-3).

For surgical visit records with only a single ICD-9-CM and CPT procedure code, the CCS categories matched more than 75% of the time for eight of 10 states and 65.5% of the time in the state with the lowest match rate (Wisconsin) (Table A-4). The CPT CCS matched the ICD-9-CM CCS more than 90% of the time in eight of 10 categories, and the ICD-9-CM CSS matched the CPT CCS over 90% of the time in six of 10 categories (Appendix A).

Appendix B contains a table presenting CCS statistics derived from the ICD-9-CM and CPT procedures for records meeting the HCUP\_AS>0 ambulatory surgery criteria in all of the HCUP SASD-CD states by body system. In Table B-1, the procedure range captured by each CCS category is shown under each column heading, denoting the major body system, for HCUP\_AS>0 records only. Two additional CCS categories are also presented as columns: *HCPCS* codes, which are only encountered in conjunction with CPT codes, and the *Invalid or Inconsistent* category, capturing records that were found to include values that are inconsistent or invalid with the patient demographic characteristics available. This latter category includes only those surgical visit records with no valid procedure codes and one or more invalid or inconsistent codes. The rows of this table, organized by state, present the number of records for each CCS procedure category coded using the ICD-9-CM and CPT coding systems. Because a single record can have more than one procedure, it is important to note that more than one body system code can appear on a single record. The percentages represent the proportion of surgeries from a specific state that included one or more body system codes in a category in relation to the total number of records for that state. Because there may be more than one procedure code per ambulatory surgery record, the sum of the percentages for each state does not add to one.

States that use ICD-9-CM procedure codes on more than half their records, such as Wisconsin, generally have a greater number of observations for ICD-9-CM than CPT procedure codes for a particular body system.<sup>9</sup> For the digestive system (CCS 68-99), for example, Wisconsin has

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<sup>9</sup> See Table 2 in Appendix A for a report on the percent of records with each type of coding system.

333,652 procedure codes using the ICD-9-CM coding system compared to 246,329 codes using the CPT coding system (Table B-1). Other states, such as Nebraska, have more CPT codes than ICD-9-CM codes; more than 92.3% of Nebraska records use only the CPT coding system (Table A-2). Nebraska has more CPT codes than ICD-9-CM codes for all 16 body system categories.

The influence of the reporting practices and capabilities of the states may be seen by comparing the percentages reported between coding systems for a single category. For example, in Kentucky where the ICD-9-CM and CPT systems each have six fields on a record, the percentage of records with digestive codes are nearly equal (32.1% ICD-9-CM vs. 31.9% CPT). In contrast, in Florida where there are five ICD-9-CM fields and 10 CPT fields, the percentage of records with digestive codes exhibits a larger difference between the two systems (22.3% ICD-9-CM vs. 34.4% CPT).

Appendix B also reflects the variation in the use of both ICD-9-CM and CPT procedure coding by state in the SASD-CD. New Jersey and South Carolina use only ICD-9-CM procedure coding in their SASD-CD data. Conversely, California, Iowa, Maine, and Maryland use only CPT coding. Hence, some states presented in Appendix B do not have observations for a particular procedure coding system. In addition, the high percentage of HCPCS codes in some states, for example New York and Wisconsin, means that using both ICD-9-CM and CPT codes may not completely characterize care provided in these states. Analysts should be aware of the utilization of different procedure coding systems during their analyses of SASD-CD data.

## **CONCLUSION**

The types of facilities providing ambulatory surgery records to the 2007 SASD-CD vary substantially across states, while the proportion of records in the 2007 SASD-CD meeting the definition of ambulatory surgery is higher (98.5%) among non-hospital based facilities than hospital-based facilities (61.1%).

By matching SASD-CD facilities with those reported in the AHA Survey, it was possible to classify the SASD-CD facilities as either hospital-based or non-hospital based. The SASD-CD from some states appear to be limited mainly to hospital-based facilities, while the SASD-CD from other states also includes a substantial number of non-hospital based facilities.

The SASD-CD has several advantages over the AHA database. The SASD-CD uses discharge-level data and does not rely on surveys with aggregate counts provided on the AHA Survey. In addition, the SASD-CD contains information from both hospital-based and non-hospital based facilities; the AHA survey only includes hospital-based facilities. This difference enables the SASD-CD to include more facilities and surgeries than the AHA Survey data.

In terms of the types of surgeries recorded in the SASD-CD files, the greatest proportions of ambulatory surgeries are related to the digestive, musculoskeletal, and integumentary systems.

Overall, the pattern of use by body system appears relatively consistent among states. However, for states that use both coding systems such as Nebraska, which have low amounts of overlap between ICD-9-CM and CPT procedure coding, reporting of use is split between the two systems. In these cases, it is particularly important to use information from both procedure coding systems to obtain a complete picture of the procedures performed. Alternatively, researchers must be cautious when analyzing ambulatory surgeries in states that use both coding systems to ensure that surgeries are not counted twice in states in which a surgery is coded twice per record.

Substantial variability exists in the utilization of procedures for particular body systems. A notable example is found in the particularly high utilization of procedures on the digestive system and on the musculoskeletal system. Such variability in healthcare needs could serve as an interesting research application of the SASD-CD. Additionally, assessing differences in the volume of ambulatory surgeries across body systems or states could also be a valuable research application of the SASD-CD data.

The oftentimes wide disparity in utilization displayed for the category *Miscellaneous Diagnostic and Therapeutic* procedures (Table B-1), which might be expected given the different emphasis of this category of procedures that includes organ transplant, mammography, magnetic resonance imaging, blood transfusion, and cancer chemotherapy by the coding systems, was evident in the data. The percentage of codes reported using the ICD-9-CM coding system occurred between less than one percent to 36.7%, while CPT procedure codes ranged from 2.5% to 84.7%. Even those states with substantial coding in both systems, such as North Carolina, the *Miscellaneous Diagnostic and Therapeutic* category was coded 23.0% of the time using ICD-9-CM codes and 23.5% of the time using the CPT coding system (Table B-1). This analysis demonstrated that, although a substantial amount of information is duplicated between the two coding systems, there is still an appreciable amount of information that is unique to one or the other set of codes. This is especially important for the *Miscellaneous Diagnostic and Therapeutic* category.

Employing the CCS as a means to compare and combine information from the ICD-9-CM and CPT procedure codes proved to be a fruitful approach. Using it as a grouper allowed consistent comparisons without encountering the problems associated with attempting to translate directly between incompatible coding systems.

In conclusion, the 2007 SASD-CD is a rich source of ambulatory surgery data, providing information on 14,574,583 ambulatory surgery visits in a total of 2,942 facilities in 16 states. The SASD-CD is also an important resource for studying ambulatory surgery in non-hospital based facilities, despite not having a comparison source of information. As this report demonstrates, over 98% of records from these facilities are ambulatory surgeries, concentrated in a small number of body systems, which may have implications for research involving those body systems (e.g., the number of surgeries may be underestimated if non-hospital based facilities are not included). These files can be useful to a broad range of researchers and policy analysts, particularly for state-specific analyses.

## **APPENDIX A**

### **Comparison of ICD-9-CM and CPT Procedure Code Use by Select State**

## **APPENDIX A: COMPARISON OF ICD-9-CM AND CPT PROCEDURE CODE USE BY SELECT STATE**

This appendix makes comparisons between ICD-9-CM procedure codes and CPT procedure codes among states that employ both coding systems.

The International Classification of Diseases, 9th Revision, Clinical Modification (ICD-9-CM) codes was originally developed as a modification of the World Health Organization (WHO) ICD system for statistical and epidemiological research. Eventually they became a means to calculate diagnosis related groups (DRGs) for inpatient prospective payment systems. The ICD-9-CM procedure codes are used to classify surgical procedures and some diagnostic procedures in the inpatient setting. The procedures are organized by body system (e.g., nervous, endocrine, respiratory, digestive, obstetrical procedures, musculoskeletal, etc.). Procedures are coded using approximately 3,500 codes comprised of two main digits followed by a decimal and one or two additional digits.

