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EXECUTIVE SUMMARY

The purpose of this report is to describe the development of new data elements based on Uniform Billing (UB-92) revenue codes that provide useful information on hospital accommodations and services. These new data elements can be employed to study issues such as use of intensive care units and to more reliably examine utilization of diagnostic and therapeutic services, beyond the information that can be gleaned from ICD-9-CM procedure codes.

A broad range of services, from simple diagnostic tests to resource-intense procedures, occur in the inpatient and outpatient hospital setting. In administrative health care data based on claims, use of services may be reported using ICD-9-CM procedure codes, charges to the revenue centers of the hospital in which services were performed, or both. ICD-9-CM procedure codes provide information on health care services, but there is concern about under-reporting certain procedures, such as non-invasive, diagnostic services. In addition, ICD-9-CM codes do not provide information on some services, such as stays in intensive care units (ICU) and psychiatric units. UB-92 revenue codes identify services and accommodations using revenue codes that are accompanied by charge information specific to the revenue center. Detailed charges based on revenue codes provide additional evidence that the patient received a specific service.

The purpose of this analysis was to create a limited number of utilization flags that reveal additional information about use of health care services beyond that coded in ICD-9-CM procedure codes. By combining information from ICD-9-CM procedure codes and UB-92 revenue codes, it is possible to obtain a more complete picture of utilization of services rendered in health care settings such as hospitals, emergency departments, and ambulatory surgery centers.

The HCUP databases, sponsored by the Agency for Healthcare Research and Quality (AHRQ), offer a large repository of data for analysis of use of health care services. The 2003 State Inpatient Databases (SID) include a census of inpatient discharges for all payers from 38 states. The 2003 State Ambulatory Surgery Databases (SASD) contain hospital-based ambulatory surgery events from 20 states. The 2003 State Emergency Department Databases (SEDD) include emergency department visits from 15 states. All but one of these state-level databases include ICD-9-CM procedure codes, and the majority include detailed charge information. The HCUP databases also contain the AHRQ Clinical Classifications Software (CCS), which groups clinically related ICD-9-CM procedures into 231 relatively homogeneous procedure categories.

Using a combination of the UB-92 revenue codes, ICD-9-CM procedure codes, and CCS procedure categories, 30 utilization flags were developed for a range of services. The following table lists the flags by type:

Utilization Flags

Accommodation	
Intensive Care Unit (ICU)	Coronary Care Unit (CCU)
Newborn Level II	Newborn Level III
Newborn Level IV	
Cardiac Services	
Cardiac Catheterization Lab	Cardiac Stress Test
Echocardiogram	Electrocardiogram (EKG)
Imaging and Diagnostic Tests	
Computed Tomography (CT) Scan	Chest X-Ray
Electroencephalogram (EEG)	Ultrasound
Magnetic Resonance Technology (MRT)	Nuclear Medicine
Devices	
Pacemaker	Other Implants
Therapeutic Services	
Lithotripsy	Occupational Therapy
Physical Therapy	Respiratory Therapy
Therapeutic Radiology and Chemotherapy	Renal Dialysis
Speech-Language Pathology	Erythropoietin (EPO)
Mental Health and Substance Abuse	Blood
Other	
Emergency Department	Observation Room
Organ Acquisition	

For the initial analyses, five geographically-dispersed states with varying population sizes were selected for the development database: KY, MN, NC, NV, and WA. SID were combined across states so no one state overly influenced the creation of the utilization flags. Another five states were chosen for a validation database: MA, NE, TN, TX, and WV. The validation database was used to substantiate the results from the development database. After the utilization flags were defined, the variation across the state databases was explored.

There was very little difference in the percentage of records with specific utilization flags when comparing the development database, the validation database, and the average across all SID that have charge detail. Only two utilization flags (i.e., chest x-ray and electrocardiogram) differed by more than 2 percentage points in the percentage of records in the development database, the validation database, and the average across the SID. Eighteen of the 30 utilization flags differed by less than one percentage point.

More variation became apparent when considering individual SID states. Only seven utilization flags differed by less than one percentage point. Twenty-one of the 30 utilization flags differed by less than 10 percentage points. Three utilization flags differed by more than 20 percentage points (i.e., chest x-ray, emergency department, and electrocardiogram). The variation in utilization across states may be an artifact of under-reporting of revenue codes in particular hospitals within a state; however, exploration of this issue was beyond the scope of the present report.

To further enable the understanding of the utilization of services rendered in health care settings such as hospitals, emergency departments, and ambulatory surgery centers, the 30 utilization flags will become part of the HCUP databases beginning in 2005. As appropriate, they also will be incorporated into HCUPnet, the interactive Web-based tool for identifying, tracking, analyzing, and comparing statistics on hospital care (<http://hcup.ahrq.gov/>). Programming code to calculate the utilization flags on other administrative databases is available to the public on the HCUP User Support Website (http://www.hcup-us.ahrq.gov/tools_software.jsp).

INTRODUCTION

A broad range of services, from simple diagnostic tests to resource-intensive procedures, occur in the inpatient and outpatient hospital setting. In administrative health care data based on claims, use of services may be reported using ICD-9-CM procedure codes, charges to the revenue centers of the hospital in which services were performed, or both. ICD-9-CM procedure codes provide information on health care services, but concern exists about under-reporting certain procedures, such as non-invasive, diagnostic services. In addition, ICD-9-CM codes do not provide information on some services, such as stays in intensive care units (ICU) and psychiatric units. Uniform Billing (UB-92) revenue codes identify services and accommodations using revenue codes that are accompanied by charge information specific to the revenue center. Detailed charges based on revenue codes provide additional evidence that the patient received a specific service. This study utilized these two types of reporting (ICD-9-CM procedures and revenue codes) to define flags that can be used to identify services rendered in health care settings, such as hospitals, emergency departments, and ambulatory surgery centers.

While ICD-9-CM procedures are typically included in administrative databases, charge details are not uniformly available across state-level data systems. The number of data organizations providing detailed charge information to the Healthcare Cost and Utilization Project (HCUP) has increased from 16 in 1998 (73 percent of states participating in HCUP) to 29 in 2003 (76 percent of HCUP states). In some states, UB-92 revenue codes are used to report charges. In other states, the detailed charge information has been bundled into logical categories by the state-level data organization and does not identify revenue centers specifically.

The HCUP databases, sponsored by the Agency for Healthcare Research and Quality (AHRQ), offer a large repository of data for analysis of health care services use. The 2003 State Inpatient Databases (SID) include a census of inpatient discharges for all payers from 38 states. The 2003 State Ambulatory Surgery Databases (SASD) contain hospital-based ambulatory surgery events from 20 states. The 2003 State Emergency Department Databases (SEDD) include emergency department visits from 15 states. All but one of these state-level databases include ICD-9-CM procedure codes, and the majority include detailed charge information. The HCUP databases also contain the AHRQ Clinical Classifications Software (CCS), which groups clinically related ICD-9-CM procedures into 231 relatively homogeneous procedure categories.

The purpose of this analysis was to create a limited number of utilization flags that reveal additional information about use of health care services beyond that coded in ICD-9-CM procedure codes. By combining information from ICD-9-CM and revenue codes, it is possible to obtain a more complete picture of utilization of health care services.

Using a combination of the UB-92 revenue codes, ICD-9-CM procedure codes, and CCS procedure categories, 30 utilization flags were developed for a range of services:

- Accommodations – intensive care unit (ICU), coronary care unit (CCU), and newborn nursery levels two to four.
- Cardiac services – cardiac catheterization, stress test, echocardiogram, and electrocardiogram.

- Imaging – computed tomography (CT) scan, chest x-ray, magnetic resonance technology, nuclear medicine, ultrasound, and electroencephalogram.
- Devices – pacemakers and other implants.
- Therapeutic services – blood, erythropoietin, lithotripsy, mental health or substance abuse services, occupational therapy, physical therapy, renal dialysis, respiratory therapy, speech pathology, and therapeutic radiology and chemotherapy.
- Other – emergency department, observation room, and organ acquisition.

APPROACH

The first step in this analysis was to determine which HCUP databases to use for the development of the utilization flags. This included identifying states that provided the necessary data and that most reliably coded UB-92 revenue codes. The next step was to define the utilization flags based on a development database of selected states. Input from clinical and coding experts was considered when finalizing the definitions of the utilization flags. Results from the development database were compared to a combined file of five different HCUP states to evaluate the reliability for uniformly identifying services. Finally, the utilization flags were applied to all possible HCUP databases to examine variations in services.

