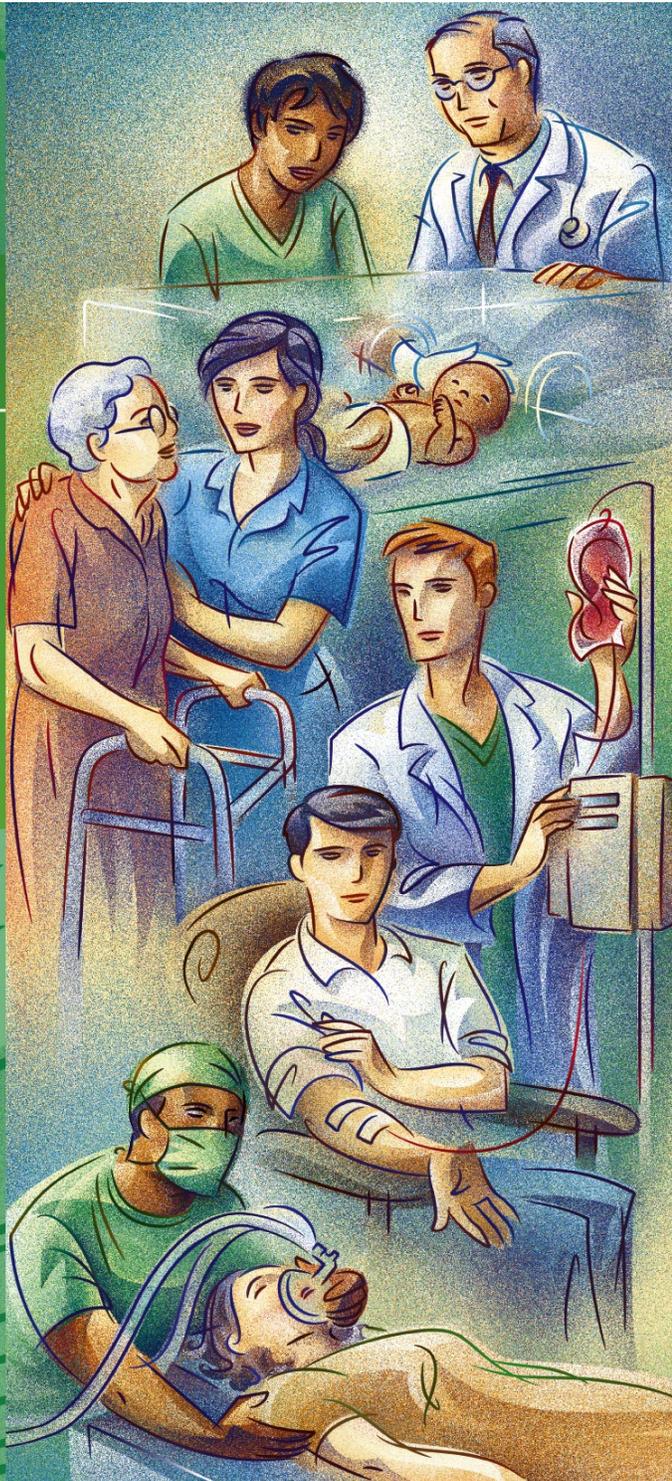




AHRQ QUALITY INDICATORS

# Guide to Patient Safety Indicators



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Department of Health and Human Services  
Agency for Healthcare Research and Quality  
<http://www.qualityindicators.ahrq.gov>

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## Preface

In health care as in other arenas, that which cannot be measured is difficult to improve. Providers, consumers, policy makers, and others seeking to improve the quality of health care need accessible, reliable indicators of quality that they can use to flag potential problems or successes; follow trends over time; and identify disparities across regions, communities, and providers. As noted in a 2001 Institute of Medicine study, *Envisioning the National Health Care Quality Report*, it is important that such measures cover not just acute care but multiple dimensions of care: staying healthy, getting better, living with illness or disability, and coping with the end of life.

The Agency for Healthcare Research and Quality (AHRQ) Quality Indicators (QIs) are one Agency response to this need for multidimensional, accessible quality indicators. They include a family of measures that providers, policy makers, and researchers can use with inpatient data to identify apparent variations in the quality of inpatient or outpatient care. AHRQ's Evidence-Based Practice Center (EPC) at the University of California San Francisco (UCSF) and Stanford University adapted, expanded, and refined these indicators based on the original Healthcare Cost and Utilization Project (HCUP) Quality Indicators developed in the early 1990s.

The new AHRQ QIs are organized into three modules: **Prevention Quality Indicators**, **Inpatient Quality Indicators**, and **Patient Safety Indicators**. AHRQ has published the three modules as a series. The first module – Prevention Quality Indicators – was released in 2001 and the second module – Inpatient Quality Indicators – was released in 2002. Both are available at AHRQ's Quality Indicators Web site at <http://www.qualityindicators.ahrq.gov>.

This third module focuses on potentially preventable complications and iatrogenic events for patients treated in hospitals. The Patient Safety Indicators (PSIs) are measures that screen for adverse events that patients experience as a result of exposure to the health care system; these events are likely amenable to prevention by changes at the system or provider level. The PSIs were initially released in March 2003. With this update (revision 2), the PSIs now include 23 Provider-level and 6 Area-level Indicators.

Full technical information on the first two modules can be found in *Evidence Report for Refinement of the HCUP Quality Indicators*, prepared by the UCSF-Stanford EPC. It can be accessed at AHRQ's Quality Indicators Web site (<http://www.qualityindicators.ahrq.gov>). The technical report for the third module, entitled *Evidence Report for Measures of Patient Safety Based on Hospital Administrative Data—The Patient Safety Indicators*, is also available on AHRQ's Quality Indicators Web site.

Improving patient safety is a critical part of efforts to provide high quality health care in the United States. This guide is intended to facilitate such efforts. As always, we would appreciate hearing from those who use our measures and tools so that we can identify how they are used, how they can be refined, and how we can measure and improve the quality of the tools themselves. You may contact us by sending an e-mail to [support@qualityindicators.ahrq.gov](mailto:support@qualityindicators.ahrq.gov).

Irene Fraser, Ph.D., Director  
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The programs for the Patient Safety Indicators (PSIs) can be downloaded from [http://www.qualityindicators.ahrq.gov/psi\\_download.htm](http://www.qualityindicators.ahrq.gov/psi_download.htm).

Instructions on how to use the programs to calculate the PSI rates are contained in the companion text, *Patient Safety Indicators: Software Documentation (both SAS and SPSS)*.

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## Introduction to the AHRQ Patient Safety Indicators

Hospitals in the United States provide the setting for some of life's most pivotal events—the birth of a child, major surgery, treatment for otherwise fatal illnesses. These hospitals house the most sophisticated medical technology in the world and provide state-of-the-art diagnostic and therapeutic services. But access to these services comes with certain costs. About 36% of personal health care expenditures in the United States go towards hospital care,<sup>1</sup> and the rate of growth in spending for hospital services has begun to increase following a half a decade of declining growth.<sup>2</sup> Simultaneously, concerns about the quality of health care services have reached a crescendo with the Institute of Medicine's series of reports describing the problem of medical errors<sup>3</sup> and the need for a complete restructuring of the health care system to improve the quality of care.<sup>4</sup> Policymakers, employers, and consumers have made the quality of care in U.S. hospitals a top priority and have voiced the need to assess, monitor, track, and improve the quality of inpatient care.

Hospital administrative data offer a window into the medical care delivered in our nation's hospitals. These data, which are collected as a routine step in the delivery of hospital services, provide information on diagnoses, procedures, age, gender, admission source, and discharge status. From these data elements, it is possible to construct a picture of the quality of medical care. Although quality assessments based on administrative data cannot be definitive, they can be used to flag potential quality problems and success stories, which can then be further investigated and studied. Hospital associations, individual hospitals, purchasers, regulators, and policymakers at the local, State, and Federal levels can use readily available hospital administrative data to begin the assessment of quality of care. In 2003, the Agency for Healthcare Research and Quality published the *National Healthcare Quality Report*<sup>5</sup> (NHQR) and *National Healthcare Disparities Report*<sup>6</sup> (NHDR) which provide a comprehensive picture of the level and variation of quality within four components of health care quality—effectiveness, safety, timeliness, and patient centeredness. These reports incorporated many Prevention Quality Indicators and Patient Safety Indicators (selected Inpatient Quality Indicators (IQIs) are under evaluation for inclusion in the next reports).

The AHRQ Quality Indicators are now being used for applications beyond quality improvement. Some organizations have used the AHRQ Quality Indicators to produce web based, comparative reports on hospital quality, such as the Texas Health Care Information Council<sup>7</sup> and the Niagara Coalition<sup>8</sup>. These organizations also supplied users with guidance on indicator interpretation. Other organizations have incorporated selected AHRQ QIs into pay for performance demonstration projects or similar programs, such as the Centers for Medicare and Medicaid Services (CMS)<sup>9</sup> and Anthem Blue Cross Blue Shield of Virginia<sup>10</sup> where hospitals would be financially rewarded for performance. Guidance on these

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<sup>1</sup> <http://www.cms.hhs.gov/statistics/nhe/projections-2002/t2.asp>: Table 2: National Health Expenditure Amounts, and Average Annual Percent Change by Type of Expenditure: Selected Calendar Years 1980-2012.

<sup>2</sup> Strunk BC, Ginsburg PB, Gabel JR. Tracking Health Care Costs. Health Affairs, 26 September 2001 (Web exclusive).

<sup>3</sup> Institute of Medicine. To Err is Human: Building a Safer Health System. Kohn LT, Corrigan JM, Donaldson MS (eds.) Washington DC: National Academy Press, 2000.

<sup>4</sup> Institute of Medicine. Crossing the Quality Chasm: A New Health System for the 21<sup>st</sup> Century. Committee of Quality of Care in America. Washington DC: National Academy Press, 2001.

<sup>5</sup> Agency for Healthcare Research and Quality. *National Healthcare Quality Report*. Rockville, MD, U.S. Department of Health and Human Services, Agency for Healthcare Research and Quality, December 2003.

<sup>6</sup> Agency for Healthcare Research and Quality. *National Healthcare Disparities Report*. Rockville, MD, U.S. Department of Health and Human Services, Agency for Healthcare Research and Quality, July 2003.

<sup>7</sup> Texas Health Care Information Council. *Indicators of Inpatient Care in Texas Hospitals, 1999-2001*. <http://www.thcic.state.tx.us/IQIReport2001/IQIReport2001.htm>. Accessed February 2004.

<sup>8</sup> Niagara Health Quality Coalition. *Alliance for Healthcare Quality: Indicators of Inpatient Care in New York Hospitals, 2001*. <http://www.myhealthfinder.com/iqi2001/index.php>. Accessed February 2004.

<sup>9</sup> Centers for Medicare & Medicaid Services. *The Premier Hospital Quality Incentive Demonstration*. <http://www.cms.hhs.gov/quality/hospital/PremierFactSheet.pdf>. Accessed February 2004.

<sup>10</sup> Grinnan, R and Shan, Y. (2003). *Anthem Blue Cross and Blue Shield of Virginia. A Pay for Performance Initiative:*

alternative uses of the AHRQ QIs is summarized in the AHRQ publication *Guidance for Using the AHRQ Quality Indicators for Hospital-Level Public Reporting or Payment*<sup>11</sup>.

The Agency for Healthcare Research and Quality (AHRQ) Patient Safety Indicators (PSIs) are a tool that takes advantage of hospital administrative data. The PSIs represent the current state-of-the-art in measuring the safety of hospital care through analysis of inpatient discharge data.

This update of the AHRQ Patient Safety Indicators (PSIs) (Revision 2) incorporates changes to the specifications to improve the specificity of the indicators (i.e. remove “false-positives”) and incorporates three new indicators based on user feedback. As organizations have increasingly adopted the standard measures for quality of care, users requested convergence of actual operationalization of measures. For instance, PSIs #18, #19, and #20 (Obstetric Trauma) were defined slightly differently than the new core measure for the same condition adopted by the Joint Commission for the Accreditation of Healthcare Organizations (JCAHO). Both definitions have advantages and disadvantages, and users desired to look at OB Trauma in both manners. As a result both definitions are now included in the software. The new PSIs #27, #28, and #29 include 3<sup>rd</sup> degree lacerations in addition to 4<sup>th</sup> degree lacerations in the numerator definition of obstetric trauma.

## What Are the Patient Safety Indicators?

The PSIs are a set of measures that can be used with hospital inpatient discharge data to provide a perspective on patient safety. Specifically, PSIs screen for problems that patients experience as a result of exposure to the healthcare system and that are likely amenable to prevention by changes at the system or provider level. These are referred to as complications or adverse events. PSIs are defined on two levels: the provider level and the area level.

- *Provider-level Indicators* provide a measure of the potentially preventable complication for patients who received their initial care and the complication of care within the same hospitalization. Provider-level Indicators include only those cases where a secondary diagnosis code flags a potentially preventable complication.
- *Area-level Indicators* capture all cases of the potentially preventable complication that occur in a given area (e.g., metropolitan service area or county) either during hospitalization or resulting in subsequent hospitalization. Area-level Indicators are specified to include principal diagnosis, as well as secondary diagnoses, for the complications of care. This specification adds cases where a patient’s risk of the complication occurred in a separate hospitalization.

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*Quality-In-Sights Hospital Incentive Program*. Unpublished document provided to AHRQ on September 4, 2003.

<sup>11</sup> Remus D, Fraser I. *Guidance for Using the AHRQ Quality Indicators for Hospital-level Public Reporting or Payment*. Rockville, MD: Department of Health and Human Services, Agency for Healthcare Research and Quality; 2004. AHRQ Pub. No. 04-0086-EF. The document and appendices can be downloaded from AHRQ’s Quality Indicators Web site (<http://www.qualityindicators.ahrq.gov/documentation.htm>).

The PSIs include the following Provider-level Indicators:

<b>Patient Safety Indicators - Provider</b>	<b>PSI Number</b>
Complications of anesthesia	1
Death in low mortality DRGs	2
Decubitus ulcer*	3
Failure to rescue	4
Foreign body left during procedure*	5
Iatrogenic pneumothorax*	6
Selected infections due to medical care*	7
Postoperative hip fracture*	8
Postoperative hemorrhage or hematoma*	9
Postoperative physiologic and metabolic derangements*	10
Postoperative respiratory failure*	11
Postoperative pulmonary embolism or deep vein thrombosis*	12
Postoperative sepsis*	13
Postoperative wound dehiscence*	14
Accidental puncture or laceration*	15
Transfusion reaction*	16
Birth trauma – injury to neonate	17
Obstetric trauma – vaginal with instrument	18
Obstetric trauma – vaginal without instrument	19
Obstetric trauma – cesarean section	20
Obstetric trauma with 3 <sup>rd</sup> degree – vaginal with instrument*	27
Obstetric trauma with 3 <sup>rd</sup> degree – vaginal without instrument*	28
Obstetric trauma with 3 <sup>rd</sup> degree – cesarean section*	29

In addition, the following PSIs were modified into Area-level Indicators to assess the total incidence of the adverse event within geographic areas:

<b>Patient Safety Indicators - Area</b>	<b>PSI Number</b>
Foreign body left during procedure	21
Iatrogenic pneumothorax	22
Selected infections due to medical care	23
Postoperative wound dehiscence	24
Accidental puncture or laceration	25
Transfusion reaction	26

\* These PSI were modified (PSIs 1, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16) or added (PSIs 27, 28, 29) in version 2.1, revision 2.

## How Can the PSIs Be Used to Assess Patient Safety?

Widespread consensus exists that health care organizations can reduce patient injuries by improving the environment for safety—from implementing technical changes, such as electronic medical record systems, to improving staff awareness of patient safety risks. Clinical process interventions also have strong evidence for reducing the risk of adverse events related to a patient's exposure to hospital care.<sup>2</sup> PSIs, which are based on computerized hospital discharge abstracts from the AHRQ's Healthcare Cost and Utilization Project (HCUP), can be used to better prioritize and evaluate local and national initiatives. Analyses of these and similar inexpensive, readily available administrative data sets may provide a screen for potential medical errors and a method for monitoring trends over time. The following scenario illustrates one potential application of the PSIs.

### Evaluating and Improving Quality of Care

A hospital association recognizes its member hospitals' need for information that can help them evaluate the quality of care they provide. There is significant interest in assessing, monitoring, and improving the safety of inpatient care. After learning about the AHRQ PSIs, the association decides to apply the indicators to the discharge abstract data submitted by individual hospitals. For each hospital, the association develops a report with graphic presentation of the risk-adjusted data to show how the hospital performs on each indicator compared to its peer group, the State as a whole, and other comparable States. National and regional averages from the AHRQ Healthcare Cost and Utilization Project (HCUP) database are also provided as additional external benchmarks. Three years of trend data are included to allow the hospital to examine any changing patterns in its performance.

One member hospital, upon receiving the report, convenes an internal work group comprised of clinicians and quality improvement professionals to review the information and identify potential areas for improvement. The hospital leadership is committed to performance excellence and providing a culture supportive of systems evaluation and redesign. To begin their evaluation, they apply the AHRQ software to their internal administrative data to distinguish those patients who experienced the complication or adverse event from those who did not. This step establishes the focus for chart review.

After the initial analysis of the administrative and clinical data, the work group meets with clinical departments involved in care of these patients. They begin an in-depth analysis of the system and processes of care. Through application of process improvement concepts, they begin to identify opportunities for improvement. After selection of their priority area (for example, reduction of postoperative complications), they begin work, including:

- Review and synthesize the evidence base and best practices from scientific literature.
- Work with the multiple disciplines and departments involved in care of surgical patients to redesign care based on best practices with an emphasis on coordination and collaboration.
- Evaluate information technology solutions.
- Implement performance measurements for improvement and accountability.
- Incorporate monitoring of performance measurements in the departmental and senior leadership meetings and include in the Board quality improvement reports.

## **What Does this Guide Contain?**

This guide provides information that hospitals, State data organizations, hospital associations, and others can use to decide how to use the PSIs. First, it describes the origin of the entire family of AHRQ Quality Indicators. Second, it provides an overview of the methods used to identify, select, and evaluate the AHRQ PSIs. Third, the guide summarizes the PSIs specifically, describes strengths and limitations of the indicators, documents the evidence that links the PSIs to the quality of health care services, and then provides in-depth two-page descriptions of each PSI. Finally, two appendices present additional technical background information. Appendix A outlines the specific definitions of each PSI, with complete ICD-9-CM coding specifications. Appendix B provides the details of the empirical methods used to explore the PSIs. Appendix C is a list of the Operating Room Procedure codes. Appendix D summarizes all the revisions of the PSI Documentation, and Appendix E lists the changes in the ICD-9-CM codes specific to this update, PSI version 2.1, revision 2.