Current Procedural Terminology (CPT), developed by the American Medical Association (AMA), is a collection of terms and codes to describe medical, surgical, and diagnostic services and procedures performed by physicians in the outpatient setting. Because they were created for physician billing purposes, the CPT codes are significantly more detailed than the ICD-9-CM codes. In addition to a surgery section which parallels the ICD-9-CM procedure codes, the CPT codes are also used for evaluation and management, anesthesia, radiology, lab and pathology, and medicine. CPT codes are level I of the Health Care Procedure Coding System (HCPCS) and comprise a major portion of the Health Care Procedure Coding System (HCPCS). Procedures are coded using approximately 8,800 codes comprised of five digits, to which two-digit modifiers may be added to explain unusual circumstances. CPT or HCPCS codes are becoming the standard for outpatient data because they are required for ambulatory patient classification systems, such as the Ambulatory Payment Classification (APC) and the Ambulatory Patient Grouping (APG).

Table A-1 lists the states that use each coding system. There are two types of records that contain CPT codes: the “core” files and the “charge detail” files. The core file supplies a fixed number of CPT code variables on a single record for each surgical visit. In contrast, the charge detail file may include a CPT code for each individual charge. A single surgical visit is represented by as many records as necessary to supply all of the charge information. As shown in Table A-1, most states that supply CPT codes provide a core file along with diagnostic and demographic information. One state, New York, supplies CPT codes solely through the charge detail file.

For New York, analysts must use the “charge detail” file to identify CPT codes related to the surgery. The HCUP\_AS variable is not available on the “charge detail” file. However, the HCUP\_AS variable in the “core file” file is set using the CPT information from the “charge detail” file for this State. For other States with CPT codes on both the “core” and “charge detail” files in 2007, analysts should use both files to identify all CPT codes related to the surgery.

States that use both coding systems include: Colorado, Florida, Kentucky, Michigan, Nebraska, New York, North Carolina, Utah, Vermont, and Wisconsin. For users of the SASD-CD, understanding which coding system a state uses is important because there are subtle differences between the two systems.

**Table A-1: Use of ICD-9-CM Procedure Codes and the CPT Procedure Codes Available through the HCUP Central Distributor, by State**

State	ICD-9-CM Procedures	Core File CPT Variables	Charge Detail File CPT Records
California	N/A	✓	N/A
Colorado	✓	✓	N/A
Florida	✓	✓	N/A
Iowa	N/A	✓	✓
Kentucky	✓	✓	N/A
Maine	N/A	✓	✓
Maryland	N/A	✓	✓
Michigan	✓	✓	N/A
Nebraska	✓	✓	✓
New Jersey	✓	N/A	N/A
New York	✓	N/A	✓
North Carolina	✓	✓	N/A
South Carolina	✓	N/A	N/A
Utah	✓	✓	N/A
Vermont	✓	✓	✓
Wisconsin	✓	✓	✓

For states that use both procedure coding systems, the average number of ICD-9-CM procedure codes is 1.6 compared to 2.5 CPT codes in the core file and 4.9 CPT codes in the charge detail file. Thus, there tend to be more CPT codes than ICD-9-CM codes, especially if the CPT codes are derived from the charge detail file.

Among states that employ both procedure coding systems, Table A-2 shows the percentage of records that have 1) both CPT procedure codes and ICD-9-CM procedure codes, 2) only ICD-9-CM procedure codes, and 3) only CPT procedure codes. For example, in Colorado, 78.0% of the records employ both coding systems, and 22.0% employ only the ICD-9-CM procedure coding system. Nebraska had very low correspondence (7.7%) between the two coding systems.



**Table A-2: Percent of Surgical Visit Records by Coding System, ICD-9-CM and CPT Available through the HCUP Central Distributor, by State, 2007 SASD-CD, Among All Surgery Visits**

State	Number of Records	Percent with Both ICD-9-CM and CPT Codes	Percent ICD-9-CM Codes Only	Percent CPT Codes Only	Neither
Colorado	379,866	78.0%	22.0%	0.1%	0.0%
Florida	2,951,688	69.8%	0.0%	30.2%	0.0%
Kentucky	618,458	100.0%	0.0%	0.0%	0.0%
Michigan	1,574,543	89.7%	10.3%	0.0%	0.0%
Nebraska	157,708	7.7%	0.0%	92.3%	0.0%
New York	1,719,016	68.2%	0.6%	31.2%	0.0%
North Carolina	1,395,573	100.0%	0.1%	0.0%	0.0%
Utah	294,441	78.2%	5.5%	16.3%	0.0%
Vermont	108,588	94.8%	3.9%	1.2%	0.1%
Wisconsin	910,468	91.2%	8.3%	0.5%	0.0%

Note: This table includes surgical visit records meeting the HCUP\_AS>0 ambulatory surgery definition.

From this point forward, the comparisons between the ICD-9-CM and CPT coding systems are performed by comparing CCS categories. This approach is used because it is not possible to directly compare, or even unambiguously map codes, between the ICD-9-CM and CPT coding systems. The CCS categories serve as a bridge because the categories have the same meaning regardless of the coding system.

Table A-3 shows the percentage of CCS categories that match between the two systems among surgical visits that code procedures using both coding systems (dual coding). For all states, the match rates are higher for the ICD-9-CM CCS categories than the CPT CCS categories regardless of the number of ICD-9-CM codes or number of CPT codes for each state. For example, Kentucky contains nine ICD-9-CM codes and six CPT codes per surgical record, and the match rate is higher for ICD-9-CM CCS codes (73.5%) than CPT CCS codes match rate (69.5%). For Florida, the number of ICD-9-CM codes and CPT codes are the same, 10 each per surgical record, and the ICD-9-CM CCS codes match rate is still higher (74.2%) than the CPT CCS codes match rate (34.7%). Lastly, Vermont contains 20 ICD-9-CM codes and 25 CPT codes per surgical record, and the match rate is again higher for the ICD-9-CM CCS codes (60.1%) than the CPT CCS codes match rate (33.5%).

These percentages indicate the extent to which the procedure information overlaps between the two coding systems. For example, Kentucky and North Carolina collect dual-coded data from their hospitals and show similar match rates between the two systems. Other states mandate the submission of only CPT codes; consequently, there is often not a matching ICD-9-CM procedure code for each CPT procedure code.

**Table A-3: Percent of Records with Matching CCS Categories Among All Surgical Visit Records with Dual Coding Available through the HCUP Central Distributor, by State, 2007 SASD-CD Ambulatory Surgeries**

State	Percent of ICD-9-CM Codes CCS Matched	Percent of CPT Codes CCS matched
Colorado	57.5%	47.8%
Florida	74.2%	34.7%
Kentucky	73.5%	69.5%
Michigan	65.2%	50.3%
Nebraska	73.3%	2.4%
New York	68.7%	26.2%
North Carolina	74.3%	72.1%
Utah	72.2%	68.7%
Vermont	60.1%	33.5%
Wisconsin	56.6%	28.3%

Note: This table includes surgical visit records meeting the HCUP\_AS>0 ambulatory surgery definition.

To reiterate, among surgical visit records that contain both types of codes, the number of codes differs between the two systems, especially when the CPT codes are derived from the charge detail file. Because no standards exist for the ordering of outpatient procedure codes, from this point forward, all of the comparisons between the ICD-9-CM procedure coding system and the CPT system are based on the subset of surgical visits that contain exactly one CPT procedure code and one ICD-9-CM procedure code. This subset of surgical visit records was selected to eliminate as much ambiguity as possible when comparing the consistency of procedure coding between the two systems. Although this simplification is necessary to allow direct comparisons of codes, the conclusions reached may not apply to observations where multiple ICD-9-CM and CPT procedure codes appear on a surgical visit record.

Table A-4 gives the rates of CCS matches among only those surgical visit records that have a single ICD-9-CM code and a single CPT code. The CCS categories match when the ICD-9-CM CCS category matches the CPT CCS category for that record.