Deciding Which HCUP Databases to Use

Twenty-nine HCUP Partners provided some information on detailed charges, with more than a third of these states reporting by UB-92 revenue codes (see Appendix A for details). Table 1 enumerates the number of states with detailed charge information by type of HCUP database.

Table 1. Summary of 2003 HCUP Databases with Detailed Charge Information

	SID	SASD	SEDD
Number of States with Detailed Charges	29 (76.3%)	15 (75.0%)	10 (66.7%)
<i>By UB-92 revenue codes</i>	14 (36.8%)	8 (40.0%)	6 (40.0%)
<i>In pre-defined categories (“charge buckets”)</i>	15 (39.5%)	7 (35.0%)	4 (26.7%)
No detailed charges	9 (23.7%)	5 (25.0%)	5 (33.3%)
Total	38 (100.0%)	20 (100.0%)	15 (100.0%)

Examining Variation in the Reporting of Revenue Codes

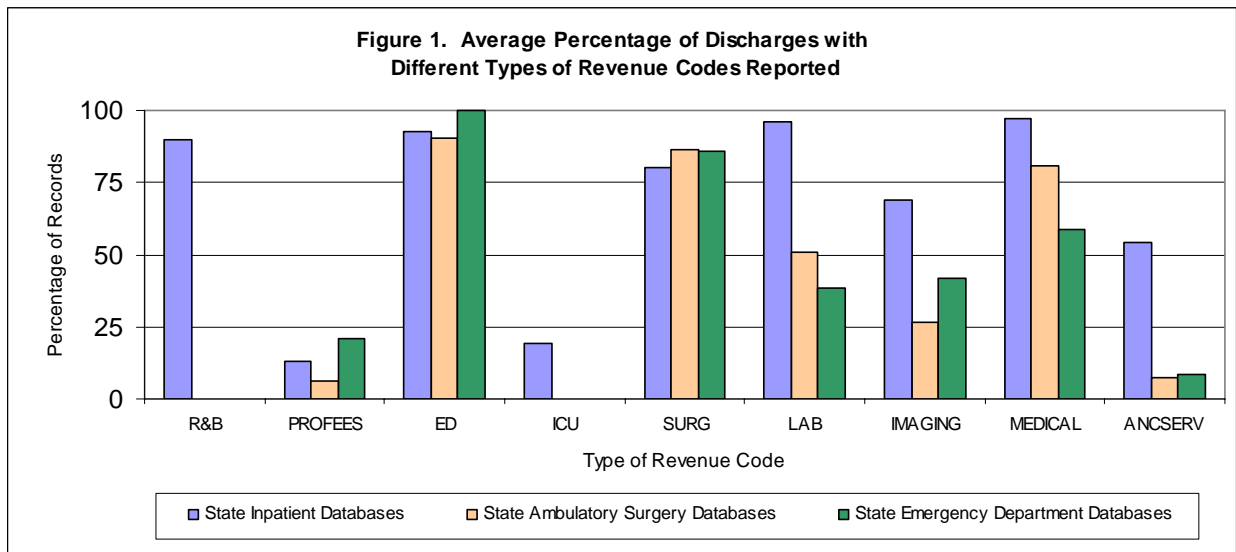
Revenue codes are four-digit codes that uniquely identify accommodation and ancillary services within a hospital. For example, revenue code 0123 indicates a room and board charge for a semi-private pediatric room and code 0401 indicates a diagnostic mammography. Some data systems do not retain the leading 0 for three-digit codes (e.g., reporting revenue code 401 instead of 0401). For analysis purposes, all revenue codes were modified to include the leading zero. Appendix B.1 includes a complete list of UB-92 codes.

In most HCUP databases, revenue codes are stored in an array (REVCD1-REVCD n , where n indicates the dimension of the array) with a corresponding array of associated charges. The number of revenue codes reported on an individual record varies.

The variation in the reporting of basic groups of revenue codes was examined across state databases in an attempt to determine if there were some states with inconsistent reporting of revenue codes. The percentage of records with the following basic types of revenue codes was calculated:

- Room and board
- Professional fees
- Emergency services on records with an admission source of emergency department
- Intensive care unit
- Surgical codes on records with a major therapeutic or major diagnostic procedure
- Laboratory
- Imaging
- Other therapeutic revenue codes for medical and ancillary services.

Figure 1 (on the following page) shows the average percentage of records for these types of revenue codes across all possible states in the inpatient data (SID), ambulatory surgery data (SASD), and emergency department data (SEDD). Appendix C.1 lists the specific revenue codes assigned to each type.



Types of Revenue Codes

R&B	Inpatient room and board revenue codes
PROFEES	Professional fee revenue codes
ED	Records with admission source of emergency department with an emergency service revenue code
ICU	Intensive care revenue codes, including coronary care
SURG	Records with a major diagnostic or therapeutic procedure that have a surgery revenue code
LAB	Diagnostic services – laboratory
IMAGING	Diagnostic services – imaging
MEDICAL	Other therapeutic services – medical
ANCSERV	Other therapeutic services – ancillary

Figure 1 reveals the following:

- Ninety percent of inpatient records had some type of room and board revenue code. Although it might be expected that all inpatient records would include room and board codes, intensive care unit and coronary care unit were included in a separate category.
- Professional fees were coded in fewer than 13 percent of inpatient records, six percent of ambulatory surgery records, and 31 percent of ED records. This is not surprising, given that most state-level databases explicitly exclude professional fees from their calculations of total charges.
- Of all inpatient cases admitted through the ED, 92 percent had an ED revenue code.
- About 19 percent of inpatient discharges include an ICU or CCU revenue code.
- Operating room or anesthesia revenue codes were reported on records with a major diagnostic and therapeutic procedure for 80 percent of inpatient records, 87 percent of ambulatory surgery records, and 85 percent of ED records.

- Laboratory revenue codes were included on 96 percent of inpatient records, 51 percent of ambulatory surgery records, and 38 percent of ED visits.
- Revenue codes for diagnostic imaging services were reported on less than 70 percent of inpatient discharges, 27 percent of ambulatory surgery records, and 42 percent of ED visits.
- Therapeutic medical service revenue codes were included on 97 percent of inpatient discharges, 81 percent of ambulatory surgery records, and less than 60 percent of ED visits.
- Revenue codes for other therapeutic ancillary revenue codes were reported on 54 percent of inpatient discharges, 7 percent of ambulatory surgery records, and almost 9 percent of ED visits.

Variation by State

Some types of revenue codes were coded consistently across states, and others were not. See Appendix C for the percentage of records with different groups of revenue codes by state in the SID, SASD, and SEDD. Percentages are listed for all discharges (Appendix C.2) and for discharges admitted through the emergency department (Appendix C.3).

Most apparent was the variation in the coding of professional fees. The reporting of professional fee revenue codes varied from 0 to 42 percent in the SID, 0 to 22 percent in the SASD, and 0 to 75 percent in the SEDD. Operating room and anesthesia revenue codes appear to be under-reported on records with a major diagnostic or therapeutic procedure.¹ The range of records with operating room or anesthesia revenue codes among those with major procedures was 69 to 87 percent for the inpatient data (SID); 76 to 94 percent for ambulatory surgery data (SASD); and 82 to 87 percent for emergency department data (SEDD).

In contrast, the following types of revenue codes reflected a relatively consistent percentage of records across states, in the inpatient setting:

- Room and board revenue codes
- Laboratory services
- Emergency services on records admitted to the hospital through the ED.

Building the Development and Validation Databases

Of the 13 states with revenue codes included in the SID,² 11 states had relatively complete reporting on a number of the basic revenue types described above. Five geographically-dispersed states with varying population sizes were selected for the development database: KY, MN, NC, NV, and WA. Data was combined across states so no one state overly influenced the creation of the utilization flags. Another five states were chosen for a validation database: MA, NE, TN, TX, and WV. The validation database was used to substantiate the results from the development database. If the percentage of records in a utilization flag was found to be

¹Major diagnostic or therapeutic procedures were identified using the AHRQ Procedure Classes (<http://www.hcup-us.ahrq.gov/toolssoftware/procedure/procedure.jsp>).

²Vermont was excluded from consideration because it provided HCUP with only the first two non-zero digits of the revenue code.

drastically different in the two databases, this would raise questions about its reliability for uniformly identifying services.