## **Support for Potential and Current Users of the AHRQ QIs**

Technical assistance is available, through an electronic user support system monitored by the QI support team, to support users in their application of the PSI software. The same e-mail address may be used to communicate to AHRQ any suggestions for PSI enhancements, general questions, and any QI related comments you may have. AHRQ welcomes your feedback. The Internet address for user support and feedback is: [support@qualityindicators.ahrq.gov](mailto:support@qualityindicators.ahrq.gov). AHRQ also offers a listserv to keep you informed on the Quality Indicators (QIs). The listserv is used to announce any QI changes or updates, new tools and resources, and to distribute other QI related information. This is a free service. Sign-up information is available at the QI website at <http://www.qualityindicators.ahrq.gov/signup.htm>.

## Origins and Background of the Quality Indicators

In the early 1990s, in response to requests for assistance from State-level data organizations and hospital associations with inpatient data collection systems, AHRQ developed a set of quality measures that required only the type of information found in routine hospital administrative data—diagnoses and major procedures, along with information on patient's age, gender, source of admission, and discharge status. These States were part of the Healthcare Cost and Utilization Project, an ongoing Federal-State-private sector collaboration to build uniform databases from administrative hospital-based data.

AHRQ developed these measures, called the HCUP Quality Indicators, to take advantage of a readily available data source—administrative data based on hospital claims—and quality measures that had been reported elsewhere.<sup>12</sup> The 33 HCUP QIs included measures for avoidable adverse outcomes, such as in-hospital mortality and complications of procedures; use of specific inpatient procedures thought to be overused, underused, or misused; and ambulatory care sensitive conditions.

Although administrative data cannot provide definitive measures of health care quality, they can be used to provide *indicators* of health care quality that can serve as the starting point for further investigation. The HCUP QIs have been used to assess potential quality-of-care problems and to delineate approaches for dealing with those problems. Hospitals with high rates of poor outcomes on the HCUP QIs have reviewed medical records to verify the presence of those outcomes and to investigate potential quality-of-care problems.<sup>13</sup> For example, one hospital that detected high utilization rates for certain procedures refined patient selection criteria for these procedures to improve appropriate utilization.

## Development of the AHRQ Quality Indicators

Since the original development of the HCUP QIs, the knowledge base on quality indicators has increased significantly. Risk-adjustment methods have become more readily available, new measures have been developed, and analytic capacity at the State level has expanded considerably. Based on input from current users and advances to the scientific base for specific indicators, AHRQ funded a project to refine and further develop the original QIs. The project was conducted by the UCSF-Stanford EPC.

The major constraint placed on the UCSF-Stanford EPC was that the measures could require only the type of information found in hospital discharge abstract data. Further, the data elements required by the measures had to be available from most inpatient administrative data systems. Some State data systems contain innovative data elements, often based on additional information from the medical record. Despite the value of these record-based data elements, the intent of this project was to create measures that were based on a *common denominator discharge data set*, without the need for additional data collection. This was critical for two reasons. First, this constraint would result in a tool that could be used with any inpatient administrative data, thus making it useful to most data systems. Second, this would enable national and regional benchmark rates to be provided using HCUP data, since these benchmark rates would need to be calculated using the universe of data available from the States.

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<sup>12</sup> Ball JK, Elixhauser A, Johantgen M, et al. *HCUP Quality Indicators, Methods, Version 1.1: Outcome, Utilization, and Access Measures for Quality Improvement*. (AHCPR Publication No. 98-0035). Healthcare Cost and Utilization Project (HCUP-3) Research notes: Rockville, MD: Agency for Health Care Policy and Research, 1998.

<sup>13</sup> *Impact: Case Studies Notebook – Documented Impact and Use of AHRQ's Research*. Compiled by Division of Public Affairs, Office of Health Care Information, Agency for Healthcare Research and Quality.

## AHRQ Quality Indicator Modules

The work of the UCSF-Stanford EPC resulted in the *AHRQ Quality Indicators*, which are distributed as three separate modules:

- **Prevention Quality Indicators.** These indicators consist of “ambulatory care sensitive conditions,” hospital admissions that evidence suggests could have been avoided through high-quality outpatient care or that reflect conditions that could be less severe, if treated early and appropriately.
- **Inpatient Quality Indicators.** These indicators reflect quality of care inside hospitals and include inpatient mortality; utilization of procedures for which there are questions of overuse, underuse, or misuse; and volume of procedures for which there is evidence that a higher volume of procedures is associated with lower mortality.
- **Patient Safety Indicators.** These indicators focus on potentially preventable instances of complications and other iatrogenic events resulting from exposure to the health care system.

# Methods of Identifying, Selecting, and Evaluating the Quality Indicators

Since the literature surrounding PSIs is sparse, the project team used a variety of additional techniques to identify, select, and evaluate each indicator, including clinician panels, expert coders, and empirical analyses.

## Step 1: Define the Concepts and the Evaluation Framework

In approaching the task of evaluating patient safety indicators based on administrative data, the project team developed a conceptual framework and standardized definitions of commonly used terms.

### Standardized Definitions

In the literature, the distinctions between medical error, adverse events, complications of care, and other terms pertinent to patient safety are not well established and are often used interchangeably. In this report, the terms medical error, adverse events or complications, and similar concepts are defined as follows:

**Case finding indicators.** Indicators for which the primary purpose is to identify specific cases in which a medical error *may* have occurred, for further investigation.

**Complication or adverse event.** “An injury caused by medical management rather than by the underlying disease or condition of the patient.”<sup>14</sup> In general, adverse events prolong the hospitalization, produce a disability at the time of discharge, or both. Used in this report, complication does not refer to the sequelae of diseases, such as neuropathy as a “complication” of diabetes. Throughout the report, “sequelae” is used to refer to these conditions.

**Medical error.** “The failure of a planned action to be completed as intended (i.e., error of execution) or the use of a wrong plan to achieve an aim (i.e., error of planning).” The definition includes errors committed by any individual, or set of individuals, working in a health care organization.<sup>15</sup>

**Patient safety.** “Freedom from accidental injury,” or “avoiding injuries or harm to patients from care that is intended to help them.” Ensuring patient safety “involves the establishment of operational systems and processes that minimize the likelihood of errors and maximizes the likelihood of intercepting them when they occur.”<sup>16</sup>

**Patient safety indicators.** Specific quality indicators which also reflect the quality of care inside hospitals, but focus on aspects of patient safety. Specifically, PSIs screen for problems that patients experience as a result of exposure to the healthcare system, and that are likely amenable to prevention by changes at the system or provider level.

**Preventable adverse event.** An adverse event attributable to error is a “preventable adverse

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<sup>14</sup> Brennan TA, Leape LL, Laird NM, Hebert L, Localio AR, Lawthers AG, et al. Incidence of adverse events and negligence in hospitalized patients. Results of the Harvard Medical Practice Study I. *N Engl J Med* 1991;324(6):370-6.

<sup>15</sup> Institute of Medicine, 2000.

<sup>16</sup> *Envisioning the National Health Care Quality Report*. Washington, DC: Institute of Medicine; 2001.

event.”<sup>17</sup> A condition for which reasonable steps may reduce (but not necessarily eliminate) the risk of that complication occurring.

**Quality.** “Quality of care is the degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge.” In this definition, “the term *health services* refers to a wide array of services that affect health...(and) applies to many types of health care practitioners (physicians, nurses, and various other health professionals) and to all settings of care...”<sup>18</sup>

**Quality indicators.** Screening tools for the purpose of identifying potential areas of concern regarding the quality of clinical care. For the purpose of this report, we focus on indicators that reflect the quality of care inside hospitals. Quality indicators may assess any of the four system components of health care quality, including patient safety (see below), effectiveness (i.e., “providing services based on scientific knowledge to all who could benefit, and refraining from providing services to those not likely to benefit), patient centeredness, and timeliness (i.e., “minimizing unnecessary delays”).<sup>19</sup>

**Rate based indicators.** Indicators for which the primary purpose is to identify the rate of a complication rather than to identify specific cases.

While the definitions above are intended to distinguish events that are less preventable from those that are more preventable, the difference is best described as a spectrum. To conceptualize this spectrum, the project team developed the following three categories of conditions:

1. **Conditions that could be either a comorbidity or a complication.** Conditions considered comorbidities (for example, congestive heart failure) are present on admission and are not caused by medical management; rather, they are due to the patient’s underlying disease. It is extremely difficult to distinguish complications from comorbidities for these conditions using administrative data. As a result, these conditions were not considered in this report.
2. **Conditions that are likely to reflect medical error.** These conditions (for example, foreign body accidentally left during a procedure) are likely to have been caused by medical error. Most of these conditions appear infrequently in administrative data, and thus rates of events lack the precision to allow for comparisons between providers. However, these conditions may be the subject of case-finding indicators.
3. **Conditions that conceivably, but not definitively reflect medical error.** These conditions (for example, postoperative DVT or PE) represent a spectrum of preventability between the previous two categories—from those that are mostly unpreventable to those that are mostly preventable. Because of the uncertainty regarding the preventability of these conditions and the likely heterogeneity of cases with the condition, indicators using these conditions are less useful as case-finding indicators. However, examining the rate of these conditions may highlight potential areas of concern.

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<sup>17</sup> Brennan et al., 1991.

<sup>18</sup> Measuring the Quality of Health Care: A statement of the National Roundtable on Healthcare Quality Division of Healthcare Services: National Academy Press; 1999.

<sup>19</sup> National Roundtable on Healthcare Quality, 1999.

## Evaluation Framework

To evaluate the soundness of each indicator, the project team applied the same framework as was applied in the technical report<sup>20</sup> for the Prevention Quality Indicators (PQIs) and Inpatient Quality Indicators (IQIs). This included six areas of evidence:

- **Face validity.** Does the indicator capture an aspect of quality that is widely regarded as important and subject to provider or public health system control? Consensual validity expands face validity beyond one person to the opinion of a panel of experts.
- **Precision.** Is there a substantial amount of provider- or community-level variation that is not attributable to random variation?
- **Minimum bias.** Is there either little effect on the indicator of variations in patient disease severity and comorbidities, or is it possible to apply risk adjustment and statistical methods to remove most or all bias?
- **Construct validity.** Does the indicator perform well in identifying true (or actual) quality of care problems?
- **Fosters real quality improvement.** Is the indicator insulated from perverse incentives for providers to improve their reported performance by avoiding difficult or complex cases, or by other responses that do not improve quality of care?
- **Application.** Has the measure been used effectively in practice? Does it have potential for working well with other indicators?

Face validity (consensual validity) was evaluated using a structured panel review, minimum bias was explored empirically and briefly during the panel review, and construct validity was evaluated using the limited literature available. A full discussion of this framework is available in the Stanford Technical report.<sup>21</sup>

The relative importance of each of these evaluation areas may differ by individual PSIs. Precision and minimum bias may be less important for indicators that are primarily designed to screen only for medical error, since these events are relatively rare. In general, these indicators are better used as case-finding indicators. For these indicators, comparisons between rates are less relevant. However, for rate-based indicators, concerns of precision and minimum bias remain if indicators are used in any comparison of rates (comparison to national averages, peer group, etc.).

## Step 2: Search the Literature to Identify Potential PSIs

The literature searches performed in connection with assessing potential AHRQ QIs<sup>22</sup> identified many references relevant to potential PSIs. In addition, the project team performed electronic searches for articles published before February 2002 followed by hand searching the bibliographies of identified references. Members of the project team were queried to supplement this list, based on their personal

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<sup>20</sup> Davies S, Geppert J, McClellan M, McDonald KM, Romano PS, Shojania KG. Refinement of the HCUP Quality Indicators. Technical Review Number 4. Rockville, MD: (Prepared by UCSF-Stanford Evidence-based Practice Center under Contract No. 290-97-0013) Agency for Healthcare Research and Quality; 2001. Report No.: 01-0035.

<sup>21</sup> Davies et al., 2001.

<sup>22</sup> Davies et al., 2001.

knowledge of recent work in the field. Because Iezzoni et al.'s Complications Screening Program (CSP)<sup>23</sup> included numerous candidate indicators, the team also performed an author search using her name. Forthcoming articles and Federal reports in press, but not published, were also included when identified through personal contacts.

The project team identified 326 articles from the Medline search. Articles were screened using both the titles and abstracts. To qualify for abstraction, an article must have described, evaluated, or validated a potential indicator of medical errors, patient safety, or potentially preventable complications based on International Classification for Diseases - Ninth Revision - Clinical Modifications (ICD-9-CM) coded administrative (hospital discharge or claims) data. Some indicators were also considered if they appeared to be readily translated into ICD-9-CM, even if the original authors did not use ICD-9-CM codes.

This search was adapted slightly and repeated using the OVID interface with EMBASE<sup>24</sup>, limited to articles published from January 1990 through the end of first quarter 2002. The EMBASE search identified 463 references, and these articles were screened in the same manner. After elimination of articles that had already been identified using Medline<sup>25</sup> and the other approaches described above, only nine additional articles met the criteria for abstraction.

### **Step 3: Develop a Candidate List of PSIs**

The project team developed a candidate list of PSIs by first reviewing the literature, then selecting a subset of indicators to undergo face validity testing by clinician panels.

#### **Candidate List of PSIs**

The literature search located relatively few patient safety indicators that could be defined using unlinked administrative data. The majority of these indicators were from the Complications Screening Program (CSP),<sup>26</sup> which was developed to identify potentially preventable complications of adult medical and surgical hospital care using commonly available administrative data. The algorithm uses discharge abstract data—specifically ICD-9-CM diagnosis and procedure codes, patient age, sex, diagnosis-related group (DRG), and date of procedure—to identify 28 complications that raise concern about the quality of care based on the rate of such occurrences at individual hospitals. Each of the complications is applied to some or all of the following specified “risk pools” separately: major surgery, minor surgery, invasive cardiac procedure, endoscopy, medical patients, and all patients. In addition, specified inclusion and exclusion criteria are applied to each complication to ensure that the complication developed in-hospital, as opposed to being present on admission, and that the complication was potentially preventable.

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<sup>23</sup> Iezzoni LI, Foley SM, Heeren T, Daley J, Duncan CC, Fisher ES, et al. A method for screening the quality of hospital care using administrative data: preliminary validation results. *QRB Qual Rev Bull* 1992;18(11):361-71.

<sup>24</sup> EMBASE. In. The Netherlands: Elsevier Science Publishers B.V.

<sup>25</sup> MEDLINE [database online]. In. Bethesda (MD): National Library of Medicine.

<sup>26</sup> Iezzoni et al., 1992.

Four later studies were designed to test criterion and construct validity by validating the data used to construct CSP screens, validating the screens as a flag for actual quality problems, and validating the replicability of hospital-level results using different data sources.<sup>27 28 29 30</sup> These studies raised concerns about the validity of the CSP, because flagged cases for most indicators were no more likely than unflagged controls to have suffered explicit process failures.

The project team also reviewed all ICD-9-CM codes implemented in or before 1999 that were identified by AHRQ as possibly describing medical errors or reflecting the consequences of such errors.<sup>31</sup> (This initial set of indicators is referred to as the Miller et al. indicators.) The project team added relevant codes from the 2000 and 2001 revisions of ICD-9-CM and selected codes from the CSP, such as those not clearly reflective of medical error, but representing a potentially preventable complication. This process was guided principally by conceptual considerations. For example, codes for postoperative AMI (an evaluated indicator that was not included in the final indicator set) were included in the evaluation set since recent evidence suggests that AMI is a potentially preventable complication.<sup>32</sup> A few codes were also deleted from the initial list based on a review of ICD-9-CM coding guidelines, described in *Coding Clinics for ICD-9-CM* and the *American Hospital Association's ICD-9-CM Coding Handbook*. For example, the code 2593 for hypoglycemic coma specifically excludes patients with diabetes mellitus, the population for which this complication is most preventable. This process of updating the Miller et al. PSIs resulted in a list of over 200 ICD-9-CM codes (valid in 2001) potentially related to medical error.

Codes identified in the CSP and updated from the Miller et. al. PSIs were then grouped into indicators. Where feasible, codes were compiled as they were in the CSP, or in some cases the Miller et al. PSIs, depending on which grouping yielded more clinically homogeneous groups. In most cases the resulting indicators were not identical to the CSP indicators, although they were closely related, as some of the specific codes included in the original CSP had been eliminated after the team's review of coding guidelines. The remaining codes were then incorporated into the most appropriate CSP-based indicator, or were grouped into clinically meaningful concepts to define novel indicators. Exclusion criteria were added based on CSP methods and clinical judgment. As a result, over 40 patient safety indicators were defined that, while building on prior work, reflected significantly changed measures to focus more narrowly on the most preventable complications.

Indicators were defined with both a numerator (complication of interest) and a denominator (population at risk). Different patient subpopulations have inherently different risks for developing a complication, with some patients having almost no risk. Thus, the denominator for each indicator represents the specific population at risk. The intention was to restrict the complication (and

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<sup>27</sup> Lawthers A, McCarthy E, Davis R, Peterson L, Palmer R, Iezzoni L. Identification of in-hospital complications from claims data: is it valid? *Medical Care* 2000;38(8):785-795.

<sup>28</sup> McCarthy EP, Iezzoni LI, Davis RB, Palmer RH, Cahalane M, Hamel MB, et al. Does clinical evidence support ICD-9-CM diagnosis coding of complications? *Med Care* 2000;38(8):868-876.

<sup>29</sup> Weingart SN, Iezzoni LI, Davis RB, Palmer RH, Cahalane M, Hamel MB, et al. Use of administrative data to find substandard care: validation of the complications screening program *Med Care* 2000;38(8):796-806.

<sup>30</sup> Iezzoni LI, Davis RB, Palmer RH, Cahalane M, Hamel MB, Mukamal K, et al. Does the Complications Screening Program flag cases with process of care problems? Using explicit criteria to judge processes. *Int J Qual Health Care* 1999;11(2):107-18.

<sup>31</sup> Miller M, Elixhauser A, Zhan C, Meyer G. Patient Safety Indicators: Using administrative data to identify potential patient safety concerns. *Health Services Research* 2001;36(6 Part II):110-132.