Of the 10 states in Table A-4, eight states have match rates greater than 75%: Colorado, Florida, Kentucky, Michigan, Nebraska, New York, Utah, and Vermont.

**Table A-4: Percent of Surgical Visit Records with Matching CCS Categories from Among Surgical Visit Records with a Single Procedure Code of Each Type Available through the HCUP Central Distributor, 2007 SASD-CD Ambulatory Surgeries**

State	Number of Records	Percent Records with Matching CCS
Colorado	113,121	82.1%
Florida	756,088	82.9%
Kentucky	353,797	76.8%
Michigan	612,703	80.6%
Nebraska	1,098	85.7%
New York	269,939	83.2%
North Carolina	760,009	74.9%
Utah	129,811	82.7%
Vermont	14,442	75.2%
Wisconsin	172,761	65.5%

Note: This table includes surgical visit records meeting the HCUP\_AS>0 ambulatory surgery definition.

The nature of the agreement between the ICD-9-CM procedure codes and the CPT procedure codes on single-procedure surgical visit records were investigated further by comparing the CPT CCS categories that were paired with the 10 most frequent ICD-9-CM CCS categories.

For each of the top 10 ICD-9-CM CCS groups, Table A-5 presents the top 10 CPT CCS groups that are paired with it. For example, the most common ICD-9-CM CCS group was CCS 76: *Colonoscopy and biopsy*. The same CPT CCS category, CCS 76, was paired with it 93.5% of the time. Several of the other paired CPT CCS groups were: 92: *Other bowel diagnostic procedures* (3.1%), 77: *Proctoscopy and anorectal biopsy* (1.8%), 234: *Pathology* (less than one percent), 240: *Medications (Injections, infusions and other forms)* (less than one percent), 70: *Upper gastrointestinal endoscopy; biopsy* (less than one percent), 232: *Anesthesia* (less than one percent), 233: *Laboratory – Chemistry and Hematology* (less than one percent), 227: *Other diagnostic procedures* (less than one percent), and 97: *Other gastrointestinal diagnostic procedures* (less than one percent).

Of the 10 most frequent ICD-9-CM CCS groups, eight were paired with the matching CPT CCS category over 90% of the time. This implies that, despite the difficulty of directly translating between the two procedure coding systems, there is some agreement between the two systems based on the broader CCS classes. The largest discrepancies occurred within two of the 10 most frequent ICD-9-CM CCS groups paired with the matching CPT CCS categories: 160: *Other therapeutic procedures on muscles and tendons* (70.8%) and 174: *Other non-OR therapeutic procedures on skin and breast* (31.2%).

**Table A-5: Pairing Between CCS ICD-9-CM and CCS CPT Categories for Top 10 ICD-9-CM Categories, Surgical Visit Records with a Single ICD-9-CM Code and a Single CPT Code Available through the HCUP Central Distributor, 2007 SASD-CD Ambulatory Surgeries**

CCS ICD-9-CM					CCS CPT		
Rank of CCS Code	N	CCS Group	CCS Description	Rank of CCS CPT Code	CCS CPT Code	Description	Percent
1	549,587	76	76: Colonoscopy and biopsy	1	76	76: Colonoscopy and biopsy	93.5%
				2	92	92: Other bowel diagnostic procedures	3.1%
				3	77	77: Proctoscopy and anorectal biopsy	1.8%
				4	234	234: Pathology	0.7%
				5	240	240: Medications (Injections, infusions and other forms)	0.4%
				6	70	70: Upper gastrointestinal endoscopy; biopsy	0.2%
				7	232	232: Anesthesia	0.1%
				8	233	233: Laboratory - Chemistry and Hematology	0.1%
				9	227	227: Other diagnostic procedures (interview; evaluation; consultation)	0.1%
				10	97	97: Other gastrointestinal diagnostic procedures	0.0%
2	237,742	70	70: Upper gastrointestinal endoscopy; biopsy	1	70	70: Upper gastrointestinal endoscopy; biopsy	98.5%
				2	234	234: Pathology	0.6%
				3	240	240: Medications (Injections, infusions and other forms)	0.2%
				4	69	69: Esophageal dilatation	0.2%
				5	232	232: Anesthesia	0.2%
				6	233	233: Laboratory - Chemistry and Hematology	0.1%
				7	206	206: Microscopic examination (bacterial smear; culture; toxicology)	0.1%
				8	98	98: Other non-OR gastrointestinal therapeutic procedures	0.0%
				9	76	76: Colonoscopy and biopsy	0.0%
				10	71	71: Gastrostomy; temporary and permanent	0.0%

CCS ICD-9-CM					CCS CPT		
Rank of CCS Code	N	CCS Group	CCS Description	Rank of CCS CPT Code	CCS CPT Code	Description	Percent
3	192,513	95	95: Other non-OR lower GI therapeutic procedures	1	76	76: Colonoscopy and biopsy	92.6%
				2	77	77: Proctoscopy and anorectal biopsy	4.7%
				3	234	234: Pathology	1.8%
				4	240	240: Medications (Injections, infusions and other forms)	0.3%
				5	96	96: Other OR lower GI therapeutic procedures	0.2%
				6	70	70: Upper gastrointestinal endoscopy; biopsy	0.2%
				7	95	95: Other non-OR lower GI therapeutic procedures	0.1%
				8	232	232: Anesthesia	0.0%
				9	170	170: Excision of skin lesion	0.0%
				10	233	233: Laboratory - Chemistry and Hematology	0.0%
4	177,120	171	171: Suture of skin and subcutaneous tissue	1	171	171: Suture of skin and subcutaneous tissue	99.4%
				2	227	227: Other diagnostic procedures (interview; evaluation; consultation)	0.3%
				3	19	19: Other therapeutic procedures on eyelids; conjunctiva; cornea	0.1%
				4	175	175: Other OR therapeutic procedures on skin and breast	0.1%
				5	174	174: Other non-OR therapeutic procedures on skin and breast	0.1%
				6	231	231: Other therapeutic procedures	0.0%
				7	214	214: Traction; splints; and other wound care	0.0%
				8	172	172: Skin graft	0.0%
				9	168	168: Incision and drainage; skin and subcutaneous tissue	0.0%
				10	240	240: Medications (Injections, infusions and other forms)	0.0%

CCS ICD-9-CM					CCS CPT		
Rank of CCS Code	N	CCS Group	CCS Description	Rank of CCS CPT Code	CCS CPT Code	Description	Percent
5	147,087	15	15: Lens and cataract procedures	1	15	15: Lens and cataract procedures	99.7%
				2	20	20: Other intraocular therapeutic procedures	0.2%
				3	227	227: Other diagnostic procedures (interview; evaluation; consultation)	0.1%
				4	240	240: Medications (Injections, infusions and other forms)	0.0%
				5	14	14: Glaucoma procedures	0.0%
				6	233	233: Laboratory - Chemistry and Hematology	0.0%
				7	19	19: Other therapeutic procedures on eyelids; conjunctiva; cornea	0.0%
				8	243	243: DME and supplies	0.0%
				9	202	202: Electrocardiogram	0.0%
				10	231	231: Other therapeutic procedures	0.0%
6	80,728	5	5: Insertion of catheter or spinal stimulator and injection into spinal canal	1	5	5: Insertion of catheter or spinal stimulator and injection into spinal canal	90.2%
				2	1	1: Incision and excision of CNS	5.3%
				3	226	226: Other diagnostic radiology and related techniques	3.7%
				4	8	8: Other non-OR or closed therapeutic nervous system procedures	0.3%
				5	240	240: Medications (Injections, infusions and other forms)	0.2%
				6	9	9: Other OR therapeutic nervous system procedures	0.0%
				7	3	3: Laminectomy; excision intervertebral disc	0.0%
				8	231	231: Other therapeutic procedures	0.0%
				9	156	156: Injections and aspirations of muscles; tendons; bursa; joints and soft tissue	0.0%
				10	181	181: Myelogram	0.0%