Defining the Utilization Flags

An initial set of utilization flags was identified using individual UB-92 revenue codes and groups of codes. Definitions were revised based on frequency of coding, input from clinical and coding experts, and the distribution of principal diagnosis and all listed procedures for each utilization flag, as shown in Appendix D. Appendix D also shows utilization flags that were considered and then dropped because of low frequency or other evidence of unreliability. In some cases, the definitions of the utilization flags were broadened to include ranges of ICD-9-CM procedure codes. A few basic patterns were detected and helped to guide decisions on how to define each utilization flag:

- When revenue codes and ICD-9-CM procedure codes revealed similar reporting of resource-intensive services, such as pacemakers and organ acquisition, the information was considered more reliable and utilization flags were created using both pieces of evidence.
- When some services, such as CT scans and cardiac stress tests, were reported in revenue codes as opposed to ICD-9-CM procedure codes, the information in the revenue codes was considered more reliable, but the additional information provided by ICD-9-CM codes was also included in the definition of the utilization flag.
- When certain revenue codes were coded inconsistently, such as professional fees, utilization flags were not created.

Similar Reporting of Resource-Intensive Services in Revenue Codes and Procedures

Revenue codes and ICD-9-CM codes or CCS categories for procedures appeared to be similar for resource-intensive services. Consider the following examples from the development database:

- Revenue codes for pacemakers captured 25,570 records. The CCS for insertion, revision, replacement, or removal of cardiac pacemaker or cardioverter/defibrillator across all listed procedures identified 25,560 records. Almost 19,000 records contained both the revenue code and corresponding CCS.
- Revenue codes for organ acquisition captured 2,400 records. The CCS categories for transplants across all listed procedures identified 3,100 records. Almost 2,370 records had both the revenue code and corresponding CCS.
- Revenue codes for cardiac catheterization captured 144,000 records. The CCS for diagnostic cardiac catheterization and coronary arteriography across all listed procedures identified 135,000 records. More than 125,000 records contained both the revenue code and corresponding CCS.

These types of resource-intensive services are probably reported under both revenue codes and ICD-9-CM services because they can affect reimbursement. ICD-9-CM procedures are integral to the calculation of the Diagnostic Related Group (DRG) used by Medicare and many other payers to determine reimbursement for an inpatient stay. For resource-intensive services, the utilization flags were defined using both the revenue codes and the corresponding CCS

procedure categories. See Appendix D for a summary of the utilization flags that were considered.

Frequent Reporting of Basic Services in Revenue Codes

For some services, it appears that revenue codes were frequently used instead of ICD-9-CM procedure codes. Consider the following examples from the development database which illustrate the dramatic differences between information gleaned from revenue codes and ICD-9-CM procedure codes:

- Revenue codes for CT scans captured more than 650,000 records. The CCS categories for CT scans across all listed procedures identified only 22,000 records.
- Revenue codes for cardiac stress tests captured 87,000 records. The corresponding CCS category across all listed procedures identified only 9,000 records.
- Revenue codes for diagnostic ultrasounds captured more than 295,000 records. The CCS categories for ultrasounds across all listed procedures identified only 12,000 records.

One explanation for these sizable discrepancies in the reporting of basic diagnostic services is that these types of services do not factor into the DRG assignment and, therefore, would not influence reimbursement. Thus, recording these services using ICD-9-CM codes is not imperative from a reimbursement standpoint. For these basic services, the utilization flags were defined using both the revenue codes and the corresponding CCS procedure categories. Even though the ICD-9-CM procedure codes are not coded as frequently, they did in some cases identify records not captured by the revenue codes. For example, of the 12,000 records with a CCS value for ultrasounds, almost half did not include a revenue code for ultrasound.

Infrequent Coding of Professional Fees

The analysis originally incorporated revenue codes for professional fees into the revenue code utilization flags for services. Unfortunately, the revenue codes for professional fees were infrequently coded and captured very few records that were not already identified by the revenue code for the service itself. For example, revenue codes for ED services identified almost 1.3 million records. In contrast, revenue codes for ED professional fees were coded on only 105,000 records. Only 700 records contained a revenue code for ED professional fees and no revenue code for an ED service. In the final set of utilization flags, professional fee revenue codes were not included with the revenue codes for the corresponding service.

UTILIZATION FLAGS

The analyses resulted in the creation of 30 utilization flags, as listed in Table 2.

Table 2. Utilization Flags

Accommodation	
Intensive Care Unit (ICU)	Coronary Care Unit (CCU)
Newborn Level II	Newborn Level III
Newborn Level IV	
Cardiac Services	
Cardiac Catheterization Lab	Cardiac Stress Test
Echocardiogram	Electrocardiogram (EKG)
Imaging and Diagnostic Tests	
Computed Tomography (CT) Scan	Chest X-Ray
Electroencephalogram (EEG)	Ultrasound
Magnetic Resonance Technology (MRT)	Nuclear Medicine
Devices	
Pacemaker	Other Implants
Therapeutic Services	
Lithotripsy	Occupational Therapy
Physical Therapy	Respiratory Therapy
Therapeutic Radiology and Chemotherapy	Renal Dialysis
Speech-Language Pathology	Erythropoietin (EPO)
Mental Health and Substance Abuse	Blood
Other	
Emergency Department	Observation Room
Organ Acquisition	

All utilization flags are defined using UB-92 revenue codes. In some cases, the revenue codes are used in conjunction with all-listed ICD-9-CM procedure codes. All of the flags are defined using the same coding scheme:

- 0 – Service is not reported on the record
- 1 – Service is indicated only by a UB-92 revenue code
- 2 – Service is indicated only by a ICD-9-CM procedure code or CCS procedure category
- 3 – Service is indicated both by a UB-92 revenue code and ICD-9-CM procedure code or CCS procedure category.

A description of each utilization flag is presented below. This includes the definition, the data element name used by the publicly available assignment programs, and the following information from the development database:

- Total percentage of records
- Percentage identified only by revenue codes
- Percentage identified only by ICD-9-CM procedure code or CCS, if applicable
- Percentage identified by both the revenue code and ICD-9-CM procedure code or CCS, if applicable.

Utilization Flags – Accommodation

Intensive Care Unit (ICU)

An intensive care unit includes medical or surgical care provided to patients who require a more demanding level of care than is rendered in the general medical or surgical unit. The utilization flag information for ICU stays appears in the table below. About 8 percent of cases with an ICU revenue code also had a CCU revenue code. Depending on the purpose of the analysis, it may be advisable to use the ICU flag in conjunction with the CCU utilization flag.

Utilization Flag:	Intensive Care Unit
Data Element Name:	U_ICU
UB-92 Revenue Codes:	0200-0209: Intensive care 0200: General classification 0201: Surgical 0202: Medical 0203: Pediatric 0204: Psychiatric 0206: Intermediate ICU 0207: Burn care 0208: Trauma 0209: Other intensive care
ICD-9-CM Procedure Codes:	None
Total Percentage of Records with this Flag:	14.9%
% identified only by revenue code	14.9%
% identified only by procedure code or CCS	Not applicable
% identified by both	Not applicable
Appendix E.1 includes the following detail for records in the development database that were identified by this utilization flag: the number of cases, the distribution of total charges, and lists of frequently coded principal diagnosis, CCS procedure categories (all listed), and procedure codes (all listed).	

Coronary Care Unit (CCU)

A coronary care unit includes medical care provided to patients with coronary illness who require a more intensive level of care than is rendered in the general medical unit. The utilization flag information for the CCU appears in the table below. About 19 percent of cases also had an ICU revenue code. Depending on the purpose of the analysis, it may be advisable to use the CCU flag in conjunction with the ICU utilization flag.

Utilization Flag:	Coronary Care Unit
Data Element Name:	U_CCU
UB-92 Revenue Codes:	0210-0219: Coronary care 0210: General classification 0211: Myocardial infarction 0212: Pulmonary care 0213: Heart transplant 0214: Intermediate CCU 0219: Other coronary care
ICD-9-CM Procedure Codes:	None
Total Percentage of Records with this Flag:	6.4%
% identified only by revenue code	6.4%
% identified only by procedure code or CCS	Not applicable
% identified by both	Not applicable
Appendix E.2 includes the following detail for records in the development database that were identified by this utilization flag: the number of cases, the distribution of total charges, and lists of frequently coded principal diagnosis, CCS procedure categories (all listed), and procedure codes (all listed).	

Newborn Level II

Newborn level II accommodations include nursing care for low birth-weight neonates who are not sick but require frequent feeding, and neonates who require more hours of nursing than normal. Level II care will accept infants more than 32 weeks old and weighing more than 3 lb. 5 oz. About a third of records in the development file with a newborn nursery revenue code included revenue codes for multiple nursery levels. Depending on the purpose of the analysis, it may be advisable to use Newborn level II in conjunction with the utilization flags for Newborn levels III and IV.