<sup>32</sup> Shojania KG, Duncan BW, McDonald KM, Wachter RM. Making health care safer: A critical analysis of patient safety practices. Evidence Report/Technology Assessment No. 43 (Prepared by the University of California at San Francisco-Stanford Evidence-based Practice Center under Contract No. 290-97-0013). Rockville, MD: Agency for Healthcare Research and Quality; 2001. Report No.: AHRQ Publication No. 01-E058.

consequently the rate) to a more homogeneous population who are actually at risk for that complication. In general, the population at risk corresponded to one risk pool (e.g., major surgery) from the CSP, if applicable, or was defined more narrowly.

### Subset Selection

After the project team developed a list of potential indicators, they selected a subset of indicators to undergo face validity testing by clinician panels, as described in Step 4. Two sources of information guided the selection process.

First, validation data from previous studies were reviewed and thresholds were set for retaining CSP-based indicators. Four studies were identified that evaluated the CSP indicators. Three of these studies, examined the predictive value of each indicator in identifying a complication that occurred in-hospital, regardless of whether this complication was due to medical error or was preventable.<sup>33 34 35</sup> In a fourth study, nurses identified specific process failures that may have contributed to complications. In order to be retained as a potential PSI, at least one of the first three studies needed to demonstrate a positive predictive value of at least 75%, meaning that 3 out of 4 patients identified by the measure did indeed have the complication of interest.<sup>36</sup> In addition, the positive predictive value of a "process failure" identified in the fourth study needed to reach or exceed 46%, which was the average rate for surgical cases that were not flagged by any of the CSP indicators. As a result, only CSP-derived indicators that were at least somewhat predictive of objectively defined process failures or medical errors were retained.

Second, specific changes to previous definitions or constructs of indicators fell into the following general categories:

- Changes to the denominator definitions (inclusion or exclusion criteria), intended to reduce bias due to the inclusion of atypical patients or to improve generalizability to a broader set of patients at risk.
- Elimination of selected ICD-9-CM codes from numerator definitions, intended to focus attention on more clinically significant complications or complications more likely to result from medical errors.
- Addition of selected ICD-9-CM codes to numerator definitions, intended to capture related complications that could result from the same or similar medical errors.
- Division of a single indicator into two or more related indicators, intended to create more clinically meaningful and conceptually coherent indicators.
- Stratification or adjustment by relevant patient characteristics, intended to reflect fundamental clinical differences among procedures (e.g., vaginal delivery with or without instrumentation) and the complications that result from them, or fundamental differences in patient risk (e.g., decubitus ulcer in lower-risk versus high-risk patients).

A total of 34 indicators, intended to be applied to all age groups, were retained for face validity testing by clinician panels. Because the primary intent in developing these indicators was to detect potentially preventable complications related to health care exposure, the final definitions for this set of indicators represented mostly new measures that built upon previous work.

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<sup>33</sup> Lawthers, et al., 2000.

<sup>34</sup> McCarthy, et al., 2000.

<sup>35</sup> Weingart et al., 2000.

<sup>36</sup> Iezzoni et al., 1999.

## Coding Review

Experts in ICD-9-CM codes reviewed each code for accuracy of capturing the complication and population at risk. In some cases, additional codes or other refinements to the indicators were suggested based on current coding guidelines.

## Step 4: Review the PSIs

The project team conducted a structured review of each indicator to evaluate the face validity (from a clinical perspective) of the indicators. The methodology for the structured review was adapted from the RAND/UCLA Appropriateness Method<sup>37</sup> and consisted of an initial independent assessment of each indicator by clinician panelists using an initial questionnaire, a conference call among all panelists, followed by a final independent assessment by clinician panelists using the same questionnaire. The review sought to establish *consensual validity*, which “extends face validity from one expert to a panel of experts who examine and rate the appropriateness of each item...”<sup>38</sup> The panel process served to refine definitions of some indicators, add new measures, and dismiss indicators with major concerns from further consideration.

Eight panels were formed: two panels examined complications of medical care indicators, three panels examined surgical complications indicators, one panel assessed indicators related to procedural complications, and two panels examined obstetric complications indicators.

Fifteen professional clinical organizations nominated a total of 162 clinicians to be panelists. To be eligible to participate, nominees were required to spend at least 30% of their work time on patient care, including hospitalized patients. Nominees were asked to provide information regarding their practice characteristics, including specialty, subspecialty, and setting. Fifty-seven panelists were selected to ensure that each panel had diverse membership in terms of practice characteristics and setting.

### Initial Assessment of the Indicators

Panelists were presented with four or five indicators, including the standardized text used to describe each ICD-9-CM code, the specific numeric code, exclusion and inclusion criteria, the clinical rationale for the indicator, and the specification criteria. For each indicator, panelists completed a 10-item questionnaire that evaluated the ability of the indicator to screen out conditions present on admission, the potential preventability of the complication, and the ability of the indicator to identify medical error. In addition, the questionnaire asked panelists to consider potential bias, reporting or charting problems, potential for gaming the indicator, and adverse effects of implementing the indicator. Finally, the questionnaire provided an opportunity for panelists to suggest changes to the indicator.

### Conference Call Participation

After the panelists submitted the initial evaluation questionnaires, they participated in a 90-minute conference call for their panel to discuss the indicators. In general, agenda items for the conference call focused on points of disagreement among panelists. However, panelists were explicitly told that consensus was not the goal of discussion. In some cases, panelists agreed on proposed changes to the indicator definitions, and such consensus was noted and the definition was modified accordingly before the final round of rating.

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<sup>37</sup> Fitch K, Bernstein J, Aguilar MD, Burnand B, LaCalle JR, Lazaro P, et al. the RAND/UCLA Appropriateness Method User's Manual: RAND; 2001.

<sup>38</sup> Green L, Lewis F. measurement and Evaluation in Health Education and Health Promotion. Mountain View, CA: Mayfield Publishing Company; 1998.

Panelists were prompted throughout the process to consider the appropriate population at risk for each indicator (specifically inclusion and exclusion criteria) in addition to the complication of interest. However, if panelists wished to discuss other aspects of the indicator, this discussion was allowed within the time allotted for that indicator (approximately 15 minutes). If time remained at the end of a call, topics that were not fully addressed previously were revisited.

## **Final Evaluation and Tabulation of Results**

Following each conference call, the project team made changes to each indicator suggested by panelists for changes that reached near consensus of the panelists. The indicators were then redistributed to panelists with the questionnaires used in the initial evaluation. The reason for all each indicator definition change was included, and panelists were asked to re-rate the indicator based on their current opinion. They were asked to keep in mind the discussion during the conference call.

Results from the final evaluation questionnaire were used to calculate median scores from the 9-point scale for each question and to categorize the degree of agreement among panelists. Median scores determined the level of acceptability of the indicator, and dispersion of ratings across the panel for each applicable question determined the agreement status. Therefore the median and agreement status were independent measurements for each question. Six criteria were used to identify the panel opinions (i.e., median, agreement status category) on the following aspects of the indicator:

- Overall usefulness of the indicator.
- Likelihood that the indicator measures a complication and not a comorbidity (specifically, present on admission).
- Preventability of the complication.
- Extent to which the complication is due to medical error.
- Likelihood that the complication is charted given that it occurs.
- Extent that the indicator is subject to bias (systematic differences, such as case mix that could affect the indicator, in a way not related to quality of care).

The project team used the ratings of the overall appropriateness of each indicator to assess its overall usefulness as a screen for potential patient safety problems. Indicators were triaged into three sets: Accepted Indicators (described in this guide), Experimental Indicators, and Rejected Indicators.

## **Step 5: Evaluate the PSIs Using Empirical Analysis**

The project team conducted empirical analyses to explore the frequency and variation of the indicators, the potential bias, based on limited risk adjustment, and the relationship between indicators. The data sources used in the empirical analyses were the 1997 Florida State Inpatient Database (SID) for initial testing and development and the 1997 HCUP State Inpatient Database for 19 States (referred to in this guide as the HCUP SID) for the final empirical analyses. The rates presented in the Detailed Evidence Section of this guide, as well as the means and parameter reference files used by the PSI software, reflect analyses of the 2000 HCUP SID for 27 states<sup>39</sup>.

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<sup>39</sup> The state data organizations included in the 2000 HCUP SID were: Arizona Department of Health Services; California Office of Statewide Health Planning & Development; Colorado Health & Hospital Association; Connecticut - Chime, Inc.; Florida Agency for Health Care Administration; Georgia: An Association of Hospitals & Health Systems; Hawaii Health Information Corporation; Illinois Health Care Cost Containment Council; Iowa Hospital Association; Kansas Hospital Association; Kentucky Department for Public Health; Maine Health Data Organization; Massachusetts Division of Health Care Finance and Policy; Michigan Health & Hospital Association; Missouri Hospital Industry Data Institute; New Jersey Department of Health & Senior Services; New York State Department of Health; North Carolina Department of Health and Human Services; Oregon Association of Hospitals & Health Systems; Pennsylvania Health Care Cost Containment Council; South Carolina State Budget & Control Board; Tennessee Hospital Association; Texas Health Care Information Council; Utah Department of Health; Virginia Health Information; Washington State Department of Health; West Virginia Health Care Authority; Wisconsin Department of Health & Family Services

All potential indicators were examined empirically by developing and conducting statistical tests for precision, bias, and relatedness of indicators. Three different estimates of hospital performance were calculated for each indicator:

1. The raw indicator rate was calculated using the number of adverse events in the numerator divided by the number of discharges in the population at risk by hospital.
2. The raw indicator was adjusted to account for differences among hospitals in age, gender, modified DRG, and comorbidities.
  - Adjacent DRG categories that were separated by the presence or absence of comorbidities or complications were collapsed to avoid adjusting for the complication being measured. Most of the super-Major Diagnostic Category (MDC) DRG categories were excluded for the same reason.
  - APR-DRG risk adjustment was not implemented because removing applicable complications from each indicator was beyond the scope of this project.
  - The ICD-9-CM codes used to define comorbidity categories were modified to exclude conditions likely to represent potentially preventable complications in certain settings.
  - “Acute on chronic” comorbidities were captured so that some patients with especially severe comorbidities would not be mislabeled as not having conditions of interest.
  - Comorbidities in obstetric patients were added.
3. Multivariate signal extraction methods were applied to adjust for reliability by estimating the amount of “noise” (i.e., variation due to random error) relative to the amount of “signal” (i.e., systematic variation in hospital performance or reliability) for each indicator.

Similar reliability adjustment has been used in the literature for similar purposes.<sup>40 41</sup> The project team constructed a set of statistical tests to examine precision, bias, and relatedness of indicators for all accepted Provider-level Indicators, and precision and bias for all accepted Area-level Indicators. It should be noted that rates based on fewer than 30 cases in the numerator or the denominator are not reported. This exclusion rule serves two purposes:

- It eliminates unstable estimates based on too few cases.
- It helps protect the identities of hospitals and patients.

A detailed description of the methodology is included in Appendix B.

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<sup>40</sup> Hofer TP, Hayward RA, Greenfield S, Wagner EH, Kaplan SH, Manning WG. The unreliability of individual physician “report cards” for assessing the costs and quality of care of a chronic disease JAMA 1999;281(22):2098-105.

<sup>41</sup> Christiansen CL, Morris CN. Improving the statistical approach to health care provider profiling. Ann Intern Med 1997;127(8 Pt 2):764-8.

## Summary Evidence on the Patient Safety Indicators

This project took a four-pronged approach to the identification, development, and evaluation of PSIs that included use of literature, clinician panels, expert coders, and empirical analyses. The literature review and the findings from the clinical panels combined with data analysis provide evidence to suggest that a number of discharge-based PSIs may be useful screens for organizations, purchasers, and policymakers to identify safety problems at the provider level, as well as to document systematic area-level differences in patient safety problems.

Most adverse events identified by the PSIs have a variety of causes in addition to potential medical error leading to the adverse event, including underlying patient health and factors that do not vary systematically. Clinician panelists rated only two of the accepted indicators as very likely to reflect medical error: (1) transfusion reaction and (2) foreign body left in during a procedure. These indicators proved to be very rare, with less than 1 per 10,000 cases at risk.

Table 1 summarizes the results of the literature review, clinician panels, and empirical analyses on the provider-level PSIs. Table 2 provides the same information for the area-level PSIs. The tables list each indicator, provide its definition, identify any concerns about its validity based on the clinician panels, and summarize the strength of evidence in the literature for each indicator.

The following notes about some of the terms in the table are intended to help the reader understand the context in which they are used.

**Validity Concerns.** The following concerns, raised during our panel review, are listed if they affect the validity of the particular indicator:

**Rare** — This indicator is relatively rare and may not have adequate statistical power for some providers.

**Condition definition varies**—This indicator includes conditions for which diagnosis may be subjective, depending on the threshold of the physician, and patients with the same clinical state may not have the same diagnosis.

**Underreporting or screening**—Conditions included in this indicator may not be systematically reported (leading to an artificially low rate) or may be routinely screened for (leading to a higher rate in facilities that screen).

**Adverse consequences**—Use of this indicator may have undesirable effects, such as increasing inappropriate antibiotic use.

**Stratification suggested**—This indicator includes some high risk patient groups and stratification is recommended when examining rates,

**Unclear preventability**—As compared to other PSIs, the conditions included in this indicator may be less preventable by the health system.

**Heterogeneous severity**—This indicator includes codes that encompass several levels of severity of a condition that cannot be ascertained by the codes.

**Case mix bias**—This indicator was felt to be particularly subject to systematic bias, and DRG and comorbidity risk adjustment may not adequately address the concern.

**Denominator unspecific**—The denominator for this indicator is less than ideal, because the true population at risk could not be identified using ICD-9-CM codes. Some patients are likely included who are not truly at risk, or some patients who are at risk are not included.

**Empirical Performance.** The performance of each indicator is measured for the following:

**Rate**—The rate measures the number of adverse events per 1,000 population at risk. Rates represent the average rate of the indicator for a nationwide sample of hospitals.

**Deviation**—Standard deviation is an estimate of systematic variation. For the PSIs, standard deviation is reported between providers.

**Bias**—Bias represents the degree to which the results may be influenced by outside factors. Bias ratings are based on a series of tests of bias using DRG and comorbidity risk adjustment. Those

indicators flagged with **X+** demonstrated substantial bias and should be risk adjusted. Those indicators flagged with **X** also demonstrated some bias. Those without a flag did not demonstrate substantial bias in empirical tests, but may nonetheless be substantially biased in a manner not detectable by the bias tests. Those marked with **N/A** did not undergo empirical testing of bias due to lack of systematic variation.

**Strength of Evidence.** The following key findings represent a review of the limited literature assessing the validity of the indicators:

**Coding**—Sensitivity is the proportion of patients who suffered an adverse event, based on detailed chart review or prospective data collection, for whom that event was coded on a discharge abstract or Medicare claim. Predictive value is the proportion of patients with a coded adverse event who were confirmed as having suffered that event, based on detailed chart review or prospective data collection.

**Construct, explicit process**—Adherence to specific, evidence-based or expert-endorsed processes of care, such as appropriate use of diagnostic modalities and effective therapies. The construct is that hospitals that provide better processes of care should experience fewer adverse events.

**Construct, implicit process**—Adherence to the “standard of care” for similar patients, based on global assessment of quality by physician chart reviewers. The construct is that hospitals that provide better overall care should experience fewer adverse events.

**Construct, staffing**—The construct is that hospitals that offer more nursing hours per patient day, better nursing skill mix, better physician skill mix, or more experienced physicians should have fewer adverse events.

The following distinctions were used to summarize the strength of the published evidence for each indicator:

- Published evidence suggests that the indicator lacks validity in this domain (i.e., less than 50% sensitivity or predictive value; explicit or implicit process failure rates no more frequent than among control patients).

- 0** No published evidence regarding this domain of validity.

- ±** Published evidence suggests that the indicator may be valid in this domain, but different studies offer conflicting results (although study quality may account for these conflicts).

- +** Published evidence suggests that the indicator is valid, or is likely to be valid, in this domain (i.e., one favorable study).

- ++** There is strong evidence supporting the validity of this indicator in this domain (i.e., multiple studies with consistent results, or studies showing both high sensitivity and high predictive value). When content validity is exceptionally high, as for transfusion reaction or iatrogenic pneumothorax, construct validity becomes less important.

A complete description of each PSI is included later in the guide under “Detailed Evidence for Patient Safety Indicators” and in Appendix A. Details on the empirical methods can be found in Appendix B.