CCS ICD-9-CM					CCS CPT		
Rank of CCS Code	N	CCS Group	CCS Description	Rank of CCS CPT Code	CCS CPT Code	Description	Percent
7	74,643	160	160: Other therapeutic procedures on muscles and tendons	1	160	160: Other therapeutic procedures on muscles and tendons	70.8%
				2	170	170: Excision of skin lesion	14.1%
				3	169	169: Debridement of wound; infection or burn	4.5%
				4	162	162: Other OR therapeutic procedures on joints	4.4%
				5	164	164: Other OR therapeutic procedures on musculoskeletal system	1.6%
				6	168	168: Incision and drainage; skin and subcutaneous tissue	0.8%
				7	154	154: Arthroplasty other than hip or knee	0.7%
				8	234	234: Pathology	0.7%
				9	142	142: Partial excision bone	0.6%
				10	171	171: Suture of skin and subcutaneous tissue	0.6%
8	65,100	139	139: Fetal monitoring	1	139	139: Fetal monitoring	96.9%
				2	137	137: Other procedures to assist delivery	1.4%
				3	227	227: Other diagnostic procedures (interview; evaluation; consultation)	1.1%
				4	206	206: Microscopic examination (bacterial smear; culture; toxicology)	0.2%
				5	197	197: Other diagnostic ultrasound	0.2%
				6	200	200: Nonoperative urinary system measurements	0.1%
				7	240	240: Medications (Injections, infusions and other forms)	0.1%
				8	233	233: Laboratory - Chemistry and Hematology	0.0%
				9	237	237: Ancillary Services	0.0%
				10	231	231: Other therapeutic procedures	0.0%

CCS ICD-9-CM					CCS CPT		
Rank of CCS Code	N	CCS Group	CCS Description	Rank of CCS CPT Code	CCS CPT Code	Description	Percent
9	62,507	30	30: Tonsillectomy and/or adenoidectomy	1	30	30: Tonsillectomy and/or adenoidectomy	97.6%
				2	32	32: Other non-OR therapeutic procedures on nose; mouth and pharynx	1.0%
				3	234	234: Pathology	0.7%
				4	33	33: Other OR therapeutic procedures on nose; mouth and pharynx	0.4%
				5	240	240: Medications (Injections, infusions and other forms)	0.1%
				6	231	231: Other therapeutic procedures	0.0%
				7	27	27: Control of epistaxis	0.0%
				8	200	200: Nonoperative urinary system measurements	0.0%
				9	26	26: Other therapeutic ear procedures	0.0%
				10	217	217: Other respiratory therapy	0.0%
10	59,653	174	174: Other non-OR therapeutic procedures on skin and breast	1	61	61: Other OR procedures on vessels other than head and neck	33.0%
				2	174	174: Other non-OR therapeutic procedures on skin and breast	31.2%
				3	63	63: Other non-OR therapeutic cardiovascular procedures	14.7%
				4	170	170: Excision of skin lesion	5.3%
				5	175	175: Other OR therapeutic procedures on skin and breast	4.9%
				6	165	165: Breast biopsy and other diagnostic procedures on breast	3.3%
				7	168	168: Incision and drainage; skin and subcutaneous tissue	2.8%
				8	172	172: Skin graft	1.2%
				9	227	227: Other diagnostic procedures (interview; evaluation; consultation)	1.0%
				10	231	231: Other therapeutic procedures	0.6%



For each of the top 10 CPT CCS categories, Table A-6 presents the top 10 ICD-9-CM CCS categories that are paired with it. Once again, this table includes only those surgical visit records with a single ICD-9-CM code and a single CPT code. In Table A-6, six of the top 10 CPT CCS classifications were paired with the same ICD-9-CM CCS classifications at least 90% of the time. The largest discrepancies occurred within three of the top 10 CPT CCS categories, 76: *Colonoscopy and biopsy* (73.7%), 171: *Suture of skin and subcutaneous tissue* (85.9%), 170: *Excision of skin lesion* (59.5%), and 169: *Debridement of wound; infection or burn* (87.2%).

Eight of the top 10 CPT CCS categories shown in Table A-6 are also in the top 10 ICD-9-CM CCS categories shown in Table A-5. Both tables have categories 76: *Colonoscopy and biopsy*, and 70: *Upper gastrointestinal endoscopy; biopsy* listed as first and second, respectively. The two of the top 10 CPT CCS categories shown in Table A-6 that do not appear in the top 10 ICD-9-CM CCS categories shown in Table A-5 are 170: *Excision of skin lesion* and 169: *Debridement of wound; infection or burn*.

**Table A-6: Pairing Between CCS CPT and CCS ICD-9-CM Categories for Top 10 CPT Categories, Surgical Visit Records with a Single ICD-9-CM Code and a Single CPT Code Available through the HCUP Central Distributor, 2007 SASD-CD Ambulatory Surgeries**

CCS CPT						CCS ICD-9-CM	
Rank of CPT CCS Group	N	CCS CPT Code	CCS Description	Rank of CCS for ICD Group	CCS ICD Code	Description	Percent
1	697,176	76	76: Colonoscopy and biopsy	1	76	76: Colonoscopy and biopsy	73.7%
				2	95	95: Other non-OR lower GI therapeutic procedures	25.6%
				3	77	77: Proctoscopy and anorectal biopsy	0.5%
				4	92	92: Other bowel diagnostic procedures	0.2%
				5	79	79: Local excision of large intestine lesion (not endoscopic)	0.0%
				6	96	96: Other OR lower GI therapeutic procedures	0.0%
				7	70	70: Upper gastrointestinal endoscopy; biopsy	0.0%
				8	163	163: Other non-OR therapeutic procedures on musculoskeletal system	0.0%
				9	231	231: Other therapeutic procedures	0.0%
				10	20	20: Other intraocular therapeutic procedures	0.0%
2	242,596	70	70: Upper gastrointestinal endoscopy; biopsy	1	70	70: Upper gastrointestinal endoscopy; biopsy	96.5%
				2	93	93: Other non-OR upper GI therapeutic procedures	2.2%
				3	92	92: Other bowel diagnostic procedures	0.4%
				4	76	76: Colonoscopy and biopsy	0.4%
				5	229	229: Nonoperative removal of foreign body	0.2%
				6	95	95: Other non-OR lower GI therapeutic procedures	0.1%
				7	194	194: Diagnostic ultrasound of gastrointestinal tract	0.1%
				8	94	94: Other OR upper GI therapeutic procedures	0.1%
				9	110	110: Other diagnostic procedures of urinary tract	0.0%
				10	96	96: Other OR lower GI therapeutic procedures	0.0%

CCS CPT					CCS ICD-9-CM		
Rank of CPT CCS Group	N	CCS CPT Code	CCS Description	Rank of CCS for ICD Group	CCS ICD Code	Description	Percent
3	204,996	171	171: Suture of skin and subcutaneous tissue	1	171	171: Suture of skin and subcutaneous tissue	85.9%
				2	19	19: Other therapeutic procedures on eyelids; conjunctiva; cornea	5.8%
				3	32	32: Other non-OR therapeutic procedures on nose; mouth and pharynx	4.6%
				4	28	28: Plastic procedures on nose	1.4%
				5	26	26: Other therapeutic ear procedures	1.2%
				6	175	175: Other OR therapeutic procedures on skin and breast	0.2%
				7	160	160: Other therapeutic procedures on muscles and tendons	0.2%
				8	118	118: Other OR therapeutic procedures; male genital	0.2%
				9	132	132: Other OR therapeutic procedures; female organs	0.1%
				10	33	33: Other OR therapeutic procedures on nose; mouth and pharynx	0.1%
4	147,221	15	15: Lens and cataract procedures	1	15	15: Lens and cataract procedures	99.6%
				2	17	17: Destruction of lesion of retina and choroid	0.2%
				3	20	20: Other intraocular therapeutic procedures	0.1%
				4	21	21: Other extraocular muscle and orbit therapeutic procedures	0.0%
				5	19	19: Other therapeutic procedures on eyelids; conjunctiva; cornea	0.0%
				6	14	14: Glaucoma procedures	0.0%
				7	32	32: Other non-OR therapeutic procedures on nose; mouth and pharynx	0.0%
				8	9	9: Other OR therapeutic nervous system procedures	0.0%
				9	23	23: Myringotomy	0.0%
				10	67	67: Other therapeutic procedures; hemic and lymphatic system	0.0%