Utilization Flag:	Newborn Level II
Data Element Name:	U_NEWBN2L
UB-92 Revenue Codes:	0172: Newborn level II
ICD-9-CM Procedure Codes:	None
Total Percentage of Records with this Flag:	0.6%
% identified only by revenue code	0.6%
% identified only by procedure code or CCS	Not applicable
% identified by both	Not applicable
Appendix E.3 includes the following detail for records in the development database that were identified by this utilization flag: the number of cases, the distribution of total charges, and lists of frequently coded principal diagnosis, CCS procedure categories (all listed), and procedure codes (all listed).	

Newborn Level III

Newborn level III accommodations include nursing care for sick neonates, who do not require intensive care, but require six to twelve hours of nursing each day. Level III care will accept infants less than 32 weeks old and weighing less than 3 lb. 5 oz. About one-third of records in the development file with a newborn nursery revenue code included revenue codes for multiple nursery levels. Depending on the purpose of the analysis, it may be advisable to use Newborn level III in conjunction with the utilization flags for Newborn levels II and IV.

Utilization Flag:	Newborn Level III
Data Element Name:	U_NEWBN3L
UB-92 Revenue Codes:	0173: Newborn level III
ICD-9-CM Procedure Codes:	None
Total Percentage of Records with this Flag:	0.6%
% identified only by revenue code	0.6%
% identified only by procedure code or CCS	Not applicable
% identified by both	Not applicable
Appendix E.4 includes the following detail for records in the development database that were identified by this utilization flag: the number of cases, the distribution of total charges, and lists of frequently coded principal diagnosis, CCS procedure categories (all listed), and procedure codes (all listed).	

Newborn Level IV

Newborn level IV accommodations include constant nursing and continuous cardiopulmonary and other support for severely ill infants. About one-third of records in the development file with a newborn nursery revenue code included revenue codes for multiple nursery levels. Depending on the purpose of the analysis, it may be advisable to use Newborn level IV in conjunction with the utilization flags for Newborn levels II and III.

Utilization Flag:	Newborn Level IV
Data Element Name:	U_NEWBN4L
UB-92 Revenue Codes:	0174: Newborn level IV
ICD-9-CM Procedure Codes:	None
Total Percentage of Records with this Flag:	0.5%
% identified only by revenue code	0.5%
% identified only by procedure code or CCS	Not applicable
% identified by both	Not applicable
Appendix E.5 includes the following detail for records in the development database that were identified by this utilization flag: the number of cases, the distribution of total charges, and lists of frequently coded principal diagnosis, CCS procedure categories (all listed), and procedure codes (all listed).	

Utilization Flags – Cardiac Services

Cardiac Catheterization Lab

Cardiac catheterization is an invasive test in which a catheter is introduced into the heart to evaluate the structure and function of the heart valves, the heart's ability to pump blood, and the pressure within the heart chambers.

Utilization Flag:	Cardiac Catheterization Lab
Data Element Name:	U_CATH
UB-92 Revenue Codes:	0481: Cardiac catheterization lab
ICD-9-CM Procedure Codes:	Procedure CCS 47: Diagnostic cardiac catheterization and coronary arteriography
Total Percentage of Records with this Flag:	5.0%
% identified only by revenue code	0.6%
% identified only by procedure code or CCS	0.3%
% identified by both	4.0%
Appendix E.6 includes the following detail for records in the development database that were identified by this utilization flag: the number of cases, the distribution of total charges, and lists of frequently coded principal diagnosis, CCS procedure categories (all listed), and procedure codes (all listed).	

Cardiac Stress Test

A cardiac stress test is used to evaluate the heart and vascular system during exercise because some cardiac abnormalities become apparent only when the heart is asked to perform at increased workloads.

Utilization Flag:	Cardiac Stress Test
Data Element Name:	U_STRESS
UB-92 Revenue Codes:	0482: Cardiac stress test
ICD-9-CM Procedure Codes:	Procedure CCS 201: Cardiac stress tests
Total Percentage of Records with this Flag:	2.9%
% identified only by revenue code	2.6%
% identified only by procedure code or CCS	0.1%
% identified by both	0.2%
Appendix E.7 includes the following detail for records in the development database that were identified by this utilization flag: the number of cases, the distribution of total charges, and lists of frequently coded principal diagnosis, CCS procedure categories (all listed), and procedure codes (all listed).	

Echocardiogram

An echocardiogram is a test in which ultrasound is used to examine the heart.

Utilization Flag:	Echocardiogram
Data Element Name:	U_ECHO
UB-92 Revenue Codes:	0483: Echocardiology
ICD-9-CM Procedure Codes:	Procedure codes: 0024: Intravascular echocardiography 3728: Intracardiac echocardiography 8872: Diagnostic ultrasound of heart
Total Percentage of Records with this Flag:	4.8%
% identified only by revenue code	3.2%
% identified only by procedure code or CCS	1.1%
% identified by both	0.5%
Appendix E.8 includes the following detail for records in the development database that were identified by this utilization flag: the number of cases, the distribution of total charges, and lists of frequently coded principal diagnosis, CCS procedure categories (all listed), and procedure codes (all listed).	

Electrocardiogram (EKG)

An electrocardiogram (EKG) includes the operation of specialized equipment to record electromotive variations in the actions of the heart muscle on an electrocardiography to diagnose heart ailments.

Utilization Flag:	Electrocardiogram
Data Element Name:	U_EKG
UB-92 Revenue Codes:	0730-0739:* Electrocardiogram (EKG/ECG) 0730: General classification 0731: Holter monitor 0739: Other EKG/ECG *Telemetry (revenue code 0732) is excluded from this range because it is more resource-intensive than the other EKG services, involving continuous monitoring of heart function.
ICD-9-CM Procedure Codes:	Procedure CCS 202: Electrocardiogram
Total Percentage of Records with this Flag:	42.1%
% identified only by revenue code	42.0%
% identified only by procedure code or CCS	0.01%
% identified by both	0.1%
Appendix E.9 includes the following detail for records in the development database that were identified by this utilization flag: the number of cases, the distribution of total charges, and lists of frequently coded principal diagnosis, CCS procedure categories (all listed), and procedure codes (all listed).	

Utilization Flags – Imaging and Diagnostic Tests

CT Scan

CT scans consist of computed tomographic scans of the head and other parts of the body.

Utilization Flag:	CT Scan
Data Element Name:	U_CTSCAN
UB-92 Revenue Codes:	0350-0359: CT Scan 0350: General classification 0351: Head 0352: Body 0359: Other CT Scan
ICD-9-CM Procedure Codes:	Procedure CCS 177: Computerized axial tomography (CT) scan head 178: CT scan chest 179: CT scan abdomen 180: Other CT scan
Total Percentage of Records with this Flag:	21.2%
% identified only by revenue code	20.5%
% identified only by procedure code or CCS	0.02%
% identified by both	0.7%
Appendix E.10 includes the following detail for records in the development database that were identified by this utilization flag: the number of cases, the distribution of total charges, and lists of frequently coded principal diagnosis, CCS procedure categories (all listed), and procedure codes (all listed).	

Chest X-Ray

Chest x-rays include taking, processing, examining, and interpreting radiographs.

Utilization Flag:	Chest X-Ray
Data Element Name:	U_CHESTXRAY
UB-92 Revenue Codes:	0324: Diagnostic radiology, chest x-ray
ICD-9-CM Procedure Codes:	Procedure codes 8744: Routine chest x-ray NOS. 8749: Other chest x-ray; x-ray of bronchus NOS, diaphragm NOS, heart NOS, lung NOS, mediastinum NOS, trachea NOS
Total Percentage of Records with this Flag:	25.1%
% identified only by revenue code	25.0%
% identified only by procedure code or CCS	0.1%
% identified by both	0.01%
Appendix E.11 includes the following detail for records in the development database that were identified by this utilization flag: the number of cases, the distribution of total charges, and lists of frequently coded principal diagnosis, CCS procedure categories (all listed), and procedure codes (all listed).	

Ultrasound

Ultrasound is a diagnostic test used to determine the shape, size, and density of objects in the path of an ultrasound beam.