**Table 1: AHRQ Provider-Level Patient Safety Indicators**

PSI Name	Definition	Validity Concerns	Empirical Performance <sup>b</sup>	Strength of Evidence
Complications of Anesthesia (PSI 1)	Cases of anesthetic overdose, reaction, or endotracheal tube misplacement per 1,000 surgery discharges. Excludes codes for drug use and self-inflicted injury.	Condition definition varies Underreporting or screening Denominator unspecific	Provider Rate = 0.61 Provider SD = 1.74 Pop. Rate = 0.56 Bias = Not detected <sup>c</sup>	0 Coding 0 Explicit Process 0 Implicit Process 0 Staffing
Death in Low Mortality DRGs (PSI 2)	In-hospital deaths per 1,000 patients in DRGs with less than 0.5% mortality. <sup>a</sup> Excludes trauma, immunocompromised, and cancer patients.	Heterogeneous severity	Provider Rate = 2.44 Provider SD = 30.60 Pop. Rate = 0.66 Bias = X+	+ Coding 0 Explicit Process + Implicit Process 0 Staffing
Decubitus Ulcer (PSI 3)	Cases of decubitus ulcer per 1,000 discharges with a length of stay of 5 or more days. Excludes patients with paralysis or in MDC 9, obstetrical patients in MDC 14, and patients admitted from a long-term care facility.	Underreporting or screening Heterogeneous severity Case mix bias	Provider Rate = 23.91 Provider SD = 21.61 Pop. Rate = 22.71 Bias = X+	- Coding 0 Explicit Process 0 Implicit Process ± Staffing
Failure to Rescue (PSI 4)	Deaths per 1,000 patients having developed specified complications of care during hospitalization. Excludes patients age 75 and older, neonates in MDC 15, patients admitted from long-term care facility and patients transferred to or from other acute care facility.	Adverse consequences Stratification suggested Unclear preventability Heterogeneous severity	Provider Rate = 125.89 Provider SD = 83.97 Pop. Rate = 144.98 Bias = X+	+ Coding 0 Explicit Process 0 Implicit Process ++ Staffing
Foreign Body Left During Procedure (PSI 5)	Discharges with foreign body accidentally left in during procedure per 1,000 discharges	Rare Stratification suggested Denominator unspecific	Provider Rate = 0.06 Provider SD = 0.17 Pop. Rate = 0.08 Bias = N/A	0 Coding 0 Explicit Process 0 Implicit Process 0 Staffing
Iatrogenic Pneumothorax (PSI 6)	Cases of iatrogenic pneumothorax per 1,000 discharges. Excludes trauma, thoracic surgery, lung or pleural biopsy, or cardiac surgery patients, and obstetrical patients in MDC 14.	Denominator unspecific	Provider Rate = 0.63 Provider SD = 0.71 Pop. Rate = 0.83 Bias = X	0 Coding 0 Explicit Process 0 Implicit Process 0 Staffing

PSI Name	Definition	Validity Concerns	Empirical Performance <sup>b</sup>	Strength of Evidence
Selected Infections Due to Medical Care (PSI 7)	Cases of secondary ICD-9-CM codes 9993 or 00662 per 1,000 discharges. Excludes patients with immunocompromised state or cancer.	Underreporting or screening Adverse consequences	Provider Rate = 1.51 Provider SD = 3.31 Pop. Rate = 1.99 Bias = X	0 Coding 0 Explicit Process 0 Implicit Process 0 Staffing
Postoperative Hip Fracture (PSI 8)	Cases of in-hospital hip fracture per 1,000 surgical discharges. Excludes patients in MDC 8, with conditions suggesting fracture present on admission and obstetrical patients in MDC 14.	Case mix bias Denominator unspecific	Provider Rate = 0.52 Provider SD = 5.93 Pop. Rate = 0.30 Bias = X	+ Coding + Explicit Process + Implicit Process 0 Staffing
Postoperative Hemorrhage or Hematoma (PSI 9)	Cases of hematoma or hemorrhage requiring a procedure per 1,000 surgical discharges. Excludes obstetrical patients in MDC 14.	Stratification suggested Case mix bias Denominator unspecific	Provider Rate = 1.59 Provider SD = 2.25 Pop. Rate = 2.03 Bias = Not detected	± Coding ± Explicit Process + Implicit Process 0 Staffing
Postoperative Physiologic and Metabolic Derangement (PSI 10)	Cases of specified physiological or metabolic derangement per 1,000 elective surgical discharges. Excludes patients with principal diagnosis of diabetes and with diagnoses suggesting increased susceptibility to derangement. Excludes obstetric admissions.	Condition definition varies	Provider Rate = 0.78 Provider SD = 20.13 Pop. Rate = 0.54 Bias = X	- Coding 0 Explicit Process 0 Implicit Process - Staffing
Postoperative Respiratory Failure (PSI 11)	Cases of acute respiratory failure per 1,000 elective surgical discharges. Excludes MDC 4 and 5 and obstetric admissions.	Unclear preventability Case mix bias	Provider Rate = 3.18 Provider SD = 10.14 Pop. Rate = 3.44 Bias = X+	+ Coding ± Explicit Process + Implicit Process ± Staffing
Postoperative PE or DVT (PSI 12)	Cases of deep vein thrombosis or pulmonary embolism per 1,000 surgical discharges. Excludes obstetric patients.	Underreporting or screening Stratification suggested	Provider Rate = 6.28 Provider SD = 20.14 Pop. Rate = 7.08 Bias = X+	+ Coding + Explicit Process + Implicit Process ± Staffing
Postoperative Sepsis (PSI 13)	Cases of sepsis per 1,000 elective surgery patients, with length of stay more than 3 days. Excludes principal diagnosis of infection, or any diagnosis of immunocompromised state or cancer, and obstetric admissions.	Condition definition varies Adverse consequences	Provider Rate = 11.48 Provider SD = 39.57 Pop. Rate = 9.75 Bias = X+	± Coding 0 Explicit Process 0 Implicit Process - Staffing

PSI Name	Definition	Validity Concerns	Empirical Performance <sup>b</sup>	Strength of Evidence
Postoperative Wound Dehiscence (PSI 14)	Cases of reclosure of postoperative disruption of abdominal wall per 1,000 cases of abdominopelvic surgery. Excludes obstetric admissions.	Case mix bias	Provider Rate = 1.47 Provider SD = 4.57 Pop. Rate = 1.41 Bias = X	0 Coding 0 Explicit Process 0 Implicit Process 0 Staffing
Accidental Puncture or Laceration (PSI 15)	Cases of technical difficulty (e.g., accidental cut or laceration during procedure) per 1,000 discharges. Excludes obstetric admissions.	Underreporting or screening  Unclear preventability	Provider Rate = 2.38 Provider SD = 2.55 Pop. Rate = 3.22 Bias = X+	± Coding 0 Explicit Process 0 Implicit Process 0 Staffing
Transfusion Reaction (PSI 16)	Cases of transfusion reaction per 1,000 discharges.	Rare  Stratification suggested	Provider Rate = 0.005 Provider SD = 0.106 Pop. Rate = 0.005 Bias = N/A	0 Coding 0 Explicit Process 0 Implicit Process 0 Staffing
Birth Trauma—Injury to Neonate (PSI 17)	Cases of birth trauma, injury to neonate, per 1,000 liveborn births. Excludes some preterm infants and infants with osteogenic imperfecta.	Condition definition varies  Unclear preventability  Heterogeneous severity	Provider Rate = 5.62 Provider SD = 19.86 Pop. Rate = 6.34 Bias = N/A	– Coding 0 Explicit Process 0 Implicit Process 0 Staffing
Obstetric Trauma—Vaginal Delivery with Instrument (PSI 18)	Cases of obstetric trauma (4 <sup>th</sup> degree lacerations, other obstetric lacerations) per 1,000 instrument-assisted vaginal deliveries.	Unclear preventability  Case mix bias	Provider Rate = 200.38 Provider SD = 141.66 Pop. Rate = 217.09 Bias = N/A	+ Coding 0 Explicit Process 0 Implicit Process 0 Staffing
Obstetric Trauma—Vaginal Delivery without Instrument (PSI 19)	Cases of obstetric trauma (4 <sup>th</sup> degree lacerations, other obstetric lacerations) per 1,000 vaginal deliveries without instrument assistance.	Unclear preventability  Case mix bias	Provider Rate = 77.96 Provider SD = 57.60 Pop. Rate = 81.98 Bias = N/A	+ Coding 0 Explicit Process 0 Implicit Process 0 Staffing
Obstetric Trauma—Cesarean Delivery (PSI 20)	Cases of obstetric trauma (4 <sup>th</sup> degree lacerations, other obstetric lacerations) per 1,000 Cesarean deliveries.	Unclear preventability  Case mix bias	Provider Rate = 5.60 Provider SD = 9.99 Pop. Rate = 5.93 Bias = N/A	+ Coding 0 Explicit Process 0 Implicit Process 0 Staffing
Obstetric Trauma with 3 <sup>rd</sup> Degree—Vaginal Delivery with Instrument (PSI 27)	Cases of obstetric trauma (3 <sup>rd</sup> and 4 <sup>th</sup> degree lacerations, other obstetric lacerations) per 1,000 instrument-assisted vaginal deliveries.	Unclear preventability  Case mix bias	Provider Rate = 238.68 Provider SD = 152.02 Pop. Rate = 246.00 Bias = N/A	+ Coding 0 Explicit Process 0 Implicit Process 0 Staffing

PSI Name	Definition	Validity Concerns	Empirical Performance <sup>b</sup>	Strength of Evidence
Obstetric Trauma with 3 <sup>rd</sup> Degree —Vaginal Delivery without Instrument (PSI 28)	Cases of obstetric trauma (3 <sup>rd</sup> and 4 <sup>th</sup> degree lacerations, other obstetric lacerations) per 1,000 vaginal deliveries without instrument assistance.	Unclear preventability Case mix bias	Provider Rate = 86.83 Provider SD = 59.32 Pop. Rate = 88.74 Bias = N/A	+ Coding 0 Explicit Process 0 Implicit Process 0 Staffing
Obstetric Trauma with 3 <sup>rd</sup> Degree — Cesarean Delivery (PSI 29)	Cases of obstetric trauma (3 <sup>rd</sup> and 4 <sup>th</sup> degree lacerations, other obstetric lacerations) per 1,000 Cesarean deliveries.	Unclear preventability Case mix bias	Provider Rate = 5.84 Provider SD = 10.09 Pop. Rate = 6.20 Bias = N/A	+ Coding 0 Explicit Process 0 Implicit Process 0 Staffing

<sup>a</sup> DRGs that are divided into “with complications and comorbidities” and “without complications and comorbidities” are only included if both divisions have mortality rates below 0.5%.

<sup>b</sup> Notes under **Empirical Performance**:

**Provider Rates** - Observed (unadjusted) and unweighted rates for providers (hospitals) and their standard deviations (SD) were calculated using the HCUP Year 2000 SID from 27 states. Provider rates are per 1,000.

**Population Rates** - The population rates are weighted provider rates (weighted by the number of discharges for each indicator).

**Table 2. AHRQ Area Level Patient Safety Indicators**

PSI Name	Definition	Validity Concerns	Empirical Performance <sup>a</sup>	Strength of Evidence
Foreign Body Left During Procedure (PSI 21)	Discharges with foreign body accidentally left in during procedure per 100,000 population		Area Rate = 7.70 Area SD = 21.71 Pop. Rate = 10.25	
Iatrogenic Pneumothorax (PSI 22)	Cases of iatrogenic pneumothorax per 100,000 population. Excludes trauma, thoracic surgery, lung or pleural biopsy, or cardiac surgery patients, and obstetrical patients in MDC 14.		Area Rate = 70.98 Area SD = 72.65 Pop. Rate = 102.26	
Selected Infections Due to Medical Care (PSI 23)	Cases of secondary ICD-9-CM codes 999.3 or 996.62 per 100,000 population. Excludes patients with immunocompromised state or cancer.		Area Rate = 177.99 Area SD = 199.59 Pop. Rate = 382.86	
Postoperative Wound Dehiscence (PSI 24)	Cases of reclosure of postoperative disruption of abdominal wall per 100,000 population. Excludes obstetric admissions.		Area Rate = 18.60 Area SD = 35.50 Pop. Rate = 20.13	

PSI Name	Definition	Validity Concerns	Empirical Performance <sup>a</sup>	Strength of Evidence
Accidental Puncture or Laceration (PSI 25)	Cases of technical difficulty (e.g., accidental cut or laceration during procedure) per 100,000 population. Excludes obstetric admissions.		Area Rate = 245.58 Area SD = 239.04 Pop. Rate = 354.08	
Transfusion Reaction (PSI 26)	Cases of transfusion reaction per 100,000 population.		Area Rate = 0.47 Area SD = 4.72 Pop. Rate = 0.52	

- <sup>a</sup> Notes under **Empirical Performance**:
- Area Rates** - Observed (unadjusted) and unweighted rates for areas (counties) and their standard deviations (SD) were based on 1371 geographic areas (counties) in the HCUP Year 2000 SID from 27 states. Area rates are per 100,000.
- Population Rates** - The population rates are weighted area rates (weighted by the area populations).

## Limitations in Using the PSIs

Many important concerns cannot currently be monitored well using administrative data, such as adverse drug events, and using these data tends to favor specific types of indicators. For example, the PSIs evaluated in this report contain a large proportion of surgical indicators, rather than medical or psychiatric, because medical complications are often difficult to distinguish from comorbidities that are present on admission. In addition, medical populations tend to be more heterogeneous than surgical, especially elective surgical populations, making it difficult to account for case-mix. Panelists often expressed that indicators were more applicable to patient safety when limited to elective surgical admissions. However, the careful use of administrative data holds promise for screening to target further data collection and analysis. The ability to assess all patients at risk for a particular patient safety problem, along with the relative low cost, are particular strengths of these data sets.

Two broad areas of concern also hold true for these data sets.

1. Questions about the clinical accuracy of discharge-based diagnosis coding lead to concerns about the interpretation of reported diagnoses that may represent safety problems. Specifically:
  - Administrative data are unlikely to capture all cases of a complication, regardless of the preventability, without false positives and false negatives (sensitivity and specificity).
  - When the codes are accurate in defining an event, the clinical vagueness inherent in the description of the code itself (e.g., “hypotension”), may lead to a highly heterogeneous pool of clinical states represented by that code.
  - Incomplete reporting is an issue in the accuracy of any data source used for identifying patient safety problems, as medical providers might fear adverse consequences as a result of “full disclosure” in potentially public records such as discharge abstracts.
2. The information about the ability of these data to distinguish adverse events in which no error occurred from true medical errors is limited. A number of factors—such as the heterogeneity of clinical conditions included in some codes, lack of information about event timing available in these data sets, and limited clinical detail for risk adjustment—contribute to the difficulty in identifying complications that represent medical error or may be at least in some part preventable.

These factors may exist for other sources of patient safety data as well. For example, they have been raised in the context of the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) implementation of a “sentinel event” program geared at identifying serious adverse events that may be related to underlying safety problems.

## **Further Research on PSIs**

The initial validation evaluations reviewed and performed for the PSIs leave substantial room for further research with detailed chart data and other data sources. Future validation work should focus on the following:

- The sensitivity and specificity of these indicators in detecting the occurrence of a complication.
- The extent to which failures in processes of care at the system or individual level are detected using these indicators.
- The relationship of these indicators with other measures of quality, such as mortality.
- Further explorations of bias and risk adjustment.

Enhancements to administrative data are worth exploring in the context of further validation studies that use data from other sources. For example, as with other quality indicators, the addition of timing variables may prove particularly useful in identifying whether a complication was present on admission, or whether it occurred during the hospitalization. While some of the complications that are present on admission may indeed reflect adverse events of care in a previous hospitalization or outpatient care, many may reflect comorbidities instead of complications. A second example area—linking hospital data over time and with outpatient data and other hospitalizations—would allow inclusion of complications that occur after discharge and likely would increase the sensitivity of the PSIs.

## **Use of External Cause-of-Injury Codes**

Several of the PSIs are based on capturing external cause-of-injury (e-code) data. These codes are used to classify environmental events, circumstances, and conditions as the cause of injury, poisoning, or other adverse events. External cause-of-injury codes are critical to evaluate population-based, cause-specific data on nonfatal injuries at the state and local levels. However, not all states collect this information in their hospital discharge data programs nor do all state uniform billing committees require use of e-codes. Users of the PSIs should be knowledgeable of the e-code requirements and practices of hospitals represented in the input data file.

Table 3 provides a summary of the PSIs that are dependent on e-codes for their definition (required), the PSIs that use e-codes within their definition, and the PSIs that do not use any e-codes in their definition. If use of e-codes is not mandated or coding may be highly variable across hospitals, the PSIs that are dependent upon e-codes should not be used and the PSIs that include e-codes in their definition should be used with caution.

**Table 3: Indicators and Use of External Cause-of-Injury Codes**

<b>Indicator Number (used in software)</b>	<b>Indicator Name</b>	<b>Use of External Cause-of-Injury Codes</b>
15 & 25	Accidental puncture or laceration	Required. Used in both the numerator and denominator definitions.
17	Birth trauma	Not used.
1	Complications of anesthesia	Required. Used in the numerator definition.
2	Death in low mortality DRGs	Not used.
3	Decubitus ulcer	Not used.
4	Failure to rescue	Not used.
5 & 21	Foreign body left during procedure	Required. Used in the numerator definition although the other ICD-9 CM codes may capture the same information.
6 & 22	Iatrogenic pneumothorax	Not used.
20 & 29	Obstetric trauma – cesarean section	Not used.
18 & 27	Obstetric trauma – vaginal with instrument	Not used.
19 & 28	Obstetric trauma – vaginal without instrument	Not used.
9	Postoperative hemorrhage or hematoma	Not used.
8	Postoperative hip fracture	Used as exclusion criteria in denominator population.
10	Postoperative physiologic and metabolic derangements	Not used.
12	Postoperative pulmonary embolism or deep vein thrombosis	Not used.
11	Postoperative respiratory failure	Not used.
13	Postoperative sepsis	Not used.
14 & 24	Postoperative wound dehiscence	Not used.
7 & 23	Selected infections due to medical care	Not used.
16 & 26	Transfusion reaction	Required. Used in the numerator definition although the other ICD-9 CM codes may capture the same information.

## Detailed Evidence for Patient Safety Indicators

This section provides an abbreviated presentation of the details of the literature review and the empirical evaluation for each PSI, including:

- The definition of the indicator
- The outcome of interest (or numerator)
- The population at risk (or denominator)
- The type of indicator
- The measures of empirical performance. Rates are population rates as reported in Table 1 (PSI – Provider) and Table 2 (PSI – Area). Provider rates are per 1,000 qualifying discharges and Area rates are per 100,000 population.

The two-page descriptions for each indicator also include a more detailed discussion of the panel review, the literature review, the source of the indicator, and the results of the empirical analysis, including information related to adjustments to increase the robustness of the rates:

- Reliability. Statistics on the signal standard deviation, signal share, and signal ratio were used to examine the effect of the reliability adjustment. Multivariate methods were applied to most of the indicators, and overall the reliability adjustment reduced the provider-level variation dramatically. In general, indicators with higher rates tend to perform better on tests of reliability; as a result, obstetric indicators with high rates tend to do very well relative to other indicators.
- Bias. The effect of age, gender, DRG, and comorbidity risk adjustment on the relative ranking of hospitals — compared to no risk adjustment — was assessed, if applicable. The presence of high bias suggests that risk adjustment, using administrative data elements, is necessary to interpret provider-level differences in the rates of these indicators.

A full report on the literature review and empirical evaluation can be found in *Evidence Report for Measures of patient Safety Based on Hospital Administrative Data — The Patient Safety Indicators* by the UCSF-Stanford EPC, available at <http://www.qualityindicators.ahrq.gov>. Detailed coding information for each PSI is provided in Appendix A.

The software manual *Patient Safety Indicators: SAS Software Documentation, Version 2.1* (also available at <http://www.qualityindicators.ahrq.gov>) provides detailed instructions on how to use the PSI software including data preparation, calculation of the PSI rates, and interpretation of output. All provider level indicators are expressed as rates per 1,000 discharges. To obtain the standardized rate for each provider level PSIs, the output of the software should be multiplied by 1,000. The area level indicators are expressed as rates per 100,000 population. To obtain the standardized area rate for each area level PSIs, the output of the software should be multiplied by 100,000.