CCS CPT					CCS ICD-9-CM		
Rank of CPT CCS Group	N	CCS CPT Code	CCS Description	Rank of CCS for ICD Group	CCS ICD Code	Description	Percent
5	77,198	5	5: Insertion of catheter or spinal stimulator and injection into spinal canal	1	5	5: Insertion of catheter or spinal stimulator and injection into spinal canal	94.3%
				2	8	8: Other non-OR or closed therapeutic nervous system procedures	4.1%
				3	9	9: Other OR therapeutic nervous system procedures	0.9%
				4	231	231: Other therapeutic procedures	0.3%
				5	174	174: Other non-OR therapeutic procedures on skin and breast	0.2%
				6	226	226: Other diagnostic radiology and related techniques	0.1%
				7	163	163: Other non-OR therapeutic procedures on musculoskeletal system	0.0%
				8	20	20: Other intraocular therapeutic procedures	0.0%
				9	156	156: Injections and aspirations of muscles; tendons; bursa; joints and soft tissue	0.0%
				10	4	4: Diagnostic spinal tap	0.0%
6	70,527	170	170: Excision of skin lesion	1	170	170: Excision of skin lesion	59.5%
				2	160	160: Other therapeutic procedures on muscles and tendons	14.9%
				3	166	166: Lumpectomy; quadrantectomy of breast	11.7%
				4	174	174: Other non-OR therapeutic procedures on skin and breast	4.5%
				5	26	26: Other therapeutic ear procedures	1.9%
				6	33	33: Other OR therapeutic procedures on nose; mouth and pharynx	1.5%
				7	19	19: Other therapeutic procedures on eyelids; conjunctiva; cornea	1.3%
				8	96	96: Other OR lower GI therapeutic procedures	1.0%
				9	32	32: Other non-OR therapeutic procedures on nose; mouth and pharynx	1.0%
				10	132	132: Other OR therapeutic procedures; female organs	0.8%

CCS CPT						CCS ICD-9-CM	
Rank of CPT CCS Group	N	CCS CPT Code	CCS Description	Rank of CCS for ICD Group	CCS ICD Code	Description	Percent
7	65,777	169	169: Debridement of wound; infection or burn	1	169	169: Debridement of wound; infection or burn	87.2%
				2	160	160: Other therapeutic procedures on muscles and tendons	5.1%
				3	142	142: Partial excision bone	3.6%
				4	132	132: Other OR therapeutic procedures; female organs	1.3%
				5	99	99: Other OR gastrointestinal therapeutic procedures	0.8%
				6	26	26: Other therapeutic ear procedures	0.5%
				7	118	118: Other OR therapeutic procedures; male genital	0.4%
				8	172	172: Skin graft	0.3%
				9	117	117: Other non-OR therapeutic procedures; male genital	0.2%
				10	148	148: Other fracture and dislocation procedure	0.2%
8	64,093	139	139: Fetal monitoring	1	139	139: Fetal monitoring	98.4%
				2	227	227: Other diagnostic procedures (interview; evaluation; consultation)	1.5%
				3	231	231: Other therapeutic procedures	0.1%
				4	110	110: Other diagnostic procedures of urinary tract	0.0%
				5	141	141: Other therapeutic obstetrical procedures	0.0%
				6	137	137: Other procedures to assist delivery	0.0%
				7	148	148: Other fracture and dislocation procedure	0.0%
9	61,065	30	30: Tonsillectomy and/or adenoidectomy	1	30	30: Tonsillectomy and/or adenoidectomy	99.9%
				2	33	33: Other OR therapeutic procedures on nose; mouth and pharynx	0.1%
				3	25	25: Diagnostic procedures on ear	0.0%
				4	23	23: Myringotomy	0.0%
				5	29	29: Dental procedures	0.0%
				6	109	109: Procedures on the urethra	0.0%

CCS CPT					CCS ICD-9-CM		
Rank of CPT CCS Group	N	CCS CPT Code	CCS Description	Rank of CCS for ICD Group	CCS ICD Code	Description	Percent
				7	159	159: Other diagnostic procedures on musculoskeletal system	0.0%
				8	231	231: Other therapeutic procedures	0.0%
10	55,935	160	160: Other therapeutic procedures on muscles and tendons	1	160	160: Other therapeutic procedures on muscles and tendons	94.5%
				2	162	162: Other OR therapeutic procedures on joints	3.3%
				3	99	99: Other OR gastrointestinal therapeutic procedures	0.8%
				4	170	170: Excision of skin lesion	0.2%
				5	150	150: Division of joint capsule; ligament or cartilage	0.2%
				6	42	42: Other OR Rx procedures on respiratory system and mediastinum	0.2%
				7	161	161: Other OR therapeutic procedures on bone	0.2%
				8	154	154: Arthroplasty other than hip or knee	0.1%
				9	143	143: Bunionectomy or repair of toe deformities	0.1%
				10	174	174: Other non-OR therapeutic procedures on skin and breast	0.1%

## **Appendix A: Summary**

Ten states in the SASD-CD employ both ICD-9-CM and CPT procedure codes. Four states (California, Iowa, Maine and Maryland) use only CPT procedure codes, while two states (New Jersey and South Carolina) use only ICD-9-CM procedure codes. Among states that employ both coding systems, varying levels of agreement exist between the two. CPT codes may be supplied in the core file or in the charge detail file. On average the number of CPT procedure codes is higher (2.5 in the core file and 4.9 in the charge detail file) than the number of ICD-9-CM procedure codes (1.6). Also, the average number of CPT codes in the charge detail file is higher than the average number of CPT codes in the core file.

Among surgical visit records with a single ICD-9-CM procedure code and a single CPT procedure code, there tends to be a high level of agreement between the CCS categories generated by the two coding systems. However, there are subtle differences between the two systems that result in different classifications for some procedures using the two types of codes. Consequently, analysts should exercise care when combining SASD-CD data across states that use different procedure coding systems.

## **APPENDIX B**

### **Comparison of ICD-9-CM and CPT Procedure Code Use by Body System by State**



## APPENDIX B: COMPARISON OF ICD-9-CM AND CPT PROCEDURE CODE USE BY BODY SYSTEM BY STATE

Appendix B contains counts of surgical visits by body system for each state. Ambulatory surgery records (classified as HCUP\_AS>0) were used to construct Table B-1.

**Table B-1: Number of Procedure Codes by State and Body System, ICD-9-CM CCS and CPT CCS Procedure Classification Available through the HCUP Central Distributor, 2007 SASD-CD Ambulatory Surgeries**

State	Nervous System (1-9)	Nervous System (1-9)	Endocrine System (10-12)	Endocrine System (10-12)
	ICD-9-CM	CPT	ICD-9-CM	CPT
<b>California</b>	N/A	299,146	N/A	2,183
Percent of State Total	N/A	10.7%	N/A	0.1%
<b>Colorado</b>	30,368	25,633	3,215	1,456
Percent of State Total	8.0%	6.7%	0.8%	0.4%
<b>Florida</b>	207,669	291,667	13,852	10,838
Percent of State Total	7.0%	9.9%	0.5%	0.4%
<b>Iowa</b>	N/A	33,301	N/A	1,519
Percent of State Total	N/A	8.6%	N/A	0.4%
<b>Kentucky</b>	52,285	51,176	3,757	2,222
Percent of State Total	8.5%	8.3%	0.6%	0.4%
<b>Maine</b>	N/A	14,488	N/A	685
Percent of State Total	N/A	5.4%	N/A	0.3%
<b>Maryland</b>	N/A	39,379	N/A	2,081
Percent of State Total	N/A	7.8%	N/A	0.4%
<b>Michigan</b>	88,077	79,466	5,605	3,128
Percent of State Total	5.6%	5.0%	0.4%	0.2%
<b>Nebraska</b>	694	17,442	65	943
Percent of State Total	0.4%	11.1%	0.0%	0.6%
<b>New Jersey</b>	24,059	N/A	1,538	N/A
Percent of State Total	6.4%	N/A	0.4%	N/A
<b>New York</b>	87,583	118,840	4,589	4,279
Percent of State Total	5.1%	6.9%	0.3%	0.2%
<b>North Carolina</b>	117,463	118,803	6,850	4,139
Percent of State Total	8.4%	8.5%	0.5%	0.3%
<b>South Carolina</b>	61,777	N/A	2,246	N/A
Percent of State Total	8.4%	N/A	0.3%	N/A
<b>Utah</b>	18,787	24,008	1,514	1,255
Percent of State Total	6.4%	8.2%	0.5%	0.4%
<b>Vermont</b>	10,883	10,867	539	229
Percent of State Total	10.0%	10.0%	0.5%	0.2%