Utilization Flag:	Ultrasound
Data Element Name:	U_ULTRASOUND
UB-92 Revenue Codes:	0402: Ultrasound
ICD-9-CM Procedure Codes:	Procedure CCS 192: Diagnostic ultrasound of head and neck 194: Diagnostic ultrasound of gastrointestinal tract 195: Diagnostic ultrasound of urinary tract 196: Diagnostic ultrasound of abdomen or retroperitoneum 197: Other diagnostic ultrasound Procedure code 9513: Ultrasound study of eye
Total Percentage of Records with this Flag:	9.7%
% identified only by revenue code	9.3%
% identified only by procedure code or CCS	0.2%
% identified by both	0.2%
Appendix E.12 includes the following detail for records in the development database that were identified by this utilization flag: the number of cases, the distribution of total charges, and lists of frequently coded principal diagnosis, CCS procedure categories (all listed), and procedure codes (all listed).	

Electroencephalogram (EEG)

EEG involves the measurement of impulse frequencies and differences in electrical potential in various areas of the brain to obtain data for use in diagnosing brain disorders.

Utilization Flag:	Electroencephalogram
Data Element Name:	U_EEG
UB-92 Revenue Codes:	0740-0749: Electroencephalogram 0740: General classification 0749: Other EEG
ICD-9-CM Procedure Codes:	Procedure codes 8914: Electroencephalogram 8919: Video and radio-telemetered electroencephalographic monitoring
Total Percentage of Records with this Flag:	2.0%
% identified only by revenue code	1.9%
% identified only by procedure code or CCS	0.0%
% identified by both	0.1%
Appendix E.13 includes the following detail for records in the development database that were identified by this utilization flag: the number of cases, the distribution of total charges, and lists of frequently coded principal diagnosis, CCS procedure categories (all listed), and procedure codes (all listed).	

Nuclear Medicine

Nuclear medicine includes both diagnostic and therapeutic procedures and radiopharmaceuticals that involve radioactive materials.

Utilization Flag:	Nuclear Medicine
Data Element Name:	U_NUCMED
UB-92 Revenue Codes:	0340-0349: Nuclear medicine 0340: General classification 0341: Diagnostic procedures 0342: Therapeutic procedures 0343: Diagnostic radiopharmaceuticals 0344: Therapeutic radiopharmaceuticals 0349: Other nuclear medicine
ICD-9-CM Procedure Codes:	Procedure codes 9201-9209: Radioisotope scan and function study 9211-9219: Other radioisotope scan 9220-9229: Therapeutic radiology and nuclear medicine 9230-9239: Stereotactic radiosurgery
Total Percentage of Records with this Flag:	5.9%
% identified only by revenue code	5.3%
% identified only by procedure code or CCS	0.3%
% identified by both	0.3%
Appendix E.14 includes the following detail for records in the development database that were identified by this utilization flag: the number of cases, the distribution of total charges, and lists of frequently coded principal diagnosis, CCS procedure categories (all listed), and procedure codes (all listed).	

Magnetic Resonance Technology (MRT)

MRT includes both magnetic resonance imaging (MRI) and magnetic resonance angiography (MRA) of the brain and other parts of the body.

Utilization Flag:	Magnetic Resonance Technology
Data Element Name:	U_MRT
UB-92 Revenue Codes:	0610-0619: Magnetic resonance technology 0610: General classification 0611: MRI of the brain, including brainstem 0612: MRI of the spinal cord, including the spine 0614: MRI other 0615: MRA of the head and neck 0616: MRA of the lower extremities 0618: MRA other 0619: Other MRT
ICD-9-CM Procedure Codes:	Procedure CCS 198: Magnetic resonance imaging
Total Percentage of Records with this Flag:	4.7%
% identified only by revenue code	4.4%
% identified only by procedure code or CCS	0.03%
% identified by both	0.3%
Appendix E.15 includes the following detail for records in the development database that were identified by this utilization flag: the number of cases, the distribution of total charges, and lists of frequently coded principal diagnosis, CCS procedure categories (all listed), and procedure codes (all listed).	

Utilization Flags – Devices

Pacemaker

The revenue code for pacemaker is used for the medical device itself and not for the insertion procedure.

Utilization Flag:	Pacemaker
Data Element Name:	U_PACEMAKER
UB-92 Revenue Codes:	0275: Pacemaker
ICD-9-CM Procedure Codes:	Procedure CCS 48: Insertion; revision; replacement; removal of cardiac pacemaker or cardioverter/defibrillator
Total Percentage of Records with this Flag:	1.0%
% identified only by revenue code	0.2%
% identified only by procedure code or CCS	0.2%
% identified by both	0.6%
Appendix E.16 includes the following detail for records in the development database that were identified by this utilization flag: the number of cases, the distribution of total charges, and lists of frequently coded principal diagnosis, CCS procedure categories (all listed), and procedure codes (all listed).	

Other Implants

Other implants include objects or materials partially or totally inserted or grafted into the body for prosthetic, therapeutic, or diagnostic purposes. Included are tissue, teeth, pellets of medicine, tubes or needles containing a radioactive substance, grafts, any liquid and solid plastic materials, shunts, artificial joints, stints, pins, plates, screws, and anchors. No ICD-9-CM procedure codes are specified for this utilization flag because it is not possible to identify what types of specific implants would be included in this revenue code.

Utilization Flag:	Other Implant
Data Element Name:	U_OTHIMPLANTS
UB-92 Revenue Codes:	0278: Other Implant This revenue code excludes experimental implantable devices (coded under revenue code 0624), intraocular lens implants (revenue code 0276), and pacemakers (revenue code 0275). A utilization flag for pacemakers is included, but the other procedures are infrequent in the inpatient setting.
ICD-9-CM Procedure Codes:	None
Total Percentage of Records with this Flag:	10.1%
% identified only by revenue code	10.1%
% identified only by procedure code or CCS	Not applicable
% identified by both	Not applicable
Appendix E.17 includes the following detail for records in the development database that were identified by this utilization flag: the number of cases, the distribution of total charges, and lists of frequently coded principal diagnosis, CCS procedure categories (all listed), and procedure codes (all listed).	

Utilization Flags – Therapeutic Services

Lithotripsy

Lithotripsy is a technique that uses shock waves to break up stones that form in the kidney, bladder, ureters, or gallbladder.

Utilization Flag:	Lithotripsy
Data Element Name:	U_LITHOTRIPSY
UB-92 Revenue Codes:	0790-0799: Extra-corporeal shock wave therapy (ESWT), formerly Lithotripsy 0790: General classification 0799: Other ESWT
ICD-9-CM Procedure Codes:	Procedure Codes: 9851: ESWT of the kidney, ureter, and/or bladder 9852: ESWT of the gall bladder and/or bile duct 9859: ESWT of other sites
Total Percentage of Records with this Flag:	0.03%
% identified only by revenue code	0.00%
% identified only by procedure code or CCS	0.02%
% identified by both	0.01%
Appendix E.18 includes the following detail for records in the development database that were identified by this utilization flag: the number of cases, the distribution of total charges, and lists of frequently coded principal diagnosis, CCS procedure categories (all listed), and procedure codes (all listed).	

Occupational Therapy

Occupational therapy includes services provided by a qualified occupational therapy practitioner for therapeutic interventions to improve, sustain, or restore an individual's level of function in performance of daily living and work. Services include the following: therapeutic activities, therapeutic exercises, sensorimotor processing, psychosocial skills training, cognitive retraining, fabrication and application of orthotic devices, and training in the use of orthotic and prosthetic devices.

Utilization Flag:	Occupational Therapy
Data Element Name:	U_OCCTHERAPY
UB-92 Revenue Codes:	0430-0439: Occupational therapy 0430: General classification 0431: Visit charge 0432: Hourly charge 0433: Group rate 0434: Evaluation or re-evaluation 0439: Other occupational therapy
ICD-9-CM Procedure Codes:	Procedure code 9383: Occupational therapy
Total Percentage of Records with this Flag:	9.6%
% identified only by revenue code	9.2%
% identified only by procedure code or CCS	0.1%
% identified by both	0.3%
Appendix E.19 includes the following detail for records in the development database that were identified by this utilization flag: the number of cases, the distribution of total charges, and lists of frequently coded principal diagnosis, CCS procedure categories (all listed), and procedure codes (all listed).	

Physical Therapy

Physical therapy includes therapeutic exercises, massage, and the utilization of light, heat, cold, water, electricity, and assistive devices for the diagnosis and rehabilitation of patients who have neuromuscular, orthopedic, or other disabilities.