## Complications of Anesthesia (PSI 1)

Definition	Cases of anesthetic overdose, reaction, or endotracheal tube misplacement per 1,000 surgery discharges with an operating room procedure.
Numerator	Discharges with ICD-9-CM diagnosis codes for anesthesia complications in any secondary diagnosis field.
Denominator	All surgical discharges defined by specific DRGs and an ICD-9-CM code for an operating room procedure.  Exclude patients with ICD-9-CM diagnosis codes for anesthesia complications in the principal diagnosis field  Exclude patients with codes for poisoning due to anesthetics (E8551, 9681-4, 9687) <b>and</b> any diagnosis code for active drug dependence, active non-dependent abuse of drugs, or self-inflicted injury.
Type of Indicator	Provider level
Empirical Performance	Rate: 0.56 per 1,000 population at risk Bias: Not detected, but may be biased in a way undetectable by empirical tests
Risk Adjustment	Age, sex, DRG, comorbidity categories

### Summary

This indicator is intended to capture cases flagged by external cause-of-injury codes (e-codes) and complications codes for adverse effects from the administration of therapeutic drugs, as well as the overdose of anesthetic agents used primarily in therapeutic settings.

### Panel Review

Panelists had concerns about the frequency of coding of these complications, especially since the use of e-codes is considered voluntary and appears to vary widely among providers. Plausibly, a “reaction” may be described without attributing it to anesthetic. Another concern is that some of these cases would be present on admission (e.g., due to recreational drug use).

Panelists expressed concern about the events that would be assigned to the code for incorrect placement of endotracheal tube. They noted that true misplacement does represent medical error, but they were skeptical about whether this code would be limited to those situations.

Ideally, this indicator would be used with a coding designation that distinguishes conditions present on admission from those that develop in-hospital. However, this is not available in the

administrative data used to define this indicator, and so this concern was addressed by eliminating codes for drugs that are commonly used as recreational drugs. While this does not eliminate the chance that these codes represent intentional or accidental overdose on the part of the patient, it should eliminate many of these cases.

### Literature Review

The literature review focused on the validity of complication indicators based on ICD-9-CM diagnosis or procedure codes. Results of the literature review indicate no published evidence for the sensitivity or predictive value of this indicator based on detailed chart review or prospective data collection. Sensitivity is the proportion of the patients who suffered an adverse event for whom that event was coded on a discharge abstract or Medicare claim. Predictive value is the proportion of patients with a coded adverse event who were confirmed as having suffered that event.

The project team found no published evidence for this indicator that supports the following constructs: (1) that hospitals that provide better processes of care experience fewer adverse events; (2) that hospitals that provide better overall care experience fewer adverse events; and (3) that hospitals that offer more nursing

hours per patient day, better nursing skill mix, better physician skill mix, or more experienced physicians have fewer adverse events.

## Empirical Analysis

The project team conducted extensive empirical analyses on the PSIs. Complications of Anesthesia generally performs well on several different dimensions, including reliability, bias, relatedness of indicators, and persistence over time.

*Reliability.* The signal ratio—measured by the proportion of the total variation across hospitals that is truly related to systematic differences (signal) in hospital performance rather than random variation (noise)—is 75.7%, suggesting that observed differences in risk-adjusted rates likely reflect true differences across hospitals.

The signal standard deviation for this indicator is 0.00187, indicating that the systematic differences (signal) among hospitals is lower than many indicators and less likely associated with hospital characteristics. The signal share is 0.00563, and is also lower than many indicators. The signal share is a measure of the share of total variation (hospital and patient) accounted for by hospitals. The lower the share, the less important the hospital in accounting for the rate and the more important other potential factors (e.g., patient characteristics).

*Minimum bias.* The project team assessed the effect of age, gender, DRG, and comorbidity risk adjustment on the relative ranking of hospitals compared to no risk adjustment. They measured (1) the impact of adjustment on the assessment of relative hospital performance, (2) the relative importance of the adjustment, (3) the impact on hospitals with the highest and lowest rates, and (4) the impact throughout the distribution. The detected bias for Complications of Anesthesia is low, indicating that the measures are likely not biased based on the characteristics observed. (It is possible that characteristics that are not observed using administrative data may be related to the patient's risk of experiencing an adverse event.)

## Source

A subset of this indicator was originally proposed by Iezzoni et al.<sup>42</sup> as part of Complications Screening Program (CSP) (CSP 21, “Complications relating to anesthetic agents and other CNS depressants”) Their definition also includes poisoning due to centrally acting muscle relaxants and accidental poisoning by nitrogen oxides, which were omitted from this PSI. Their definition excludes other codes included in the PSI, namely, poisoning by other and unspecified general anesthetics and external cause of injury codes for “endotracheal tube wrongly placed during anesthetic procedure” and adverse effects of anesthetics in therapeutic use.

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<sup>42</sup> Iezzoni LI, Daley J, Heeren T, Foley SM, Fisher ES, Duncan C, et al. Identifying complications of care using administrative data. *Med Care* 1994;32(7):700-15.

## Death in Low-Mortality DRGs (PSI 2)

Definition	In-hospital deaths per 1,000 patients in DRGs with less than 0.5% mortality.
Numerator	Discharges with disposition of “deceased”.
Denominator	Patients in DRGs with less than 0.5% mortality rate, based on NIS 1997 low-mortality DRG. If a DRG is divided into “without/with complications,” both DRGs must have mortality rates below 0.5% to qualify for inclusion.  Exclude patients with any code for trauma, immunocompromised state, or cancer.
Type of Indicator	Provider level
Empirical Performance	Rate: 0.66 per 1,000 population at risk Bias: Substantial bias; should be risk-adjusted
Risk Adjustment	Age, sex, DRG, comorbidity categories

### Summary

This indicator is intended to identify in-hospital deaths in patients unlikely to die during hospitalization. The underlying assumption is that when patients admitted for an extremely low-mortality condition or procedure die, a health care error is more likely to be responsible. Patients experiencing trauma or having an immunocompromised state or cancer are excluded, as these patients have higher non-preventable mortality.

### Panel Review

This indicator should be evaluated separately by type of DRG when used as an indicator of quality. For example, the PSI Software reports the low-mortality DRG rate for all the included DRGs and separately by DRG type: adult medical, adult surgical (with and without an operating room procedure), pediatric medical, pediatric surgical (with and without an operating room procedure), and obstetric and psychiatric. The overall usefulness of this indicator was rated as favorable by panelists. Because the denominator includes many heterogeneous patients cared for by different services, this indicator should be stratified by DRG type (i.e., medical, surgical, psychiatric, obstetric, pediatric) when used as an indicator of quality.

Panelists noted that hospital case-mix may affect the rate of death in low mortality DRGs, and patients referred from skilled nursing facilities, those with certain comorbidities, and

older patients may be at higher risk of dying. They advocated risk adjustment for comorbidities and age.

Panelists advocated that this indicator not be subject to public reporting because of the potential bias and questions about the extent of preventability.

### Literature Review

Based on two-stage implicit review of randomly selected deaths, Hannan et al. found that patients in low-mortality DRGs (<0.5%) were 5.2 times more likely than all other patients who died (9.8% versus 1.7%) to have received “care that departed from professionally recognized standards,” after adjusting for patient demographic, geographic, and hospital characteristics.<sup>43</sup> In 15 of these 26 cases (58%) of substandard care, the patient’s death was attributed at least partially to that care. The association with substandard care was stronger for the DRG-based definition of this indicator than for the procedure-based definition (5.7% versus 1.7%, OR=3.2). The project team was unable to find other evidence on the validity of this indicator.

<sup>43</sup> Hannan EL, Bernard HR, O'Donnell JF, Kilburn H, Jr. A methodology for targeting hospital cases for quality of care record reviews. *Am J Public Health* 1989;79(4):430-6.

## Empirical Analysis

The project team conducted extensive empirical analyses on the PSIs. Death in Low-mortality DRGs generally performs well on several different dimensions, including reliability, bias, relatedness of indicators, and persistence over time.

*Reliability.* The signal ratio—measured by the proportion of the total variation across hospitals that is truly related to systematic differences (signal) in hospital performance rather than random variation (noise)—is high, relative to other indicators, at 94.2%, suggesting that observed differences in risk-adjusted rates likely reflect true differences across hospitals.

The signal standard deviation for this indicator is lower than many indicators, at 0.00439, indicating that the systematic differences (signal) among hospitals is low and less likely associated with hospital characteristics. The signal share is high, relative to other indicators, at 0.04237. The signal share is a measure of the share of total variation (hospital and patient) accounted for by hospitals. The lower the share, the less important the hospital in accounting for the rate and the more important other potential factors (e.g., patient characteristics).

*Minimum bias.* The project team assessed the effect of age, gender, DRG, and comorbidity risk adjustment on the relative ranking of hospitals compared to no risk adjustment. They measured (1) the impact of adjustment on the assessment of relative hospital performance, (2) the relative importance of the adjustment, (3) the impact on hospitals with the highest and lowest rates, and (4) the impact throughout the distribution. The detected bias for Death in Low-mortality DRGs is high, indicating that the measures are biased based on the characteristics observed. (It is possible that characteristics that are not observed using administrative data may be related to the patient's risk of experiencing an adverse event.) Risk adjustment is important for this indicator.

## Source

This indicator was originally proposed by Hannan et al. as a criterion for targeting “cases that would have a higher percentage of quality of care problems than cases without the criterion,

as judged by medical record review.”<sup>44</sup> An alternative form of this indicator focused on “primary surgical procedures,” rather than DRGs, with less than 0.5% inpatient mortality.

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<sup>44</sup> Hannan et al. 1989.

## Decubitus Ulcer (PSI 3)

Definition	Cases of decubitus ulcer per 1,000 discharges with a length of stay greater than 4 days.
Numerator	Discharges with ICD-9-CM code of 7070 in any secondary diagnosis field.
Denominator	All medical and surgical discharges defined by specific DRGs. Include only patients with a length of stay of 5 or more days. Exclude patients with ICD-9-CM code of 7070 in the principal diagnosis field. Exclude patients in MDC-9 or patients with any diagnosis of hemiplegia, paraplegia, or quadriplegia. Exclude obstetrical patients in MDC 14. Exclude patients admitted from a long-term care facility.
Type of Indicator	Provider level
Empirical Performance	Rate: 22.71 per 1,000 population at risk Bias: Substantial bias; should be risk-adjusted
Risk Adjustment	Age, sex, DRG, comorbidity categories

### Summary

This indicator is intended to flag cases of in-hospital decubitus ulcers. Its definition is limited to decubitus ulcer as a secondary diagnosis to better screen out cases that may be present on admission. In addition, this indicator excludes patients who have a length of stay of 4 days or less, as it is unlikely that a decubitus ulcer would develop within this period of time. Finally, this indicator excludes patients who are particularly susceptible to decubitus ulcer, namely patients with major skin disorders (MDC 9) and paralysis.

### Panel Review

The overall usefulness of this indicator was rated as very favorable by panelists. Concerns regarding the systematic screening for ulcers and reliability of coding, especially for early stage ulcers, brought into question that assertion. Therefore, this indicator appears to be best used as a rate-based indicator. Panelists suggested that patients admitted from a long-term care facility be excluded, as these patients may have an increased risk of having decubiti present on admission.

Panelists noted that hospitals that routinely screen for decubitus ulcers as part of a quality improvement program might have an artificially high rate of ulcers compared to other hospitals,

which may cause this indicator to be somewhat biased.

This indicator includes pediatric patients. Pressure sores are very unusual in children, except among the most critically ill children (who may be paralyzed to improve ventilator management) and children with chronic neurological problems. Age stratification is recommended.

### Literature Review

*Coding validity.* No evidence on validity is available from CSP studies. Geraci et al. confirmed only 2 of 9 episodes of pressure ulcers reported on discharge abstracts of Veterans Affairs (VA) patients hospitalized in 1987-89 for congestive heart failure (CHF), chronic obstructive pulmonary disease (COPD), or diabetes.<sup>45</sup> The sensitivity for a nosocomial ulcer was 40%. Among Medicare hip fracture patients, Keeler et al. confirmed 6 of 9 reported pressure ulcers, but failed to ascertain 89

<sup>45</sup> Geraci JM, Ashton CM, Kuykendall DH, Johnson ML, Wu L. International Classification of Diseases, 9<sup>th</sup> Revision, Clinical Modification codes in discharge abstracts are poor measures of complication occurrence in medical inpatients. *Med Care* 1997;35(6):589-602.

additional cases (6% sensitivity) using ICD-9-CM codes.<sup>46</sup> In the largest study to date, Berlowitz et al. found that the sensitivity of a discharge diagnosis of pressure ulcer among all patients transferred from VA hospitals to VA nursing homes in 1996 was 31% overall, or 54% for stage IV (deep) ulcers.<sup>47</sup> The overall sensitivity increased modestly since 1992 (26.0%), and was slightly but statistically significantly better among medical patients than among surgical patients (33% versus 26%).

*Construct validity.* Needleman and Buerhaus found that nurse staffing was inconsistently associated with the occurrence of pressure ulcers among medical patients, and was independent of pressure ulcers among major surgery patients.<sup>48</sup> As was expected, nursing skill mix (RN hours/licensed nurse hours) was significantly associated with the pressure ulcer rate.<sup>49</sup> Total licensed nurse hours per acuity-adjusted patient day were inconsistently associated with the rate of pressure ulcers.

## Empirical Analysis

The project team conducted extensive empirical analyses on the PSIs. Decubitus Ulcer generally performs well on several different dimensions, including reliability, bias, relatedness of indicators, and persistence over time.

*Reliability.* The signal ratio—measured by the proportion of the total variation across hospitals that is truly related to systematic differences (signal) in hospital performance rather than random variation (noise)—is high, relative to

other indicators, at 85.6%, suggesting that observed differences in risk-adjusted rates likely reflect true differences across hospitals.

The signal standard deviation for this indicator is lower than many indicators, at 0.0147, indicating that the systematic differences (signal) among hospitals is low and less likely associated with hospital characteristics. The signal share is lower than many indicators, at 0.01067. The signal share is a measure of the share of total variation (hospital and patient) accounted for by hospitals. The lower the share, the less important the hospital in accounting for the rate and the more important other potential factors (e.g., patient characteristics).

*Minimum bias.* The project team assessed the effect of age, gender, DRG, and comorbidity risk adjustment on the relative ranking of hospitals compared to no risk adjustment. They measured (1) the impact of adjustment on the assessment of relative hospital performance, (2) the relative importance of the adjustment, (3) the impact on hospitals with the highest and lowest rates, and (4) the impact throughout the distribution. The detected bias for Decubitus Ulcer is high, indicating that the measure is biased based on the characteristics observed. (It is possible that characteristics that are not observed using administrative data may be related to the patient's risk of experiencing an adverse event.) Risk adjustment is important for this indicator.

## Source

This indicator was originally proposed by Iezzoni et al.<sup>50</sup> as part of the Complications Screening Program (CSP 6, "cellulitis or decubitus ulcer"). Needleman and Buerhaus identified decubitus ulcer as an "outcome potentially sensitive to nursing"<sup>51</sup> The American Nurses Association, its State associations, and the California Nursing Outcomes Coalition have identified the total prevalence of inpatients with Stage I, II, III, or IV pressure ulcers as a "nursing-sensitive quality indicator for acute care settings."<sup>52</sup>

<sup>46</sup> Keeler E, Kahn K, Bentow S. Assessing quality of care for hospitalized Medicare patients with hip fracture using coded diagnoses from the Medicare Provider Analysis and Review file. Springfield, VA: NTIS; 1991.

<sup>47</sup> Berlowitz D, Brand H, Perkins C. Geriatric syndromes as outcome measures of hospital care: Can administrative data be used? *JAGS* 1999;47:692-696.

<sup>48</sup> Needleman J, Buerhaus PI, Mattke S, Stewart M, Zelevinsky K. Nurse Staffing and Patient Outcomes in Hospitals. Boston, MA: Health Resources Services Administration; 2001 February 28. Report No.: 230-88-0021.

<sup>49</sup> Lichtig LK, Knauf RA, Hillholland DK. Some impacts of nursing on acute care hospital outcomes. *J Nurs Adm* 1999;29(2):25-33.

<sup>50</sup> Iezzoni LI, Daley J, Heeren T, Foley SM, Risher ES, Duncan C, et al. Identifying complications of care using administrative data. *Med Care* 1994;32(7):700-15.

<sup>51</sup> Needleman et al. 2001.

<sup>52</sup> Nursing-Sensitive Quality Indicators for Acute Care Settings and ANA's Safety & Quality Initiative. In: American Nurses Association; 1999.

## Failure to Rescue (PSI 4)

Definition	Deaths per 1,000 patients having developed specified complications of care during hospitalization.
Numerator	Discharges with a disposition of “deceased”.
Denominator	Discharges with potential complications of care listed in failure to rescue definition (i.e., pneumonia, DVT/PE, sepsis, acute renal failure, shock/cardiac arrest, or GI hemorrhage/acute ulcer). Exclusion criteria specific to each diagnosis.  Exclude patients age 75 years and older.  Exclude neonatal patients in MDC 15.  Exclude patients transferred to an acute care facility.  Exclude patients transferred from an acute care facility.  Exclude patients admitted from a long-term care facility.
Type of Indicator	Provider level
Empirical Performance	Rate: 144.98 per 1,000 population at risk Bias: Substantial bias; should be risk-adjusted
Risk Adjustment	Age, sex, DRG, comorbidity categories

### Summary

This indicator is intended to identify patients who die following the development of a complication. The underlying assumption is that good hospitals identify these complications quickly and treat them aggressively.

Failure to Rescue may be fundamentally different than other indicators reviewed in this report, as it may reflect different aspects of quality of care (effectiveness in rescuing a patient from a complication versus preventing a complication). This indicator includes pediatric patients. It is important to note that children beyond the neonatal period inherently recover better from physiological stress and thus may have a higher rescue rate.

### Panel Review

Panelists expressed concern regarding patients with “do not resuscitate” (DNR) status. In cases where this DNR status is not a direct result of poor quality of care, it would be contrary to patient desire and poor quality of care to rescue a patient. In addition, very old patients—or patients with advanced cancer or HIV—may not desire or may be particularly difficult to rescue

from these complications. As a result, this indicator definition was modified to exclude those patients age 75 years and older. In addition, panelists suggested the exclusion of patients admitted from long-term care facilities.

Panelists noted that several adverse incentives may be introduced by implementing this indicator. In particular, since some type of adjustment may be desirable, this indicator may encourage the upcoding of complications and comorbidities to inflate the denominator or manipulate risk adjustment. Others noted that this indicator could encourage irresponsible resource use and allocation, although this is likely to be a controversial idea. Finally, panelists emphasized that this indicator should be used internally by hospitals, as it is not validated for public reporting.