State	Nervous System (1-9)	Nervous System (1-9)	Endocrine System (10-12)	Endocrine System (10-12)
	ICD-9-CM	CPT	ICD-9-CM	CPT
<b>Wisconsin</b>	107,650	89,143	2,150	1,576
Percent of State Total	11.8%	9.8%	0.2%	0.2%
<b>Grand Total</b>	1,214,120	1,398,092	80,932	42,588
Percent of Grand Total	5.7%	6.5%	0.4%	0.2%

**Table B-1: Number of Procedure Codes by State and Body System, ICD-9-CM CCS and CPT CCS Classification Available through the HCUP Central Distributor, 2007 SASD-CD Ambulatory Surgeries (continued)**

State	Eye (13-21)	Eye (13-21)	Ear (22-26)	Ear (22-26)
	ICD-9-CM	CPT	ICD-9-CM	CPT
<b>California</b>	N/A	360,672	N/A	40,884
Percent of State Total	N/A	12.9%	N/A	1.5%
<b>Colorado</b>	18,073	12,471	5,795	3,925
Percent of State Total	4.8%	3.3%	1.5%	1.0%
<b>Florida</b>	191,764	394,884	35,922	38,750
Percent of State Total	6.5%	13.4%	1.2%	1.3%
<b>Iowa</b>	N/A	36,780	N/A	10,315
Percent of State Total	N/A	9.6%	N/A	2.7%
<b>Kentucky</b>	35,571	32,406	15,481	14,319
Percent of State Total	5.8%	5.2%	2.5%	2.3%
<b>Maine</b>	N/A	13,314	N/A	4,438
Percent of State Total	N/A	5.0%	N/A	1.7%
<b>Maryland</b>	N/A	25,945	N/A	6,431
Percent of State Total	N/A	5.1%	N/A	1.3%
<b>Michigan</b>	91,196	74,307	28,965	24,523
Percent of State Total	5.8%	4.7%	1.8%	1.6%
<b>Nebraska</b>	849	7,583	365	5,439
Percent of State Total	0.5%	4.8%	0.2%	3.4%
<b>New Jersey</b>	24,774	N/A	8,984	N/A
Percent of State Total	6.6%	N/A	2.4%	N/A
<b>New York</b>	140,718	209,798	21,197	27,049
Percent of State Total	8.2%	12.2%	1.2%	1.6%
<b>North Carolina</b>	121,225	112,710	32,211	29,211
Percent of State Total	8.7%	8.1%	2.3%	2.1%
<b>South Carolina</b>	67,045	N/A	15,104	N/A
Percent of State Total	9.1%	N/A	2.1%	N/A
<b>Utah</b>	16,245	23,693	9,063	9,864
Percent of State Total	5.5%	8.0%	3.1%	3.4%
<b>Vermont</b>	8,548	7,227	2,353	1,770
Percent of State Total	7.9%	6.7%	2.2%	1.6%
<b>Wisconsin</b>	82,284	64,512	17,518	11,604
Percent of State Total	9.0%	7.1%	1.9%	1.3%
<b>Total</b>	1,090,323	1,556,994	311,233	275,715
Percent of Grand Total	5.1%	7.3%	1.5%	1.3%

**Table B-1: Number of Procedure Codes by State and Body System, ICD-9-CM CCS and CPT CCS Procedure Classification Available through the HCUP Central Distributor, 2007 SASD-CD Ambulatory Surgeries (continued)**

State	Nose, Mouth, and Pharynx (27-33)	Nose, Mouth, and Pharynx (27-33)	Respiratory System (34-42)	Respiratory System (34-42)
	ICD-9-CM	CPT	ICD-9-CM	CPT
<b>California</b>	N/A	96,025	N/A	27,079
Percent of State Total	N/A	3.4%	N/A	1.0%
<b>Colorado</b>	25,694	17,049	6,852	4,746
Percent of State Total	6.8%	4.5%	1.8%	1.2%
<b>Florida</b>	76,496	79,603	38,156	45,870
Percent of State Total	2.6%	2.7%	1.3%	1.6%
<b>Iowa</b>	N/A	18,893	N/A	10,879
Percent of State Total	N/A	4.9%	N/A	2.8%
<b>Kentucky</b>	26,962	23,251	9,368	8,725
Percent of State Total	4.4%	3.8%	1.5%	1.4%
<b>Maine</b>	N/A	6,044	N/A	5,453
Percent of State Total	N/A	2.3%	N/A	2.0%
<b>Maryland</b>	N/A	17,831	N/A	19,885
Percent of State Total	N/A	3.5%	N/A	3.9%
<b>Michigan</b>	73,134	55,337	25,999	31,231
Percent of State Total	4.6%	3.5%	1.7%	2.0%
<b>Nebraska</b>	633	9,642	141	4,761
Percent of State Total	0.4%	6.1%	0.1%	3.0%
<b>New Jersey</b>	23,656	N/A	4,432	N/A
Percent of State Total	6.3%	N/A	1.2%	N/A
<b>New York</b>	54,430	63,711	13,388	23,287
Percent of State Total	3.2%	3.7%	0.8%	1.4%
<b>North Carolina</b>	69,479	59,797	19,554	18,717
Percent of State Total	5.0%	4.3%	1.4%	1.3%
<b>South Carolina</b>	36,293	N/A	13,474	N/A
Percent of State Total	5.0%	N/A	1.8%	N/A
<b>Utah</b>	22,046	22,740	2,648	2,565
Percent of State Total	7.5%	7.7%	0.9%	0.9%
<b>Vermont</b>	3,726	2,806	1,493	1,300
Percent of State Total	3.4%	2.6%	1.4%	1.2%
<b>Wisconsin</b>	36,602	23,714	10,640	9,548
Percent of State Total	4.0%	2.6%	1.2%	1.0%
<b>Grand Total</b>	699,563	579,609	236,827	252,150
Percent of Grand Total	3.3%	2.7%	1.1%	1.2%

**Table B-1: Number of Procedure Codes by State and Body System, ICD-9-CM CCS and CPT CCS Procedure Classification Available through the HCUP Central Distributor, 2007 SASD-CD Ambulatory Surgeries (continued)**