Utilization Flag:	Physical Therapy
Data Element Name:	U_PHYTHERAPY
UB-92 Revenue Codes:	0420-0429: Physical therapy 0420: General classification 0421: Visit charge 0422: Hourly charge 0423: Group rate 0424: Evaluation or re-evaluation 0429: Other physical therapy
ICD-9-CM Procedure Codes:	Procedure CCS 212: Diagnostic physical therapy 213: Physical therapy exercises; manipulation; and other procedures
Total Percentage of Records with this Flag:	20.0%
% identified only by revenue code	19.3%
% identified only by procedure code or CCS	0.1%
% identified by both	0.6%
Appendix E.20 includes the following detail for records in the development database that were identified by this utilization flag: the number of cases, the distribution of total charges, and lists of frequently coded principal diagnosis, CCS procedure categories (all listed), and procedure codes (all listed).	

Therapeutic Radiology and Chemotherapy

This utilization flag includes therapeutic radiology services and chemotherapy administration. This encompasses therapy by injection or ingestion of radioactive substances, but excludes specific charges for the chemotherapy drugs.

Utilization Flag:	Therapeutic radiology
Data Element Name:	U_RADTHERAPY
UB-92 Revenue Codes:	0330-0339: Radiology – Therapeutic and/or Chemotherapy Administration 0330: General classification 0331: Chemotherapy administration - injected 0332: Chemotherapy administration - oral 0333: Radiation therapy 0335: Chemotherapy administration - intravenous 0339: Other radiology - therapeutic
ICD-9-CM Procedure Codes:	Procedure CCS 211: Therapeutic radiology for cancer treatment 224: Cancer Chemotherapy
Total Percentage of Records with this Flag:	1.2%
% identified only by revenue code	0.3%
% identified only by procedure code or CCS	0.6%
% identified by both	0.3%
Appendix E.21 includes the following detail for records in the development database that were identified by this utilization flag: the number of cases, the distribution of total charges, and lists of frequently coded principal diagnosis, CCS procedure categories (all listed), and procedure codes (all listed).	

Respiratory Therapy

Respiratory services include the administration of oxygen and certain drugs through inhalation or positive pressure. Rehabilitative therapy through the measurement of inhaled and exhaled gases and the evaluation of the patient's ability to exchange oxygen and other gases is also included.

Utilization Flag:	Respiratory Therapy
Data Element Name:	U_RESPTHERAPY
UB-92 Revenue Codes:	0410-0419: Respiratory Services 0410: General classification 0412: Inhalation services 0413: Hyperbaric oxygen therapy 0419: Other respiratory services
ICD-9-CM Procedure Codes:	Procedure codes 9390-9399: Respiratory therapy 9670-9672: Continuous mechanical ventilation
Total Percentage of Records with this Flag:	23.6%
% identified only by revenue code	20.6%
% identified only by procedure code or CCS	0.3%
% identified by both	2.7%
Appendix E.22 includes the following detail for records in the development database that were identified by this utilization flag: the number of cases, the distribution of total charges, and lists of frequently coded principal diagnosis, CCS procedure categories (all listed), and procedure codes (all listed).	

Speech-Language Pathology

Speech-language pathology includes services provided to persons with impaired communications skills.

Utilization Flag:	Speech/Language Pathology
Data Element Name:	U_SPEECHTHERAPY
UB-92 Revenue Codes:	0440-0449: Speech-language pathology 0440: General classification 0441: Visit charge 0442: Hourly charge 0443: Group rate 0444: Evaluation or re-evaluation 0449: Other speech-language pathology
ICD-9-CM Procedure Codes:	Procedure codes 93.71-93.75: Speech and reading rehabilitation
Total Percentage of Records with this Flag:	3.9%
% identified only by revenue code	3.7%
% identified only by procedure code or CCS	0.03%
% identified by both	0.1%
Appendix E.23 includes the following detail for records in the development database that were identified by this utilization flag: the number of cases, the distribution of total charges, and lists of frequently coded principal diagnosis, CCS procedure categories (all listed), and procedure codes (all listed).	

Blood

Blood includes blood products and their administration, processing, and storage.

Utilization Flag:	Blood
Data Element Name:	U_BLOOD
UB-92 Revenue Codes:	0380-0389: Blood 0380: General classification 0381: Packed red cells 0382: Whole blood 0383: Plasma 0384: Platelets 0385: Leucocytes 0386: Other components 0387: Other derivatives (cryoprecipitates) 0389: Other blood 0390-0399: Blood and blood component administration, processing, and storage 0390: General classification 0391: Administrations (e.g., transfusions) 0399: Other processing and storage
ICD-9-CM Procedure Codes:	Procedure CCS 222: Blood transfusion
Total Percentage of Records with this Flag:	11.9%
% identified only by revenue code	7.4%
% identified only by procedure code or CCS	0.2%
% identified by both	4.3%
Appendix E.24 includes the following detail for records in the development database that were identified by this utilization flag: the number of cases, the distribution of total charges, and lists of frequently coded principal diagnosis, CCS procedure categories (all listed), and procedure codes (all listed).	

Renal Dialysis

Renal dialysis involves a waste removal process that uses an artificial kidney when the body's own kidneys have failed. The waste may be removed directly from the blood (hemodialysis) or indirectly from the blood by flushing a special solution between the abdominal covering and the tissue (peritoneal dialysis).

Utilization Flag:	Renal Dialysis
Data Element Name:	U_DIALYSIS
UB-92 Revenue Codes:	0800-0809: Inpatient renal dialysis 0800: General classification 0801: Inpatient hemodialysis 0802: Inpatient peritoneal (non-CAPD) 0803: Inpatient continuous ambulatory peritoneal dialysis (CAPD) 0804: Inpatient continuous cycling peritoneal dialysis (CCPD) 0809: Other inpatient dialysis
ICD-9-CM Procedure Codes:	Procedure Codes 3995: Hemodialysis 5498: peritoneal dialysis
Total Percentage of Records with this Flag:	1.8%
% identified only by revenue code	0.3%
% identified only by procedure code or CCS	0.2%
% identified by both	1.3%
Appendix E.25 includes the following detail for records in the development database that were identified by this utilization flag: the number of cases, the distribution of total charges, and lists of frequently coded principal diagnosis, CCS procedure categories (all listed), and procedure codes (all listed).	

Erythropoietin (EPO)

Erythropoietin (EPO) is a naturally occurring hormone, produced by the kidneys, which stimulates the body to produce more red blood cells. EPO also is available as a therapeutic agent used to treat anemia in patients with chronic kidney disease, cancer patients receiving chemotherapy, and HIV-infected individuals receiving AZT therapy. It is also indicated for use in patients scheduled to undergo elective, non-cardiac, non-vascular surgery.

Utilization Flag:	Erythropoietin
Data Element Name:	U_EPO
UB-92 Revenue Codes:	0634-0635: Erythropoietin 0634: EPO less than 10,000 units 0635: EPO 10,000 units or more
ICD-9-CM Procedure Codes:	None
Total Percentage of Records with this Flag:	0.4%
% identified only by revenue code	0.4%
% identified only by procedure code or CCS	Not applicable
% identified by both	Not applicable
Appendix E.26 includes the following detail for records in the development database that were identified by this utilization flag: the number of cases, the distribution of total charges, and lists of frequently coded principal diagnosis, CCS procedure categories (all listed), and procedure codes (all listed).	

Mental Health and Substance Abuse (MH-SA)

The utilization flag for mental health and substance abuse includes a combination of accommodation and ancillary services.

Utilization Flag:	Mental Health and Substance Abuse
Data Element Name:	U_MHSA
UB-92 Revenue Codes:	<p>0114: Room and board – private – psychiatric 0116: Room and board – private – detoxification 0124: Room and board – semi-private (2 bed) – psychiatric 0126: Room and board – semi-private (2 bed) – detoxification 0134: Room and board – semi-private (3-4 bed) – psychiatric 0136: Room and board – semi-private (3-4 bed) – detoxification 0144: Room and board – private deluxe – psychiatric 0146: Room and board – private deluxe – detoxification 0154: Room and board – ward – psychiatric 0156: Room and board – ward – detoxification 0513: Psychiatric clinic (non-emergency outpatient visit) 0944: Drug rehabilitation 0945: Alcohol rehabilitation 1001: Residential treatment – psychiatric 1002: Residential treatment – chemical dependency</p> <p>0900-919: Behavioral health treatment and services 0900: General classification 0901: Electroshock treatment 0902: Milieu therapy 0903: Play therapy 0904: Activity therapy 0905: Intensive outpatient services - psychiatric 0906: Intensive outpatient services – chemical dependency 0907: Community behavioral health program (day treatment) 0909: Other 0910: General classification 0911: Rehabilitation 0912: Partial hospitalization – less intensive 0913: Partial hospitalization – intensive 0914: Individual therapy 0915: Group therapy 0916: Family therapy 0917: Bio feedback 0918: Testing 0919: Other behavioral health treatment and services</p>
ICD-9-CM Procedure Codes:	<p>Procedure CCS 218: Psychological and psychiatric evaluation and therapy 219: Alcohol and drug rehabilitation/detoxification</p>

Total Percentage of Records with this Flag:	5.0%
% identified only by revenue code	3.9%
% identified only by procedure code or CCS	0.4%
% identified by both	0.7%
<p>Appendix E.27 includes the following detail for records in the development database that were identified by this utilization flag: the number of cases, the distribution of total charges, and lists of frequently coded principal diagnosis, CCS procedure categories (all listed), and procedure codes (all listed).</p>	

Utilization Flags – Other

Emergency Department

The revenue codes for ED include emergency treatment to ill and injured persons who require immediate, unscheduled medical or surgical care.