### Literature Review

*Construct validity.* Silber and colleagues have published a series of studies establishing the construct validity of failure-to-rescue rates through their associations with hospital characteristics and other measures of hospital performance. Among patients admitted for cholecystectomy and transurethral

prostatectomy, failure to rescue was independent of severity of illness at admission, but was significantly associated with the presence of surgical house staff and a lower percentage of board-certified anesthesiologists.<sup>53</sup> The adverse occurrence rate was independent of this hospital characteristic. In a larger sample of patients who underwent general surgical procedures, lower failure-to-rescue rates were found at hospitals with high ratios of registered nurses to beds.<sup>54</sup> Failure rates were strongly associated with risk-adjusted mortality rates, as expected, but not with complication rates.<sup>55</sup>

More recently, Needleman and Buerhaus confirmed that higher registered nurse staffing (RN hours/adjusted patient day) and better nursing skill mix (RN hours/licensed nurse hours) were consistently associated with lower failure-to-rescue rates, even using administrative data to define complications.<sup>56</sup>

### Empirical Analysis

The project team conducted extensive empirical analyses on the PSIs. Failure to Rescue generally performs well on several different dimensions, including reliability, bias, relatedness of indicators, and persistence over time.

*Reliability.* The signal ratio—measured by the proportion of the total variation across hospitals that is truly related to systematic differences (signal) in hospital performance rather than

random variation (noise)—is moderately high, relative to other indicators, at 66.6%, suggesting that observed differences in risk-adjusted rates may reflect true differences across hospitals.

The signal standard deviation for this indicator is also high, relative to other indicators, at 0.04617, indicating that the systematic differences (signal) among hospitals is high and more likely associated with hospital characteristics. The signal share is lower than many indicators, at 0.01450. The signal share is a measure of the share of total variation (hospital and patient) accounted for by hospitals. The lower the share, the less important the hospital in accounting for the rate and the more important other potential factors (e.g., patient characteristics).

*Minimum bias.* The project team assessed the effect of age, gender, DRG, and comorbidity risk adjustment on the relative ranking of hospitals compared to no risk adjustment. They measured (1) the impact of adjustment on the assessment of relative hospital performance, (2) the relative importance of the adjustment, (3) the impact on hospitals with the highest and lowest rates, and (4) the impact throughout the distribution. The detected bias for Failure to Rescue is high, indicating that the measures are biased based on the characteristics observed. (It is possible that characteristics that are not observed using administrative data may be related to the patient's risk of experiencing an adverse event.) Risk adjustment is important for this indicator.

### Source

This indicator was originally proposed by Silber et al. as a more powerful tool than the risk-adjusted mortality rate to detect true differences in patient outcomes across hospitals.<sup>57</sup> The underlying premise was that better hospitals are distinguished not by having fewer adverse occurrences but by more successfully averting death among (i.e., rescuing) patients who experience such complications. More recently, Needleman and Buerhaus adapted Failure to Rescue to administrative data sets, hypothesizing that this outcome might be sensitive to nurse staffing.<sup>58</sup>

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<sup>53</sup> Silber JH, Williams SV, Krakauer H, Schwartz JS. Hospital and patient characteristics associated with death after surgery. A study of adverse occurrence and failure to rescue. *Med Care* 1992;30(7):615-29.

<sup>54</sup> Silber J, Rosenbaum P, Ross R. Comparing the contributions of groups of predictors: Which outcomes vary with hospital rather than patient characteristics? *J Am Stat Assoc* 1995;90:7-18.

<sup>55</sup> Silber JH, Rosenbaum PR, Williams SV, Ross RN, Schwartz JS. The relationship between choice of outcome measure and hospital rank in general surgical procedures: Implications for quality assessment. *Int J Qual Health Care* 1997;9(3):193-200.

<sup>56</sup> Needleman J, Buerhaus PI, Mattke S, Stewart M, Zelevinsky K. *Nurse Staffing and Patient Outcomes in Hospitals*. Boston MA: Health Resources and Services Administration; 2001 February 28. Report No.:230-99-0021.

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<sup>57</sup> Silber et al. 1992.

<sup>58</sup> Needleman et al. 2001.

## Foreign Body Left During Procedure (PSI 5)

### Provider Level Definition (only secondary diagnosis)

Definition	Discharges with foreign body accidentally left in during procedure per 1,000 discharges.
Numerator	Discharges with ICD-9-CM codes for foreign body left in during procedure in any secondary diagnosis field.
Denominator	All medical and surgical discharges defined by specific DRGs. Exclude patients with ICD-9-CM codes for foreign body left in during procedure in the principal diagnosis field
Type of Indicator	Provider level
Empirical Performance	Rate: 0.08 per 1,000 population at risk Bias: Did not undergo empirical testing of bias
Risk Adjustment	Age, sex, DRG, comorbidity categories

## Foreign Body Left During Procedure (PSI 21)

### Area Level Definition (principal or secondary diagnosis)

Definition	Discharges with foreign body accidentally left in during procedure per 100,000 population.
Numerator	Discharges with ICD-9-CM codes for foreign body left in during procedure in any diagnosis field (principal or secondary) of medical and surgical discharges defined by specific DRGs.
Denominator	Population of county or MSA associated with FIPS code of patient's residence or hospital location.
Type of Indicator	Area level
Empirical Performance	Rate: 10.25 per 100,000 population
Risk Adjustment	No risk adjustment

### Summary

This indicator is intended to flag cases of a foreign body accidentally left in a patient during a procedure. This indicator is defined on both a provider level (by restricting cases to those flagged by a secondary diagnosis or procedure code) and an area level (by including all cases).

### Panel Review

Panelists believed that this indicator was useful in identifying cases of a foreign body left in during a procedure. However, they suggested that each case identified be examined carefully by the hospital, because this indicator was likely to yield few cases and some automated systems

report this complication when a foreign body is left in intentionally.

Panelists also noted that the population at risk included both medical and surgical patients, but not all of these patients are at risk. The panelists felt that limiting the population at risk to surgical patients would decrease the sensitivity of this indicator substantially. Since not all patients in the denominator are actually at risk, some hospitals may appear to have a lower rate if they have fewer medical patients who have undergone invasive procedures.

## Literature Review

The literature review focused on the validity of complication indicators based on ICD-9-CM diagnosis or procedure codes. Results of the literature review indicate no published evidence for the sensitivity or predictive value of this indicator based on detailed chart review or prospective data collection. Sensitivity is the proportion of the patients who suffered an adverse event for whom that event was coded on a discharge abstract or Medicare claim. Predictive value is the proportion of patients with a coded adverse event who were confirmed as having suffered that event.

The project team found no published evidence for this indicator that supports the following constructs: (1) that hospitals that provide better processes of care experience fewer adverse events; (2) that hospitals that provide better overall care experience fewer adverse events; and (3) that hospitals that offer more nursing hours per patient day, better nursing skill mix, better physician skill mix, or more experienced physicians have fewer adverse events.

## Empirical Analysis

The project team conducted extensive empirical analyses on the PSIs. Foreign Body Left During Procedure generally performs well on several different dimensions, including reliability, bias, relatedness of indicators, and persistence over time. Due to the rarity of this diagnosis, reliability and bias were not assessed.

## Source

This indicator was originally proposed by Iezzoni et al. as part of the Complications Screening Program (CSP “sentinel events”).<sup>59</sup> It was also included as one component of a broader indicator (“adverse events and iatrogenic complications”) in AHRQ’s original HCUP Quality Indicators.<sup>60</sup> It was proposed by Miller et al. in the “Patient Safety Indicator Algorithms

and Groupings.”<sup>61</sup> Based on expert consensus panels, McKesson Health Solutions included this indicator in its CareEnhance Resource Management Systems, Quality Profiler Complications Measures Module.

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<sup>59</sup> Iezzoni LI, Daley J, Heeren T, Foley SM, Fisher ES, Duncan C, et al. Identifying complications of care using administrative data. *Med Care* 1994;32(7):700-15.

<sup>60</sup> Johantgen M, Elixhauser A, Bali JK, Goldfarb M, Harris DR. Quality indicators using hospital discharge data: state and national applications. *Jt Comm J Qual Improv* 1998;24(2):88-105.

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<sup>61</sup> Miller M, Elixhauser A, Zhan C, Meyer G. Patient safety indicators: Using administrative data to identify potential patient safety concerns. *Health Services Research* 2001;36(6 Part II):110-132.

## Iatrogenic Pneumothorax (PSI 6)

### Provider Level Definition (only secondary diagnosis)

Definition	Cases of iatrogenic pneumothorax per 1,000 discharges.
Numerator	Discharges with ICD-9-CM code of 512.1 in any secondary diagnosis field.
Denominator	All medical and surgical discharges defined by specific DRGs. Excluded patients with ICD-9-CM code of 512.1 in the principal diagnosis field. Exclude patients with any diagnosis of trauma. Exclude patients with any code indicating thoracic surgery or lung or pleural biopsy or assigned to cardiac surgery DRGs. Exclude obstetrical patients in MDC 14.
Type of Indicator	Provider level
Empirical Performance	Rate: 0.83 per 1,000 population at risk Bias: Some bias demonstrated
Risk Adjustment	Age, sex, DRG, comorbidity categories

## Iatrogenic Pneumothorax (PSI 22)

### Area Level Definition (principal or secondary diagnosis)

Definition	Cases of iatrogenic pneumothorax per 100,000 population.
Numerator	Discharges with ICD-9-CM code of 512.1 in any diagnosis field (principal or secondary) of medical and surgical discharges defined by specific DRGs. Exclude patients with any diagnosis of trauma. Exclude patients with any code indicating thoracic surgery or lung or pleural biopsy or assigned to cardiac surgery DRGs. Exclude obstetrical patients in MDC 14.
Denominator	Population of county or MSA associated with FIPS code of patient's residence or hospital location.
Type of Indicator	Area level
Empirical Performance	Rate: 102.26 per 100,000 population
Risk Adjustment	No risk adjustment

### Summary

This indicator is intended to flag cases of pneumothorax caused by medical care. This indicator is defined on both a provider level (by including cases of iatrogenic pneumothorax occurring as a secondary diagnosis during hospitalization) and on an area level (by including all cases of iatrogenic pneumothorax).

Iatrogenic pneumothorax excludes all trauma patients because these patients may be more

susceptible to non-preventable iatrogenic pneumothorax or may be miscoded for traumatic pneumothorax. The smaller anatomy of children, especially neonates, may increase the technical complexity of these procedures in this population (however, these procedures are less likely to be performed in unmonitored settings).

### Panel Review

Panelists rated the overall usefulness of this indicator favorably. The denominator of the

definition that the panelists rated was limited to patients receiving a central line, Swan-Ganz catheter, or thorocentesis. However, exploratory empirical analyses found that this definition could not be operationalized using administrative data, as these procedures appeared to be under-reported. Although the panelists noted that this complication, given the definition rated, reflected medical error, the actual final definition of this indicator includes cases that may be less reflective of medical error. Specifically, this indicator includes patients in whom a pneumothorax resulted from barotrauma, including patients with acute respiratory distress syndrome.

Panelists expressed concern that some approaches of placing a central line (e.g., subclavian) may be more likely to result in pneumothorax than other approaches (e.g., internal jugular). However, other complications—such as complications of the carotid artery—would be more common with internal jugular approaches. Thus, if providers simply change approach, they may have a decrease in pneumothorax but an increase in other unmeasured complications.

## Literature Review

The literature review focused on the validity of complication indicators based on ICD-9-CM diagnosis or procedure codes. Results of the literature review indicate no published evidence for the sensitivity or predictive value of this indicator based on detailed chart review or prospective data collection. Sensitivity is the proportion of the patients who suffered an adverse event for whom that event was coded on a discharge abstract or Medicare claim. Predictive value is the proportion of patients with a coded adverse event who were confirmed as having suffered that event.

The project team found no published evidence for this indicator that supports the following constructs: (1) that hospitals that provide better processes of care experience fewer adverse events; (2) that hospitals that provide better overall care experience fewer adverse events; and (3) that hospitals that offer more nursing hours per patient day, better nursing skill mix, better physician skill mix, or more experienced physicians have fewer adverse events.

## Empirical Analysis

The project team conducted extensive empirical analyses on the PSIs. Iatrogenic Pneumothorax generally performs well on several different dimensions, including reliability, bias, relatedness of indicators, and persistence over time.

*Reliability.* The signal ratio—measured by the proportion of the total variation across hospitals that is truly related to systematic differences (signal) in hospital performance rather than random variation (noise)—is moderately high, relative to other indicators, at 79.9%, suggesting that observed differences in risk-adjusted rates may reflect true differences across hospitals.

The signal standard deviation for this indicator is lower than many indicators, at 0.00143, indicating that the systematic differences (signal) among hospitals is low and less likely associated with hospital characteristics. The signal share is lower than many indicators, at 0.00183. The signal share is a measure of the share of total variation (hospital and patient) accounted for by hospitals. The lower the share, the less important the hospital in accounting for the rate and the more important other potential factors (e.g., patient characteristics).

*Minimum bias.* The project team assessed the effect of age, gender, DRG, and comorbidity risk adjustment on the relative ranking of hospitals compared to no risk adjustment. They measured (1) the impact of adjustment on the assessment of relative hospital performance, (2) the relative importance of the adjustment, (3) the impact on hospitals with the highest and lowest rates, and (4) the impact throughout the distribution. The detected bias for Iatrogenic Pneumothorax is moderate, indicating that the measures may or may not be substantially biased based on the characteristics observed.

## Source

This diagnosis code was proposed by Miller et al. as one component of a broader indicator (“iatrogenic conditions”) in the “Patient Safety Indicator Algorithms and Groupings.”<sup>62</sup> It was also included as one component of a broader indicator (“adverse events and iatrogenic complications”) in AHRQ’s Version 1.3 HCUP Quality Indicators.

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<sup>62</sup> Miller M, Elixhauser A, Zhan C, Meyer G. Patient safety indicators: Using administrative data to identify potential patient safety concerns. *Health Services Research* 2001;36(6 Part II):110-132.

## Selected Infections Due to Medical Care (PSI 7)

### Provider Level Definition (only secondary diagnosis)

Definition	Cases of ICD-9-CM codes 9993 or 99662 per 1,000 discharges.
Numerator	Discharges with ICD-9-CM code of 9993 or 99662 in any secondary diagnosis field.
Denominator	All medical and surgical discharges defined by specific DRGs. Exclude patients with ICD-9-CM code of 9993 or 99662 in the principal diagnosis field. Exclude patients with any diagnosis code for immunocompromised state or cancer.
Type of Indicator	Provider level
Empirical Performance	Rate: 1.99 per 1,000 population at risk Bias: Some bias demonstrated
Risk Adjustment	Age, sex, DRG, comorbidity categories

## Selected Infections Due to Medical Care (PSI 23)

### Area Level Definition (principal or secondary diagnosis)

Definition	Cases of ICD-9-CM codes 9993 or 99662 per 100,000 population.
Numerator	Discharges with ICD-9-CM code of 9993 or 99662 in any diagnosis field (principal or secondary) of medical and surgical discharges defined by specific DRGs. Exclude patients with any diagnosis code for immunocompromised state or cancer.
Denominator	Population of county or MSA associated with FIPS code of patient's residence or hospital location.
Type of Indicator	Area level
Empirical Performance	Rate: 382.86 per 100,000 population
Risk Adjustment	No risk adjustment

### Summary

This indicator is intended to flag cases of infection due to medical care, primarily those related to intravenous (IV) lines and catheters. This indicator is defined both on a provider level (by including cases based on secondary diagnosis associated with the same hospitalization) and on an area level (by including all cases of such infection). Patients with potential immunocompromised states (e.g., AIDS, cancer, transplant) are excluded, as they may be more susceptible to such infection.

This indicator includes children and neonates. It should be noted that high-risk neonates are at particularly high risk for catheter-related infections.

### Panel Review

Panelists expressed particular interest in tracking IV and catheter-related infections, despite the potential for bias due to charting or under-reporting. For the most part, they felt that these complications were important to track. As with other indicators tracking infections, concern

regarding the potential overuse of prophylactic antibiotics remains.

## Literature Review

The literature review focused on the validity of complication indicators based on ICD-9-CM diagnosis or procedure codes. Results of the literature review indicate no published evidence for the sensitivity or predictive value of this indicator based on detailed chart review or prospective data collection. Sensitivity is the proportion of the patients who suffered an adverse event for whom that event was coded on a discharge abstract or Medicare claim. Predictive value is the proportion of patients with a coded adverse event who were confirmed as having suffered that event.

The project team found no published evidence for this indicator that supports the following constructs: (1) that hospitals that provide better processes of care experience fewer adverse events; (2) that hospitals that provide better overall care experience fewer adverse events; and (3) that hospitals that offer more nursing hours per patient day, better nursing skill mix, better physician skill mix, or more experienced physicians have fewer adverse events.

## Empirical Analysis

The project team conducted extensive empirical analyses on the PSIs. Selected Infections Due to Medical Care generally performs well on several different dimensions, including reliability, bias, relatedness of indicators, and persistence over time.

*Reliability.* The signal ratio—measured by the proportion of the total variation across hospitals that is truly related to systematic differences (signal) in hospital performance rather than random variation (noise)—is moderately high, relative to other indicators, at 70.8%, suggesting that observed differences in risk-adjusted rates may reflect true differences across hospitals.

The signal standard deviation for this indicator is lower than many indicators, at 0.00134, indicating that the systematic differences (signal) among hospitals is low and less likely associated with hospital characteristics. The signal share is lower than many indicators, at 0.00095. The signal share is a measure of the share of total variation (hospital and patient) accounted for by hospitals. The lower the share,

the less important the hospital in accounting for the rate and the more important other potential factors (e.g., patient characteristics).

*Minimum bias.* The project team assessed the effect of age, gender, DRG, and comorbidity risk adjustment on the relative ranking of hospitals compared to no risk adjustment. They measured (1) the impact of adjustment on the assessment of relative hospital performance, (2) the relative importance of the adjustment, (3) the impact on hospitals with the highest and lowest rates, and (4) the impact throughout the distribution. The detected bias for Selected Infections Due to Medical Care is moderate, indicating that the measures may or may not be substantially biased based on the characteristics observed. (It is possible that characteristics that are not observed using administrative data may be related to the patient's risk of experiencing an adverse event.)