State	Cardiovascular System (43-63)	Cardiovascular System (43-63)	Heme and Lymphatic System (64-67)	Heme and Lymphatic System (64-67)
	ICD-9-CM	CPT	ICD-9-CM	CPT
<b>California</b>	N/A	87,665	N/A	19,814
Percent of State Total	N/A	3.1%	N/A	0.7%
<b>Colorado</b>	18,591	13,774	4,445	2,630
Percent of State Total	4.9%	3.6%	1.2%	0.7%
<b>Florida</b>	104,274	158,689	21,333	20,329
Percent of State Total	3.5%	5.4%	0.7%	0.7%
<b>Iowa</b>	N/A	18,113	N/A	3,046
Percent of State Total	N/A	4.7%	N/A	0.8%
<b>Kentucky</b>	34,641	42,212	5,175	3,287
Percent of State Total	5.6%	6.8%	0.8%	0.5%
<b>Maine</b>	N/A	8,674	N/A	1,790
Percent of State Total	N/A	3.3%	N/A	0.7%
<b>Maryland</b>	N/A	29,301	N/A	6,096
Percent of State Total	N/A	5.8%	N/A	1.2%
<b>Michigan</b>	103,465	89,482	14,395	11,061
Percent of State Total	6.6%	5.7%	0.9%	0.7%
<b>Nebraska</b>	611	8,756	109	1,412
Percent of State Total	0.4%	5.6%	0.1%	0.9%
<b>New Jersey</b>	17,762	N/A	5,366	N/A
Percent of State Total	4.7%	N/A	1.4%	N/A
<b>New York</b>	53,780	100,246	11,858	12,020
Percent of State Total	3.1%	5.8%	0.7%	0.7%
<b>North Carolina</b>	67,614	79,833	12,041	8,684
Percent of State Total	4.8%	5.7%	0.9%	0.6%
<b>South Carolina</b>	51,295	N/A	3,686	N/A
Percent of State Total	7.0%	N/A	0.5%	N/A
<b>Utah</b>	11,321	11,624	2,693	2,246
Percent of State Total	3.8%	3.9%	0.9%	0.8%
<b>Vermont</b>	2,701	3,607	928	781
Percent of State Total	2.5%	3.3%	0.9%	0.7%
<b>Wisconsin</b>	40,423	44,474	7,112	4,186
Percent of State Total	4.4%	4.9%	0.8%	0.5%
<b>Grand Total</b>	834,016	831,548	143,523	114,058
Percent of Grand Total	3.9%	3.9%	0.7%	0.5%

**Table B-1: Number of Procedure Codes by State and Body System, ICD-9-CM CCS and CPT CCS Procedure Classification Available through the HCUP Central Distributor, 2007 SASD-CD Ambulatory Surgeries (continued)**

State	Digestive System (68-99)	Digestive System (68-99)	Urinary System (100-112)	Urinary System (100-112)
	ICD-9-CM	CPT	ICD-9-CM	CPT
<b>California</b>	N/A	1,079,331	N/A	79,058
Percent of State Total	N/A	38.5%	N/A	2.8%
<b>Colorado</b>	81,525	65,607	17,683	12,636
Percent of State Total	21.5%	17.3%	4.7%	3.3%
<b>Florida</b>	656,805	1,014,363	95,554	112,358
Percent of State Total	22.3%	34.4%	3.2%	3.8%
<b>Iowa</b>	N/A	127,638	N/A	13,225
Percent of State Total	N/A	33.2%	N/A	3.4%
<b>Kentucky</b>	198,703	197,557	25,241	24,149
Percent of State Total	32.1%	31.9%	4.1%	3.9%
<b>Maine</b>	N/A	78,841	N/A	11,112
Percent of State Total	N/A	29.6%	N/A	4.2%
<b>Maryland</b>	N/A	101,872	N/A	25,925
Percent of State Total	N/A	20.1%	N/A	5.1%
<b>Michigan</b>	437,911	403,889	89,525	79,178
Percent of State Total	27.8%	25.7%	5.7%	5.0%
<b>Nebraska</b>	5,145	57,913	469	7,002
Percent of State Total	3.3%	36.7%	0.3%	4.4%
<b>New Jersey</b>	82,948	N/A	22,537	N/A
Percent of State Total	22.0%	N/A	6.0%	N/A
<b>New York</b>	391,371	536,131	45,509	60,163
Percent of State Total	22.8%	31.2%	2.6%	3.5%
<b>North Carolina</b>	331,786	328,701	57,760	55,069
Percent of State Total	23.8%	23.6%	4.1%	3.9%
<b>South Carolina</b>	229,829	N/A	34,393	N/A
Percent of State Total	31.4%	N/A	4.7%	N/A
<b>Utah</b>	96,821	105,738	6,947	8,548
Percent of State Total	32.9%	35.9%	2.4%	2.9%
<b>Vermont</b>	35,224	31,194	3,783	3,349
Percent of State Total	32.4%	28.7%	3.5%	3.1%
<b>Wisconsin</b>	333,652	246,329	33,478	20,587
Percent of State Total	36.6%	27.1%	3.7%	2.3%
<b>Total</b>	4,391,625	4,967,871	659,646	606,953
Percent of Grand Total	20.5%	23.2%	3.1%	2.8%

**Table B-1: Number of Procedure Codes by State and Body System, ICD-9-CM CCS and CPT CCS Procedure Classification Available through the HCUP Central Distributor, 2007 SASD-CD Ambulatory Surgeries (continued)**

State	Male Genital System (113-118)	Male Genital System (113-118)	Female Genital System (119-121, 123-132)	Female Genital System (119-121, 123-132)
	ICD-9-CM	CPT	ICD-9-CM	CPT
<b>California</b>	N/A	40,843	N/A	131,596
Percent of State Total	N/A	1.5%	N/A	4.7%
<b>Colorado</b>	5,156	4,089	18,924	15,618
Percent of State Total	1.4%	1.1%	5.0%	4.1%
<b>Florida</b>	39,589	49,876	89,246	106,691
Percent of State Total	1.3%	1.7%	3.0%	3.6%
<b>Iowa</b>	N/A	3,440	N/A	16,202
Percent of State Total	N/A	0.9%	N/A	4.2%
<b>Kentucky</b>	6,901	6,520	31,086	30,386
Percent of State Total	1.1%	1.1%	5.0%	4.9%
<b>Maine</b>	N/A	3,346	N/A	12,204
Percent of State Total	N/A	1.3%	N/A	4.6%
<b>Maryland</b>	N/A	8,749	N/A	35,764
Percent of State Total	N/A	1.7%	N/A	7.0%
<b>Michigan</b>	20,305	19,736	76,630	72,991
Percent of State Total	1.3%	1.3%	4.9%	4.6%
<b>Nebraska</b>	123	1,937	600	6,781
Percent of State Total	0.1%	1.2%	0.4%	4.3%
<b>New Jersey</b>	10,276	N/A	48,188	N/A
Percent of State Total	2.7%	N/A	12.8%	N/A
<b>New York</b>	22,267	29,540	89,529	130,591
Percent of State Total	1.3%	1.7%	5.2%	7.6%
<b>North Carolina</b>	14,998	14,256	61,613	60,367
Percent of State Total	1.1%	1.0%	4.4%	4.3%
<b>South Carolina</b>	9,367	N/A	28,532	N/A
Percent of State Total	1.3%	N/A	3.9%	N/A
<b>Utah</b>	3,324	3,761	11,567	10,008
Percent of State Total	1.1%	1.3%	3.9%	3.4%
<b>Vermont</b>	1,353	1,081	4,156	3,784
Percent of State Total	1.2%	1.0%	3.8%	3.5%
<b>Wisconsin</b>	11,578	7,966	31,050	22,222
Percent of State Total	1.3%	0.9%	3.4%	2.4%
<b>Grand Total</b>	219,630	222,884	783,523	764,200
Percent of Grand Total	1.0%	1.0%	3.7%	3.6%

**Table B-1: Number of Procedure Codes by State and Body System, ICD-9-CM CCS and CPT CCS Procedure Classification Available through the HCUP Central Distributor, 2007 SASD-CD Ambulatory Surgeries (continued)**