Utilization Flag:	Emergency Department
Data Element Name:	U_ED
UB-92 Revenue Codes:	0450-0459: Magnetic resonance technology 0450: General classification 0451: EMTALA* screening services 0452: ED beyond EMTALA* screening 0456: Urgent care 0459: Other emergency room *EMTALA is the Emergency Medical Treatment and Labor Act, which requires that hospitals screen anyone presenting for care, and may transfer patients only after they have been stabilized.
ICD-9-CM Procedure Codes:	None
Total Percentage of Records with this Flag:	41.6%
% identified only by revenue code	41.6%
% identified only by procedure code or CCS	Not applicable
% identified by both	Not applicable
Appendix E.28 includes the following detail for records in the development database that were identified by this utilization flag: the number of cases, the distribution of total charges, and lists of frequently coded principal diagnosis, CCS procedure categories (all listed), and procedure codes (all listed).	

Observation Room

Observation services are those services furnished by a hospital on the hospital's premises, including use of a bed and periodic monitoring by a hospital's nursing or other staff, which are reasonable and necessary to evaluate an outpatient's condition or determine the need for a possible admission to the hospital as an inpatient. Most observation services do not exceed one day. Some patients, however, may require a second day of outpatient observation services.

Utilization Flag:	Observation Room
Data Element Name:	U_OBSERVATION
UB-92 Revenue Codes:	0762: Observation room
ICD-9-CM Procedure Codes:	None
Total Percentage of Records with this Flag:	3.0%
% identified only by revenue code	3.0%
% identified only by procedure code or CCS	Not applicable
% identified by both	Not applicable
Appendix E.29 includes the following detail for records in the development database that were identified by this utilization flag: the number of cases, the distribution of total charges, and lists of frequently coded principal diagnosis, CCS procedure categories (all listed), and procedure codes (all listed).	

Organ Acquisition

Organ acquisition includes the attainment and storage of body tissue, bone marrow, organs, or any other body component used for transplantation.

Utilization Flag:	Organ Acquisition
Data Element Name:	U_ORGANACQ
UB-92 Revenue Codes:	0810-0819: Acquisition of body components 0810: General classification 0811: Living donor 0812: Cadaver donor 0813: Unknown donor 0814: Unsuccessful donor search 0819: Other donor
ICD-9-CM Procedure Codes:	None
Total Percentage of Records with this Flag:	0.1%
% identified only by revenue code	0.1%
% identified only by procedure code or CCS	Not applicable
% identified by both	Not applicable
Appendix E.30 includes the following detail for records in the development database that were identified by this utilization flag: the number of cases, the distribution of total charges, and lists of frequently coded principal diagnosis, CCS procedure categories (all listed), and procedure codes (all listed).	

VARIATIONS IN UTILIZATION ACROSS THE HCUP STATES

There was very little difference in the percentage of records with specific utilization flags, when comparing the development database, the validation database, and the average across the 24 SID that have charge detail. While there were 29 states that provided HCUP with charge detail, only 24 states could be used for the assignment of the utilization flags, as detailed below:

- Thirteen states included revenue codes used in the assignment of the utilization flags.
- Eleven states provided pre-defined charge buckets for which at least one category matched a utilization flag.
- Four other states (CO, IL, OR, and VA) that provided pre-defined charge buckets had no category that matched the definition of a utilization flag. These states were not used for these analyses.
- Vermont was excluded because the data included only the first two non-zero digits of the revenue code.

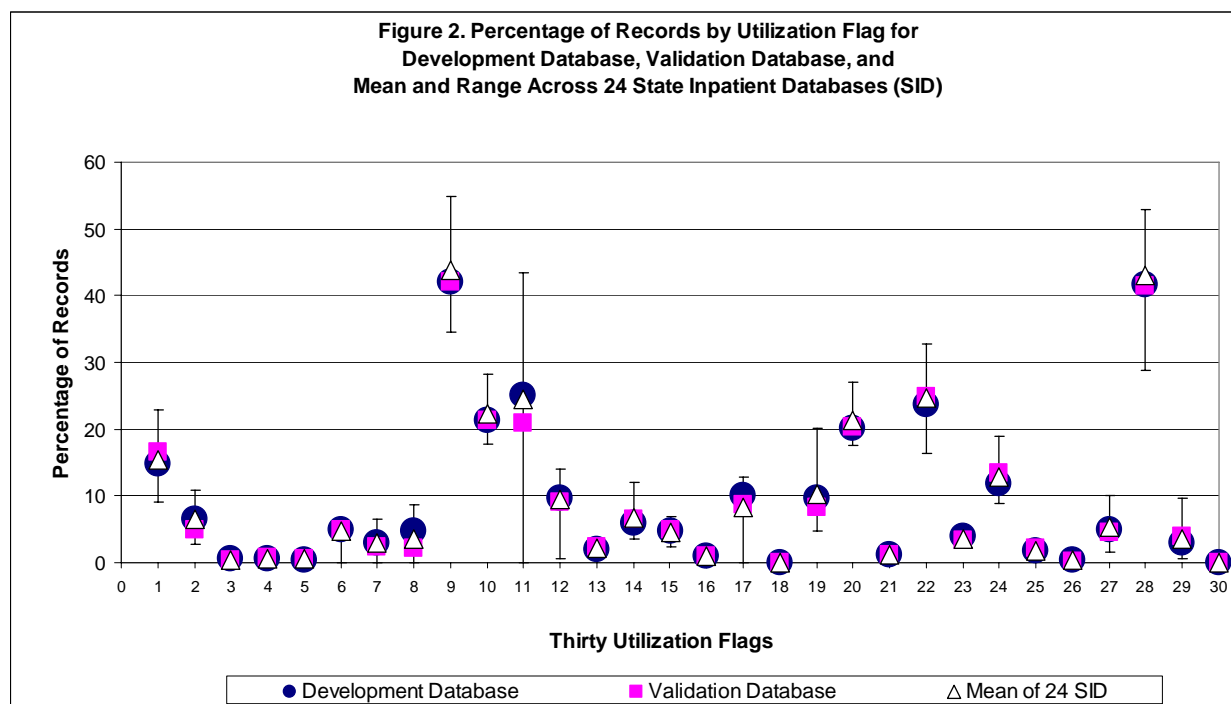
Table 3 includes the percentage of records by utilization flag for the development database, the validation database, and the average across the 24 SID.