## Source

This indicator was originally proposed by Iezzoni et al. as part of the Complications Screening Program (CSP 11, "miscellaneous complications").<sup>63</sup> The University HealthSystem Consortium adopted the CSP indicator for major (#2933) and minor (#2961) surgery patients. A much narrower definition, including only 9993 ("other infection after infusion, injection, transfusion, vaccination"), was proposed by Miller et al. in the "Patient Safety Indicator Algorithms and Groupings."<sup>64</sup> The American Nurses Association and its State associations have identified the number of laboratory-confirmed bacteremic episodes associated with central lines per critical care patient day as a "nursing-sensitive quality indicator for acute care settings."<sup>65</sup>

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<sup>63</sup> Iezzoni LI, Daley J, Heeren T, Foley SM, Fisher ES, Duncan C, et al. Identifying complications of care using administrative data. *Med Care* 1994;32(7):700-15.

<sup>64</sup> Miller M, Elixhauser A, Zhan C, Meyer G. Patient safety indicators: Using administrative data to identify potential patient safety concerns. *Health Services Research* 2001;36(6 Part II):110-132.

<sup>65</sup> Nursing-Sensitive Quality Indicators for Acute Care Settings and ANA's Safety and Quality Initiative. In: American Nurses Association; 1999.

## Postoperative Hip Fracture (PSI 8)

Definition	Cases of in-hospital hip fracture per 1,000 surgical discharges with an operating room procedure.
Numerator	Discharges with ICD-9-CM code for hip fracture in any secondary diagnosis field.
Denominator	All surgical discharges defined by specific DRGs and an ICD-9-CM code for an operating room procedure.  Exclude patients with ICD-9-CM code for hip fracture in the principal diagnosis field, cases where the only operating room procedure is hip fracture repair, or where a procedure for hip fracture repair occurs before the first operating room procedure.  <i>Note: If day of procedure is not available in the input data file, the rate may be slightly lower than if the information was available.</i>  Exclude all patients with diseases and disorders of the musculoskeletal system and connective tissue (MDC 8); patients with principal diagnosis codes for seizure, syncope, stroke, coma, cardiac arrest, anoxic brain injury, poisoning, delirium or other psychoses, or trauma; with any diagnosis of metastatic cancer, lymphoid malignancy, bone malignancy or self-inflicted injury; obstetrical patients in MDC 14; or patients 17 years of age or younger.
Type of Indicator	Provider level
Empirical Performance	Rate: 0.30 per 1,000 population at risk Bias: Some bias demonstrated
Risk Adjustment	Age, sex, DRG, comorbidity categories

### Summary

This indicator is intended to capture cases of in-hospital fracture—specifically, hip fractures. This indicator limits diagnosis codes to secondary diagnosis codes to eliminate fractures that were present on admission. It further excludes patients in MDC 8 (musculoskeletal disorders) and patients with indications for trauma or cancer, or principal diagnoses of seizure, syncope, stroke, coma, cardiac arrest, or poisoning, as these patients may have a fracture present on admission. This indicator is limited to surgical cases since previous research suggested that these codes in medical patients often represent conditions present on admission (see Literature Review).

### Panel Review

Although this indicator was initially presented as "In-hospital hip fracture and fall," panelists unanimously suggested that falls should be eliminated from this indicator and that all in-hospital fractures should be included. The

resulting indicator was termed "In-hospital fracture possibly related to falls." Children were excluded after empirical analysis revealed that they did not have a substantial number of cases in the numerator.

Panelists noted that this indicator may be slightly biased for hospitals that care for more of the elderly and frail, because they have weaker bones and are more susceptible to falls.

Panelists were interested in capturing all fractures occurring in-hospital, although it was not possible to operationalize this suggestion.

### Literature Review

*Coding validity.* The original CSP definition had an adequate confirmation rate among major surgical cases in Medicare inpatient claims files (57% by coders' review, 71% by physicians' review), but a very poor confirmation rate among medical cases (11% by both coders' and

physicians' review).<sup>66 67</sup> This problem was attributable to the fact that most hip fractures among medical inpatients were actually comorbid diagnoses present at admission rather than complications of hospital care. Nurse reviews were not performed.

*Construct validity.* Explicit process of care failures in the CSP validation study were relatively frequent among cases with CSP 25 (76% of major surgery patients, 54% of medical patients), after excluding patients who had hip fractures at admission, but unflagged controls were not evaluated on the same criteria.<sup>68</sup> Physician reviewers identified potential quality problems in 24% of major surgery patients and 5% of medical patients with CSP 25 (versus 2% of unflagged controls for each risk group).<sup>69</sup>

### Empirical Analysis

The project team conducted extensive empirical analyses on the PSIs. Postoperative Hip Fracture generally performs well on several different dimensions, including reliability, bias, relatedness of indicators, and persistence over time.

*Reliability.* The signal ratio—measured by the proportion of the total variation across hospitals that is truly related to systematic differences (signal) in hospital performance rather than random variation (noise)—is moderately high, relative to other indicators, at 67.1%, suggesting that observed differences in risk-adjusted rates may reflect true differences across hospitals.

The signal standard deviation for this indicator is lower than many indicators, at 0.00184, indicating that the systematic differences (signal) among hospitals is low and less likely

<sup>66</sup> Lawthers A, McCarthy E, Davis R, Peterson L, Palmer R, Iezzoni L. Identification of in-hospital complications from claims data: Is it valid? *Med Care* 2000;38(8):785-795.

<sup>67</sup> Weingart SN, Iezzoni LI, Davis RB, Palmer RH, Cahalane M, Hamel MB, et al. Use of administrative data to find substandard care: Validation of the Complications Screening Program. *Med Care* 2000;38(8):796-806.

<sup>68</sup> Iezzoni LI, Davis RB, Palmer RH, Cahalane M, Hamel MB, Mukamal K, et al. Does the Complications Screening Program flag cases with process of care problems: Using explicit criteria to judge processes. *Int J Qual Health Care* 1999;11(2):107-18.

<sup>69</sup> Weingart et al. 2000.

associated with hospital characteristics. The signal share is lower than many indicators, at 0.00403. The signal share is a measure of the share of total variation (hospital and patient) accounted for by hospitals. The lower the share, the less important the hospital in accounting for the rate and the more important other potential factors (e.g., patient characteristics).

*Minimum bias.* The project team assessed the effect of age, gender, DRG, and comorbidity risk adjustment on the relative ranking of hospitals compared to no risk adjustment. They measured (1) the impact of adjustment on the assessment of relative hospital performance, (2) the relative importance of the adjustment, (3) the impact on hospitals with the highest and lowest rates, and (4) the impact throughout the distribution. The detected bias for Postoperative Hip Fracture is moderate, indicating that the measures may or may not be substantially biased based on the characteristics observed. (It is possible that characteristics that are not observed using administrative data may be related to the patient's risk of experiencing an adverse event.)

### Source

This indicator was originally proposed by Iezzoni et al.<sup>70</sup> as part of the Complications Screening Program (CSP 25, "in-hospital hip fracture or fall"). Their definition also includes any documented fall, based on external cause of injury codes. Needleman and Buerhaus considered in-hospital hip fracture as an "Outcome Potentially Sensitive to Nursing," but discarded it because the "event rate was too low to be useful."<sup>71</sup> The American Nurses Association, its State associations, and the California Nursing Outcomes Coalition have identified the number of patient falls leading to injury per 1,000 patient days (based on clinical data collection) as a "nursing-sensitive quality indicator for acute care settings."<sup>72</sup>

<sup>70</sup> Iezzoni LI, Daley J, Heeren T, Foley SM, Fisher ES, Duncan C, et al. Identifying complications of care using administrative data. *Med Care* 1994;32(7):700-15.

<sup>71</sup> Needleman J, Buerhaus PI, Mattke S, Stewart M, Zelevinsky K. *Nurse Staffing and Patient Outcomes in Hospitals*. Boston, MA: Health Resources Services Administration; 2001 February 28. Report No.: 230-99-0021.

<sup>72</sup> *Nursing-Sensitive Quality Indicators for Acute Care Settings and ANA's Safety & Quality Initiative*. In: American Nurses Association; 1999.

## Postoperative Hemorrhage or Hematoma (PSI 9)

Definition	Cases of hematoma or hemorrhage requiring a procedure per 1,000 surgical discharges with an operating room procedure.
Numerator	Discharges with ICD-9-CM codes for postoperative hemorrhage or postoperative hematoma in any secondary diagnosis field and code for postoperative control of hemorrhage or drainage of hematoma (respectively) in any procedure code field.
Denominator	All surgical discharges defined by specific DRGs and an ICD-9-CM code for an operating room procedure.  Exclude patients with ICD-9-CM codes for postoperative hemorrhage or postoperative hematoma in the principal diagnosis field  Exclude patients where the only operating room procedure is postoperative control of hemorrhage or drainage of hematoma.  Exclude patients where a procedure for postoperative control of hemorrhage or drainage of hematoma occurs before the first operating room procedure.  <i>Note: If day of procedure is not available in the input data file, the rate may be slightly lower than if the information was available.</i>  Exclude obstetrical patients in MDC 14.
Type of Indicator	Provider level
Empirical Performance	Rate: 2.03 per 1,000 population at risk Bias: Not detected in empirical tests
Risk Adjustment	Age, sex, DRG, comorbidity categories

### Summary

This indicator is intended to capture cases of hemorrhage or hematoma following a surgical procedure. This indicator limits hemorrhage and hematoma codes to secondary procedure and diagnosis codes, respectively, to isolate those hemorrhages that can truly be linked to a surgical procedure.

### Panel Review

Panelists noted that some patients may be at higher risk for developing a postoperative hemorrhage or hematoma. Specifically, they were concerned about patients with coagulopathies and those on anticoagulants. They suggested that where possible, this indicator be stratified for patients with underlying clotting differences. They also noted that patients admitted for trauma may be at a higher risk for developing postoperative hemorrhage or may have a hemorrhage diagnosed that occurred during the trauma. They also

suggested that this indicator be stratified for trauma and non-trauma patients.

### Literature Review

*Coding validity.* The original CSP definition had a relatively high confirmation rate among major surgical cases (83% by coders' review, 57% by physicians' review, 52% by nurse-abstracted clinical documentation, and 76% if nurses also accepted physicians' notes as adequate documentation).<sup>73 74 75</sup> Hartz and Kuhn estimated

<sup>73</sup> Lawthers A, McCarthy E, Davis R, Peterson L, Palmer R, Iezzoni L. Identification of in-hospital complications from claims data: Is it valid? *Med Care* 2000;38(8):785-795.

<sup>74</sup> McCarthy EP, Iezzoni LI, Davis RB, Palmer RH, Cahalane M, Hamel MB, et al. Does clinical evidence support ICD-9-CM diagnosis coding of complications? *Med Care* 2000;38(8):868-876.

<sup>75</sup> Weingart SN, Iezzoni LI, Davis RB, Palmer RH, Cahalane M, Hamel MB, et al. Use of administrative data to find substandard care: Validation of the

the validity of hemorrhage codes using a gold standard based on transfusion “requirement.”<sup>76</sup> They identified only 26% of episodes of bleeding (defined as requiring return to surgery or transfusion of at least six units of blood products) by applying this indicator (9981) to Medicare patients who underwent coronary artery bypass surgery; the predictive value was 75%.

**Construct Validity.** Explicit process of care failures in the CSP validation study were relatively frequent among major surgical cases with CSP 24, but not among medical cases (66% and 13%, respectively), after excluding patients who had hemorrhage or hematoma at admission.<sup>77</sup> Cases flagged on this indicator and unflagged controls did not differ significantly on a composite of 17 generic process criteria. Similarly, cases flagged on this indicator and unflagged controls did not differ significantly on a composite of four specific process criteria for major surgical cases and two specific process criteria for medical cases in the earlier study of elderly Medicare beneficiaries.<sup>78</sup>

## Empirical Analysis

The project team conducted extensive empirical analyses on the PSIs. Postoperative Hemorrhage or Hematoma generally performs well on several different dimensions, including reliability, bias, relatedness of indicators, and persistence over time.

**Reliability.** The signal ratio—measured by the proportion of the total variation across hospitals that is truly related to systematic differences (signal) in hospital performance rather than random variation (noise)—is lower than most

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Complications Screening Program. *Med Care* 2000;38(8):796-806.

<sup>76</sup> Hartz AJ, Kuhn EM. Comparing hospitals that perform coronary artery bypass surgery: The effect of outcome measures and data sources. *Am J Public Health* 1994;84(10):1609-14.

<sup>77</sup> Iezzoni LI, Davis RB, Palmer RH, Cahalane M, Hamel MB, Mukamal K, et al. Does the complications Screening Program flag case with process of care problems? Using explicit criteria to judge processes. *Int J Qual Health Care* 1999;11(2):107-18.

<sup>78</sup> Iezzoni L, Lawthers A, Petersen L, McCarthy E, Palmer R, Cahalane M, et al. Project to validate the Complications Screening Program: Health Care Financing Administration; 1998 March 31. Report No: HCFA Contract 500-94-0055.

indicators, at 8.6%, suggesting that observed differences in risk-adjusted rates may not reflect true differences across hospitals.

The signal standard deviation for this indicator is lower than most indicators, at 0.00039, indicating that the systematic differences (signal) among hospitals is low and less likely associated with hospital characteristics. The signal share is lower than many indicators, at 0.00006. The signal share is a measure of the share of total variation (hospital and patient) accounted for by hospitals. The lower the share, the less important the hospital in accounting for the rate and the more important other potential factors (e.g., patient characteristics).

**Minimum bias.** The project team assessed the effect of age, gender, DRG, and comorbidity risk adjustment on the relative ranking of hospitals compared to no risk adjustment. They measured (1) the impact of adjustment on the assessment of relative hospital performance, (2) the relative importance of the adjustment, (3) the impact on hospitals with the highest and lowest rates, and (4) the impact throughout the distribution. The detected bias for Postoperative Hemorrhage or Hematoma is low, indicating that the measures are likely not biased based on the characteristics observed. (It is possible that characteristics that are not observed using administrative data may be related to the patient's risk of experiencing an adverse event.)

## Source

This indicator was originally proposed by Iezzoni et al.<sup>79</sup> as part of the Complications Screening Program (CSP 24, “post-procedural hemorrhage or hematoma”), although their definition allowed either procedure or diagnosis codes. By contrast, the current definition requires a hemorrhage or hematoma diagnosis with an associated procedure to either control the hemorrhage or drain the hematoma. It was also included as one component of a broader indicator (“adverse events and iatrogenic complications”) in AHRQ's original HCUP Quality Indicators.<sup>80</sup>

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<sup>79</sup> Iezzoni LI, Daley J, Heeren T, Foley SM, Fisher ES, Duncan C, et al. Identifying complications of care using administrative data. *Med Care* 1994;32(7):700-15.

<sup>80</sup> Johantgen M, Elixhauser A, Bali JK, Goldfarb M, Harris DR. Quality indicators using hospital discharge data: State and national applications. *Jt Comm J Qual Improv* 1998;24(2):88-105. Published erratum appears in *Jt Comm J Qual Improv* 1998;24(6):341.

## Postoperative Physiologic and Metabolic Derangement (PSI 10)

Definition	Cases of specified physiological or metabolic derangement per 1,000 elective surgical discharges with an operating room procedure.
Numerator	Discharges with ICD-9-CM codes for physiologic and metabolic derangements in any secondary diagnosis field.  Discharges with acute renal failure (subgroup of physiologic and metabolic derangements) must be accompanied by a procedure code for dialysis (3995, 5498).
Denominator	All elective* surgical discharges defined by specific DRGs and an ICD-9-CM code for an operating room procedure. *Defined by admit type.  Exclude patients with ICD-9-CM codes for physiologic and metabolic derangements in the principal diagnosis field,  Exclude patients with acute renal failure where a procedure for dialysis occurs before or on the same day as the first operating room procedure.  <i>Note: If day of procedure is not available in the input data file, the rate may be slightly lower than if the information was available.</i>  Exclude patients with both a diagnosis code of ketoacidosis, hyperosmolarity, or other coma (subgroups of physiologic and metabolic derangements coding) <b>and</b> a principal diagnosis of diabetes.  Exclude patients with both a secondary diagnosis code for acute renal failure (subgroup of physiologic and metabolic derangements coding) <b>and</b> a principal diagnosis of acute myocardial infarction, cardiac arrhythmia, cardiac arrest, shock, hemorrhage, or gastrointestinal hemorrhage.  Exclude obstetrical patients in MDC 14.
Type of Indicator	Provider level
Empirical Performance	Rate: 0.54 per 1,000 population at risk Bias: Some bias demonstrated
Risk Adjustment	Age, sex, DRG, comorbidity categories

### Summary

This indicator is intended to flag cases of postoperative metabolic or physiologic complications. The population at risk is limited to elective surgical patients, because patients undergoing non-elective surgery may develop less preventable derangements. In addition, each diagnosis has specific exclusions, designed to reduce the number of flagged cases in which the diagnosis was present on admission or was more likely to be non-preventable.

### Panel Review

Panelists expressed concern that acute renal failure suffers from the problem of varied definition: what one doctor may call acute renal failure, another may not. To ensure that the only

renal failure cases that are picked up are those that are clinically severe, the panel suggested that acute renal failure be included only when it is paired with a procedure code for dialysis.

Panelists noted that coding of relatively transient metabolic and physiologic complications may be lacking, such as in cases of diabetic ketoacidosis. Conversely, some physicians may capture non-clinically significant events in this indicator.

This indicator includes pediatric patients, which was not specifically discussed by the panel. The incidence of these complications is a function of the underlying prevalence of diabetes and renal impairment, which are less common among children than among adults.

## Literature Review

**Coding validity.** No evidence on validity is available from CSP studies. Geraci et al.<sup>81</sup> confirmed only 5 of 15 episodes of acute renal failure and 12 of 34 episodes of hypoglycemia reported on discharge abstracts of VA patients hospitalized for CHF, COPD, or diabetes. Romano reported no false positives in episodes of acute renal failure or hypoglycemia using discharge abstracts of diskectomy patients.<sup>82</sup> ICD-9-CM diagnoses (585 or 7885) had a sensitivity of 8% and a predictive value of 4% in comparison with the VA's National Surgical Quality Improvement Program database, which defines renal failure as requiring dialysis within 30 days after surgery.<sup>83</sup>

**Construct Validity.** After adjusting for patient demographic, geographic, and hospital characteristics, Hannan et al. reported that cases with a secondary diagnosis of fluid and electrolyte disorders were no more likely to have received care that departed from professionally recognized standards than cases without that code (2.2% versus 1.7%, OR=1.13).<sup>84</sup> However, these ICD-9-CM codes were omitted from the accepted AHRQ PSIs.