State	Obstetrical (122, 133-141)	Obstetrical (122, 133-141)	Musculoskeletal System (142-164)	Musculoskeletal System (142-164)
	ICD-9-CM	CPT	ICD-9-CM	CPT
<b>California</b>	N/A	9,359	N/A	394,276
Percent of State Total	N/A	0.3%	N/A	14.1%
<b>Colorado</b>	8,951	5,306	50,565	40,059
Percent of State Total	2.4%	1.4%	13.3%	10.5%
<b>Florida</b>	25,474	64,219	226,901	263,007
Percent of State Total	0.9%	2.2%	7.7%	8.9%
<b>Iowa</b>	N/A	7,107	N/A	41,390
Percent of State Total	N/A	1.8%	N/A	10.8%
<b>Kentucky</b>	15,375	15,199	63,462	62,208
Percent of State Total	2.5%	2.5%	10.3%	10.1%
<b>Maine</b>	N/A	12,463	N/A	31,526
Percent of State Total	N/A	4.7%	N/A	11.9%
<b>Maryland</b>	N/A	27,290	N/A	59,650
Percent of State Total	N/A	5.4%	N/A	11.7%
<b>Michigan</b>	56,808	33,628	197,185	174,115
Percent of State Total	3.6%	2.1%	12.5%	11.1%
<b>Nebraska</b>	14	373	1,638	20,679
Percent of State Total	0.0%	0.2%	1.0%	13.1%
<b>New Jersey</b>	866	N/A	58,189	N/A
Percent of State Total	0.2%	N/A	15.4%	N/A
<b>New York</b>	2,650	7,335	162,164	213,190
Percent of State Total	0.2%	0.4%	9.4%	12.4%
<b>North Carolina</b>	28,066	27,492	174,566	173,619
Percent of State Total	2.0%	2.0%	12.5%	12.4%
<b>South Carolina</b>	1,759	N/A	92,806	N/A
Percent of State Total	0.2%	N/A	12.7%	N/A
<b>Utah</b>	286	1	48,156	55,125
Percent of State Total	0.1%	0.0%	16.4%	18.7%
<b>Vermont</b>	4,351	3,633	13,306	10,560
Percent of State Total	4.0%	3.3%	12.3%	9.7%
<b>Wisconsin</b>	929	829	128,350	83,359
Percent of State Total	0.1%	0.1%	14.1%	9.2%
<b>Total</b>	276,267	278,295	1,831,603	1,856,902
Percent of Grand Total	1.3%	1.3%	8.6%	8.7%



**Table B-1: Number of Procedure Codes by State and Body System, ICD-9-CM CCS and CPT CCS Procedure Classification Available through the HCUP Central Distributor, 2007 SASD-CD Ambulatory Surgeries (continued)**

State	Integumentary System (165-175)	Integumentary System (165-175)	Miscellaneous Diagnostics and Therapeutic (176-231)*	Miscellaneous Diagnostics and Therapeutic (176-231)*
	ICD-9-CM	CPT	ICD-9-CM	CPT
<b>California</b>	N/A	212,114	N/A	452,899
Percent of State Total	N/A	7.6%	N/A	16.1%
<b>Colorado</b>	103,642	82,924	36,460	115,487
Percent of State Total	27.3%	21.8%	9.6%	30.4%
<b>Florida</b>	235,198	293,500	260,726	1,016,479
Percent of State Total	8.0%	9.9%	8.8%	34.4%
<b>Iowa</b>	N/A	35,731	N/A	293,929
Percent of State Total	N/A	9.3%	N/A	76.3%
<b>Kentucky</b>	99,611	115,698	109,680	131,421
Percent of State Total	16.1%	18.7%	17.7%	21.2%
<b>Maine</b>	N/A	34,735	N/A	225,204
Percent of State Total	N/A	13.1%	N/A	84.7%
<b>Maryland</b>	N/A	75,333	N/A	414,996
Percent of State Total	N/A	14.8%	N/A	81.7%
<b>Michigan</b>	308,756	287,596	170,133	455,983
Percent of State Total	19.6%	18.3%	10.8%	29.0%
<b>Nebraska</b>	920	16,150	1,372	124,055
Percent of State Total	0.6%	10.2%	0.9%	78.7%
<b>New Jersey</b>	41,016	N/A	40,102	N/A
Percent of State Total	10.9%	N/A	10.6%	N/A
<b>New York</b>	93,654	128,306	145,239	1,079,997
Percent of State Total	5.4%	7.5%	8.4%	62.8%
<b>North Carolina</b>	213,959	256,502	320,773	327,359
Percent of State Total	15.3%	18.4%	23.0%	23.5%
<b>South Carolina</b>	108,043	N/A	269,190	N/A
Percent of State Total	14.7%	N/A	36.7%	N/A
<b>Utah</b>	7,003	3,876	27	7,249
Percent of State Total	2.4%	1.3%	0.0%	2.5%
<b>Vermont</b>	9,566	9,627	22,227	84,688
Percent of State Total	8.8%	8.9%	20.5%	78.0%
<b>Wisconsin</b>	74,899	41,777	74,534	617,938
Percent of State Total	8.2%	4.6%	8.2%	67.9%
<b>Total</b>	2,043,168	1,899,037	2,187,685	7,164,833
Percent of Grand Total	9.5%	8.9%	10.2%	33.5%

\*Such procedures captured in this range include other organ transplant, mammography, magnetic resonance imaging, blood transfusion, and cancer chemotherapy.

**Table B-1: Number of Procedure Codes by State and Body System, ICD-9-CM CCS and CPT CCS Procedure Classification Available through the HCUP Central Distributor, 2007 SASD-CD Ambulatory Surgeries (continued)**

State	HCPCS*	HCPCS*	Invalid or Inconsistent**	Invalid or Inconsistent**
	ICD-9-CM	CPT	ICD-9-CM	CPT
<b>California</b>	N/A	0	N/A	0
Percent of State Total	N/A	0.0%	N/A	0.0%
<b>Colorado</b>	0	22	0	13
Percent of State Total	0.0%	0.0%	0.0%	0.0%
<b>Florida</b>	0	220	32	2
Percent of State Total	0.0%	0.0%	0.0%	0.0%
<b>Iowa</b>	N/A	2,518	N/A	3
Percent of State Total	N/A	0.7%	N/A	0.0%
<b>Kentucky</b>	0	0	678	1,906
Percent of State Total	0.0%	0.0%	0.1%	0.3%
<b>Maine</b>	N/A	543	N/A	4
Percent of State Total	N/A	0.2%	N/A	0.0%
<b>Maryland</b>	N/A	175	N/A	144
Percent of State Total	N/A	0.0%	N/A	0.0%
<b>Michigan</b>	0	74	18	18
Percent of State Total	0.0%	0.0%	0.0%	0.0%
<b>Nebraska</b>	0	567	259	0
Percent of State Total	0.0%	0.4%	0.2%	0.0%
<b>New Jersey</b>	0	N/A	0	N/A
Percent of State Total	0.0%	N/A	0.0%	N/A
<b>New York</b>	0	6,311	0	1,052
Percent of State Total	0.0%	0.4%	0.0%	0.1%
<b>North Carolina</b>	0	20	0	1,678
Percent of State Total	0.0%	0.0%	0.0%	0.1%
<b>South Carolina</b>	0	N/A	8	N/A
Percent of State Total	0.0%	N/A	0.0%	N/A
<b>Utah</b>	0	136	297	1
Percent of State Total	0.0%	0.0%	0.1%	0.0%
<b>Vermont</b>	0	10	0	14
Percent of State Total	0.0%	0.0%	0.0%	0.0%
<b>Wisconsin</b>	0	320	237	3,341
Percent of State Total	0.0%	0.0%	0.0%	0.4%
<b>Grand Total</b>	0	16,876	11,616	44,777
Percent of Grand Total	0.0%	0.1%	0.1%	0.2%

\*Refers to CPT/ Healthcare Common Procedure Coding System (HCPCS) Level I codes that cannot be classified using the CCS system.

Note: Healthcare Common Procedure Coding System (HCPCS) National Level II codes are often used with CPT codes to enhance their scope. They are not used to categorize procedures in this table because no mapping to CCS exists at the present time.

\*\*A validation algorithm is used to identify invalid codes based on logic identifying all valid codes in a certain time period. Inconsistent codes are identified when comparing the nature of the codes to patient demographic characteristics.

## **Appendix B: Summary**

The state variation in the use of the two coding systems is apparent when comparing the number of codes available by body system in the CCS Procedure Classification software available through the HCUP Central Distributor for records in the 2007 SASD-CD that qualified as ambulatory surgery (HCUP\_AS>0). At times, the variation in codes available between coding systems can be large. Thus, researchers interested in studying ambulatory surgery for particular diagnosis or procedure areas should select states with sufficient procedure codes available for analysis.