Table 3. Percentage of Records by Utilization Flag

Utilization Flags	Development Database	Validation Database	State Inpatient Databases for 24 States		
	% of Records (A)	% of Records (B)	Mean % Across States (C)	Minimum % Across States (D)	Maximum % Across States (E)
1. Intensive Care Unit	14.89	16.61	15.45	9.12	22.98
2. Coronary Care Unit	6.43	5.03	6.45	2.70	10.84
3. Newborn Level II	0.56	0.47	0.44	0.01	0.84
4. Newborn Level III	0.56	0.71	0.51	0.03	1.03
5. Newborn Level IV	0.49	0.6	0.60	0.09	1.02
6. Cardiac Catheterization Lab	4.98	4.84	4.74	0.00	5.95
7. Cardiac Stress Test	2.9	2.38	3.01	0.00	6.59
8. Echocardiogram	4.79	2.2	3.48	0.00	8.60
9. Electrocardiogram	42.13	42.13	43.82	34.48	54.80
10. CT Scan	21.22	21.23	22.39	17.68	28.18
11. Chest X-Ray	25.05	20.84	24.44	0.01	43.50
12. Ultrasound	9.7	9.12	9.55	0.62	14.11
13. Electroencephalogram	2.03	2.37	2.23	1.32	3.34
14. Nuclear Medicine	5.88	6.5	6.68	3.48	12.00
15. Magnetic Resonance Technology	4.65	4.93	4.60	2.45	6.86
16. Pacemaker	1.04	0.98	0.97	0.00	1.35
17. Other Implants	10.1	8.64	8.30	0.00	12.82
18. Lithotripsy	0.03	0.04	0.04	0.01	0.07
19. Occupational Therapy	9.64	8.38	10.28	4.71	20.17
20. Physical Therapy	20.04	20.26	21.34	17.50	27.02
21. Therapeutic Radiology and Chemotherapy	1.22	1.19	1.17	0.77	1.50
22. Respiratory Therapy	23.62	24.96	24.63	16.44	32.76
23. Speech-Language Pathology	3.89	3.26	3.63	2.59	5.56
24. Blood	11.92	13.36	12.76	8.91	18.95
25. Renal Dialysis	1.83	2.15	1.82	1.15	2.44
26. Erythropoietin	0.37	0.23	0.35	0.00	0.74
27. Mental Health and Substance Abuse	4.96	4.53	5.42	1.50	9.98
28. Emergency Department	41.56	41.44	43.01	28.74	52.81
29. Observation Room	3.05	3.93	3.55	0.58	9.64
30. Organ Acquisition	0.08	0.07	0.06	0.02	0.13

Only two utilization flags differed by more than two percentage points in the percentage of records in the development database (column A), the validation database (column B), and the average across 24 SID (column C). The utilization flag for chest x-ray appeared on 25 percent of records in the development database, 21 percent of records in the validation database, and 24 percent of records across the SID. The utilization flag for an echocardiogram appeared on 4.8 percent of records in the development database, 2.2 percent of records in the validation database, and 3.5 percent of records across the SID. Eighteen of the 30 utilization flags differed by less than one percentage point.

There was more variation when considering the 24 SID. Figure 2 demonstrates the variation across the 30 utilization flags, as listed in Table 3. The percentage of records for the development database (column A of Table 3) and the validation database (column B of Table 3) are displayed by a single marker in Figure 2 (circle and square, respectively). The percentage for the mean of the 24 SID (column C of Table 3) is marked by a triangle in Figure 2. Vertical bars indicate the range across the 24 SID (columns D and E of Table 3).



Six utilization flags differed by less than one percentage point across the 24 states. Twenty of the 30 utilization flags differed by less than 10 percentage points. The three utilization flags with the most variation were chest x-ray (number 11 on Figure 2, ranging from 0.01 percent to 43.5 percent), emergency department (number 28 on Figure 2, ranging from 29 percent to 53 percent), and electrocardiogram (number 9 on Figure 2, ranging from 34 percent to 55 percent).

Appendix F.1 presents the percentage of records in each utilization flag for the 24 SID. Thirteen of these states have information for all utilization flags because they provided revenue codes. For the other states, the percentage for the utilization flag is presented only if there was a matching pre-defined charge bucket. Appendices F.2 and F.3 include similar information by utilization for SASD and SEDD states, respectively. For the SASD analysis, 11 of the 15 states providing charge detail included the necessary information. Six states provided revenue codes

and five states had pre-defined charge buckets that matched at least one utilization flag. The remaining four states were excluded for the following reasons:

- Vermont did not provide complete revenue codes
- Maryland SASD did not include ICD-9-CM procedures
- Colorado and North Carolina had charge buckets that did not correspond to the revenue code ranges for the utilization flags.

For the SEDD analysis included in Appendix F.3, eight of the 10 states providing charge detail included the necessary information. Four states provided revenue codes, and another four states had pre-defined charge buckets that matched at least one utilization flag. The remaining two states were excluded for the following reasons:

- Vermont did not provide complete revenue codes
- Maryland SEDD did not include ICD-9-CM procedures.

ADDING THE UTILIZATION FLAGS TO OTHER ADMINISTRATIVE DATABASES

Both SAS and SPSS programs are available for assigning the utilization flags to other administrative databases. The programs can be downloaded from the HCUP User Support Website (www.hcup-us.ahrq.gov/tools_software.jsp). Table 4 lists the required data elements.

Table 4. Data Elements Required for Assigning the Utilization Flags

Data Elements	Description
KEY	Unique record identifier
REVCD1-REVCDn	Array of dimension n of four-character UB-92 revenue codes, including the leading zero. The assignment program allows the user to specify the length of the array.
PR1-PRn	Array of dimension n of ICD-9-CM procedure codes, decimals removed. The assignment program allows the user to specify the length of the array.
PRCCS1-PRCCSn	Array of dimension n of AHRQ CCS procedure categories. The length of the array must be the same as the length of the ICD-9-CM procedure array. The program to assign the procedure CCS is available at http://www.hcup-us.ahrq.gov/tools_software.jsp .
NPR	NPR indicates the total number of ICD-9-CM procedure codes reported on the discharge record. For example, if a discharge record has five procedures reported, then NPR equals five. The value on NPR is never larger than the dimension of the array of ICD-9-CM procedures.

The utilization flag assignment program allows the revenue codes either to be included in the same file as the procedure codes and CCS, or to be in a separate file. In the HCUP databases available for purchase through the HCUP Central Distributor,³ the revenue codes are stored in a separate file. The SAS and SPSS programs assign the 30 utilization flags, output the resulting data set, and calculate summary and detailed statistics for each flag.

³For information on purchasing HCUP state and nationwide databases, refer to the HCUP User Support Website (www.hcup-us.ahrq.gov).

CONCLUSIONS AND IMPLEMENTATION STRATEGY

This study demonstrates the power of administrative data (i.e., computerized hospital discharge data) in facilitating health care research. Using ICD-9-CM procedure codes in conjunction with information from revenue centers within the hospital allows researchers to capture the occurrence of specific services that would not be identified using only one type of information.

The fact that the analysis revealed little variation in the percentage of records with specific utilization flags between the development database, the validation database, and the average across the SID indicates that the utilization flags are applicable for use in administrative databases other than HCUP. It also demonstrates the value of leaving revenue code information in their original format and not collapsing them into pre-defined categories. The detail provided by the revenue center codes enables a researcher to maximize the usefulness and comparability of the data to other information reported on the discharge record.

This study underscores the idea that most of the utilization flags are appropriate for use in different health care settings, such as hospitals, emergency departments, and ambulatory surgery centers. However, a limited number of flags (ICU, CCU, and newborn nursery levels) are specific to inpatient records.

To further explore the utilization of services rendered in inpatient and outpatient health care settings, the 30 utilization flags will become part of the HCUP databases beginning in 2005. As appropriate, they will also be incorporated into HCUPnet, the interactive Web-based tool for identifying, tracking, analyzing, and comparing statistics on hospital care (<http://hcup.ahrq.gov/>). Programming code to calculate the utilization flags on other administrative databases is available to the public on the HCUP User Support Website (http://www.hcup-us.ahrq.gov/tools_software.jsp).

ALPHABETIC INDEX OF UTILIZATION FLAGS

Utilization Flag	Data Element Name	Page
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Cardiac Catheterization Lab	U_CATH	17
Cardiac Stress Test	U_STRESS	18
Chest X-Ray	U_CHESTXRAY	22
Computed Tomography Scan	U_CTSCAN	21
Coronary Care Unit	U_CCU	13
Echocardiogram	U_ECHO	19
Electrocardiogram	U_EKG	20
Electroencephalogram	U_EEG	24
Emergency Department	U_ED	40
Erythropoietin	U_EPO	37
Intensive Care Unit	U_ICU	12
Lithotripsy	U_LITHOTRIPSY	29
Magnetic Resonance Technology	U_MRT	26
Mental Health and Substance Abuse	U_MHSA	38
Nuclear Medicine	U_NUCMED	25
Newborn Level II	U_NEWBN2L	14
Newborn Level III	U_NEWBN3L	15
Newborn Level IV	U_NEWBN4L	16
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Occupational Therapy	U_OCCTherapy	30
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Other Implants	U_OTHIMPLANTS	28
Pacemaker	U_PACEMAKER	27
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Therapeutic Radiology and Chemotherapy	U_RADTHERAPY	32
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Respiratory Therapy	U_RESPTHERAPY	33
Speech-Language Pathology	U_SPEECHTHERAPY	34
Ultrasound	U_ULTRASOUND	23

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