## Empirical Evidence

The project team conducted extensive empirical analyses on the PSIs. Postoperative Physiologic and Metabolic Derangement generally performs

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<sup>81</sup> Geraci JM, Ashton CM, Kuykendall DH, Johnson ML, Wu L. International Classification of Diseases, 9<sup>th</sup> Revision, Clinical Modification codes in discharge abstracts are poor measures of complication occurrence in medical inpatients. *Med Care* 1997;35(6):589-602.

<sup>82</sup> Romano P. Can administrative data be used to ascertain clinically significant postoperative complications. *American Journal of Medical Quality* Press.

<sup>83</sup> Best W, Khuri S, Phelan M, Hur K, Henderson W, Demakis J, et al. Identifying patient preoperative risk factors and postoperative adverse events in administrative databases: Results from the Department of Veterans Affairs National Surgical Quality Improvement Program. *J Am Coll Surg* 2002;194(3):257-266.

<sup>84</sup> Hannan EL, Bernard HR, O'Donnell JF, Kilburn H, Jr. A methodology for targeting hospital cases for quality of care record reviews. *Am J Public Health* 1989;79(4):430-6.

well on several different dimensions, including reliability, bias, relatedness of indicators, and persistence over time.

**Reliability.** The signal ratio—measured by the proportion of the total variation across hospitals that is truly related to systematic differences (signal) in hospital performance rather than random variation (noise)—is lower than many indicators, at 20.9%, suggesting that observed differences in risk-adjusted rates may not reflect true differences across hospitals.

The signal standard deviation for this indicator is lower than many indicators, at 0.00054, indicating that the systematic differences (signal) among hospitals is low and less likely associated with hospital characteristics. The signal share is lower than many indicators, at 0.00033. The signal share is a measure of the share of total variation (hospital and patient) accounted for by hospitals. The lower the share, the less important the hospital in accounting for the rate and the more important other potential factors (e.g., patient characteristics).

**Minimum bias.** The project team assessed the effect of age, gender, DRG, and comorbidity risk adjustment on the relative ranking of hospitals compared to no risk adjustment. They measured (1) the impact of adjustment on the assessment of relative hospital performance, (2) the relative importance of the adjustment, (3) the impact on hospitals with the highest and lowest rates, and (4) the impact throughout the distribution. The detected bias for Postoperative Physiologic and Metabolic Derangement is moderate, indicating that the measures may or may not be substantially biased based on the characteristics observed. (It is possible that characteristics that are not observed using administrative data may or may not be related to the patient's risk of experiencing an adverse event.)

## Source

This indicator was originally proposed by Iezzoni et al.<sup>85</sup> as part of the CSP (CSP 20, "postoperative physiologic and metabolic derangements"). The University HealthSystem Consortium adopted the CSP indicator for major surgery patients (#2945).

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<sup>85</sup> Iezzoni LI, Daley J, Heeren T, Foley SM, Fisher ES, Duncan C, et al. Identifying complications of care using administrative data. *Med Care* 1994;32(7):700-15.

## Postoperative Respiratory Failure (PSI 11)

Definition	Cases of acute respiratory failure per 1,000 elective surgical discharges with an operating room procedure.
Numerator	Discharges with ICD-9-CM codes for acute respiratory failure (518.81) in any secondary diagnosis field (After 1999, include 518.84).
Denominator	All elective* surgical discharges defined by specific DRGs and an ICD-9-CM code for an operating room procedure. *Defined by admit type. Exclude patients with ICD-9-CM codes for acute respiratory failure in the principal diagnosis field, Exclude patients where a procedure for tracheostomy is the only operating room procedure. Exclude patients where a procedure for tracheostomy occurs before the first operating room procedure. <i>Note: If day of procedure is not available in the input data file, the rate may be slightly lower than if the information was available.</i> Exclude patients with respiratory or circulatory diseases (MDC 4 and MDC 5). Exclude obstetrical patients in MDC 14.
Type of Indicator	Provider level
Empirical Performance	Rate: 3.44 per 1,000 population at risk Bias: Substantial bias; should be risk-adjusted
Risk Adjustment	Age, sex, DRG, comorbidity categories

### Summary

This indicator is intended to flag cases of postoperative respiratory failure. This indicator limits the code for respiratory failure to secondary diagnosis codes to eliminate respiratory failure that was present on admission. It further excludes patients who have major respiratory or circulatory disorders and limits the population at risk to elective surgery patients.

### Panel Review

Panelists rated the overall usefulness of this indicator as relatively favorable. They felt that only acute respiratory failure should be retained in this indicator and noted that this clinically significant event is at least partially preventable.

### Literature Review

*Coding Validity.* CSP 3 had a relatively high confirmation rate among major surgical cases in the FY1994 Medicare inpatient claims files from California and Connecticut (72% by coders'

review, 75% by physicians' review).<sup>86 87</sup> Nurse reviews were not performed.

Geraci et al. confirmed 1 of 2 episodes of respiratory failure reported on discharge abstracts of VA patients hospitalized for CHF or diabetes; the sensitivity for respiratory decompensation requiring mechanical ventilation was 25%.<sup>88</sup>

<sup>86</sup> Lawthers a, McCarthy E, Davis R, Peterson L, Palmer R, Iezzoni L. Identification of in-hospital complications from claims data: is it valid? *Med Care* 2000;38(8):785-795.

<sup>87</sup> Weingart SN, Iezzoni LI, Davis RB, Palmer RH, Cahalane M, Hamel MB, et al. Use of administrative data to find substandard care: Validation of the Complications Screening Program. *Med Care* 2000;38(8):796-806.

<sup>88</sup> Geraci JM, Ashton CM, Kuykendall DH, Johnson ML, Wu L. In-hospital complications among survivors of admission for congestive heart failure, chronic obstructive pulmonary disease, or diabetes mellitus. *J Gen Intern Med* 1995;10(6):307-14.

**Construct Validity.** Explicit process of care failures in the CSP validation study were slightly but not significantly more frequent among major surgical cases with CSP 3 than among unflagged controls (52% versus 46%).<sup>89</sup> Indeed, cases flagged on this indicator were significantly less likely than unflagged controls (24% versus 64%) to have at least one of four specific process-of-care problems in the earlier study of elderly Medicare beneficiaries.<sup>90</sup>

Needleman and Buerhaus found that nurse staffing was independent of the occurrence of pulmonary failure among major surgery patients.<sup>91</sup> However, Kovner and Gergen reported that having more registered nurse hours per adjusted patient day was associated with a lower rate of “pulmonary compromise” after major surgery.<sup>92</sup>

### Empirical Analysis

The project team conducted extensive empirical analyses on the PSIs. Postoperative Respiratory Failure generally performs well on several different dimensions, including reliability, bias, relatedness of indicators, and persistence over time.

**Reliability.** The signal ratio—measured by the proportion of the total variation across hospitals that is truly related to systematic differences (signal) in hospital performance rather than random variation (noise)—is lower than many indicators, at 46.6%, suggesting that observed differences in risk-adjusted rates may not reflect true differences across hospitals.

The signal standard deviation for this indicator is lower than many indicators, at 0.00230, indicating that the systematic differences (signal) among hospitals is low and less likely associated with hospital characteristics. The signal share is lower than many indicators, at 0.00187. The signal share is a measure of the share of total variation (hospital and patient) accounted for by hospitals. The lower the share, the less important the hospital in accounting for the rate and the more important other potential factors (e.g., patient characteristics).

**Minimum bias.** The project team assessed the effect of age, gender, DRG, and comorbidity risk adjustment on the relative ranking of hospitals compared to no risk adjustment. They measured (1) the impact of adjustment on the assessment of relative hospital performance, (2) the relative importance of the adjustment, (3) the impact on hospitals with the highest and lowest rates, and (4) the impact throughout the distribution. The detected bias for Postoperative Respiratory Failure is high, indicating that the measures likely are biased based on the characteristics observed. (It is possible that characteristics that are not observed using administrative data may be related to the patient’s risk of experiencing an adverse event.) Risk adjustment is important for this indicator.

### Source

This indicator was originally proposed by Iezzoni et al. as part of the CSP (CSP 3, “postoperative pulmonary compromise”).<sup>93</sup> Their definition also includes pulmonary congestion, other (or postoperative) pulmonary insufficiency, and acute pulmonary edema, which were omitted from this PSI. The University HealthSystem Consortium (#2927) and AHRQ’s original HCUP Quality Indicators adopted the CSP indicator for major surgery patients.<sup>94</sup> Needleman and Buerhaus identified postoperative pulmonary failure as an “Outcome Potentially Sensitive to Nursing,” using the original CSP definition.<sup>95</sup>

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<sup>89</sup> Iezzoni LI, Davis RB, Palmer RH, Cahalane M, Hamel MB, Mukamal K, et al. Does the Complications Screening Program flag cases with process of care problems? Using explicit criteria to judge processes. *Int J Qual Health Care* 1999;11(2):107-18.

<sup>90</sup> Hawker GA, Coyte PC, Wright JG, Paul JE, Bombardier C. Accuracy of administrative data for assessing outcomes after knee replacement surgery. *J. Clin Epidemiol* 1997;50(3):265-73.

<sup>91</sup> Needleman J, Buerhaus PI, Mattke S, Stewart M, Zelevinsky K. *Nurse Staffing and Patient Outcomes in Hospitals*. Boston, MA: Health Resources Services Administration; 2001 February 28. Report No.:230-99-0021.

<sup>92</sup> Kovner C, Gergen PJ. Nurse staffing levels and adverse events following surgery in U.S. hospitals. *Image J Nurs Sch* 1998;30(4):315-21.

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<sup>93</sup> Iezzoni LI, Daley J, Heeren T, Foley SM, Fisher ES, Duncan C, et al. Identifying complications of care using administrative data. *Med Care* 1994;32(7):700-15.

<sup>94</sup> Johantgen M, Elixhauser A, Bali JK, Goldfarb M, Harris DR. Quality indicators using hospital discharge data: State and national applications. *Jt Comm J Qual Improv* 1998;24(2):88-195. Published erratum appears in *Jt Comm J Qual Improv* 1998;24(6):341.

<sup>95</sup> Needleman et al. 2001.

## Postoperative Pulmonary Embolism or Deep Vein Thrombosis (PSI 12)

Definition	Cases of deep vein thrombosis (DVT) or pulmonary embolism (PE) per 1,000 surgical discharges with an operating room procedure.
Numerator	Discharges with ICD-9-CM codes for deep vein thrombosis or pulmonary embolism in any secondary diagnosis field.
Denominator	All surgical discharges defined by specific DRGs and an ICD-9-CM code for an operating room procedure.  Exclude patients with ICD-9-CM codes for deep vein thrombosis or pulmonary embolism in the principal diagnosis field.  Exclude patients where a procedure for interruption of vena cava is the only operating room procedure  Exclude patients where a procedure for interruption of vena cava occurs before or on the same day as the first operating room procedure.  <i>Note: If day of procedure is not available in the input data file, the rate may be slightly lower than if the information was available.</i>  Exclude obstetrical patients in MDC 14.
Type of Indicator	Provider level
Empirical Performance	Rate: 7.08 per 1,000 population at risk Bias: Substantial bias; should be risk-adjusted
Risk Adjustment	Age, sex, DRG, comorbidity categories

### Summary

This indicator is intended to capture cases of postoperative venous thromboses and embolism—specifically, pulmonary embolism and deep venous thrombosis. This indicator limits vascular complications codes to secondary diagnosis codes to eliminate complications that were present on admission. It further excludes patients who have principal diagnosis of DVT, as these patients are likely to have had PE/DVT present on admission.

### Panel Review

Panelists rated the overall usefulness of this indicator relatively highly as compared to other indicators. They noted that preventative techniques should decrease the rate of this indicator. This indicator includes pediatric patients. In the absence of specific thrombophilic disorders, postoperative thromboembolic complications in children are most likely to be secondary to venous catheters rather than venous stasis in the lower extremities.

Because the risk for DVT/PE varies greatly according to the type of procedure performed,

panelists suggested that this indicator be adjusted or stratified according to surgical procedure types.

### Literature Review

*Coding validity.* Geraci et al. confirmed only 1 of 6 episodes of DVT or PE reported on discharge abstracts of VA patients for CHF, COPD, or diabetes; the sensitivity was 100%.<sup>96</sup> Among Medicare hip fracture patients, by contrast, Keeler et al. confirmed 88% of reported PE cases, and failed to ascertain just 6 cases (65% sensitivity) using ICD-9-CM codes.<sup>97</sup> For DVT, they found just 1 of 6 cases using ICD-9-CM codes (but no false positive codes). Other studies have demonstrated that ICD-9-CM codes for DVT and PE have high predictive value when listed as the principal

<sup>96</sup> Geraci JM, Ashton CM, Kuykendall DH, Johnson ML, Wu L. In-hospital complications among survivors of admission for congestive heart failure, chronic obstructive pulmonary disease, or diabetes mellitus. *J Gen Intern Med* 1995;10(6):307-14.

<sup>97</sup> Keeler E, Kahn K, Bentow S. Assessing quality of care for hospitalized Medicare patients with hip fracture using coded diagnoses from the Medicare Provider Analysis and Review File. Springfield, VA: NTIS;1991.

diagnosis for readmissions after major orthopedic surgery (100%) or after inferior vena cava filter placement (98%).<sup>98</sup> However, these findings do not directly address the validity of DVT/PE as a secondary diagnosis among patients treated by anticoagulation.

*Construct validity.* Explicit process of care failures in the CSP validation study were relatively frequent among both major surgical and medical cases with CSP 22 (72% and 69%, respectively), after disqualifying cases in which DVT/PE was actually present at admission.<sup>99</sup> Needleman and Buerhaus found that nurse staffing was independent of the occurrence of DVT/PE among both major surgical or medical patients.<sup>100</sup> However, Kovner and Gergen reported that having more registered nurse hours and non-RN hours was associated with a lower rate of DVT/PE after major surgery.<sup>101</sup>

## Empirical Analysis

The project team conducted extensive empirical analyses on the PSIs. Postoperative PE or DVT generally performs well on several different dimensions, including reliability, bias, relatedness of indicators, and persistence over time.

*Reliability.* The signal ratio—measured by the proportion of the total variation across hospitals that is truly related to systematic differences (signal) in hospital performance rather than random variation (noise)—is moderately high, relative to other indicators, at 72.6%, suggesting that observed differences in risk-adjusted rates likely reflect true differences across hospitals.

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<sup>98</sup> White RH, Romano P, Zhou H, Rodrigo J, Barger W. Incidence and time course of thromboembolic outcomes following total hip or knee arthroplasty. *Arch Intern Med* 1998;158(14):1525-31.

<sup>99</sup> Iezzoni LI, Davis RB, Palmer RH, Cahalane M, Hamel MB, Mukamal K, et al. Does the Complications Screening Program flag cases with process of care problems? Using explicit criteria to judge processes. *Int J Qual Health Care* 1999;11(2):107-18.

<sup>100</sup> Needleman J, Buerhaus PI, Mattke S, Stewart M, Zelevinsky K. *Nurse Staffing and Patient Outcomes in Hospitals*. Boston, MA: Health Resources Services Administration; 2001 February 28. Report No.:230-99-0021.

<sup>101</sup> Kovner C, Gergen PH. Nurse staffing levels and adverse events following surgery in U.S. hospitals. *Image J Nurs Sch* 1998;30(4):315-21.

The signal standard deviation for this indicator is lower than many indicators, at 0.00633, indicating that the systematic differences (signal) among hospitals is low and less likely associated with hospital characteristics. The signal share is lower than many indicators, at 0.00511. The signal share is a measure of the share of total variation (hospital and patient) accounted for by hospitals. The lower the share, the less important the hospital in accounting for the rate and the more important other potential factors (e.g., patient characteristics).

*Minimum bias.* The project team assessed the effect of age, gender, DRG, and comorbidity risk adjustment on the relative ranking of hospitals compared to no risk adjustment. They measured (1) the impact of adjustment on the assessment of relative hospital performance, (2) the relative importance of the adjustment, (3) the impact on hospitals with the highest and lowest rates, and (4) the impact throughout the distribution. The detected bias for Postoperative PE or DVT is high, indicating that the measures likely are biased based on the characteristics observed. (It is possible that characteristics that are not observed using administrative data may be related to the patient's risk of experiencing an adverse event.) Risk adjustment is important for this indicator.

## Source

This indicator was originally proposed by Iezzoni et al. as part of the Complications Screening Program (CSP 22, "venous thrombosis and pulmonary embolism")<sup>102</sup> and was one of AHRQ's original HCUP Quality Indicators for major surgery and invasive vascular procedure patients.<sup>103</sup> A code that maps to this indicator in the final AHRQ PSI was proposed by Miller et al. as one component of a broader indicator ("iatrogenic conditions").<sup>104</sup>

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<sup>102</sup> Iezzoni LI, Daley J, Heeren T, Foley SM, Fisher ES, Duncan C, et al. Identifying complications of care using administrative data. *Med Care* 1994;32(7):700-15.

<sup>103</sup> Johantgen M, Elixhauser A, Bali JK, Goldfarb M, Harris DR. Quality indicators using hospital discharge data: State and national applications. *Jt Comm J Qual Improv* 1998;24(2):88-195. Published erratum appears in *Jt Comm J Qual Improv* 1998;24(6):341.

<sup>104</sup> Miller M, Elixhauser A, Zhan C, Meyer G. Patient safety indicators: Using administrative data to identify potential patient safety concerns. *Health Services Research* 2001;36(6 Part II):110-132.

## Postoperative Sepsis (PSI 13)

Definition	Cases of sepsis per 1,000 elective surgery patients with an operating room procedure and a length of stay of 4 days or more.
Numerator	Discharges with ICD-9-CM code for sepsis in any secondary diagnosis field.
Denominator	All elective* surgical discharges defined by specific DRGs and an ICD-9-CM code for an operating room procedure. *Defined by admit type. Exclude patients with ICD-9-CM codes for sepsis in the principal diagnosis field, Exclude patients with a principal diagnosis of infection, any code for immunocompromised state, or cancer. Include only patients with a length of stay of 4 days or more. Exclude obstetrical patients in MDC 14.
Type of Indicator	Provider level
Empirical Performance	Rate: 9.75 per 1,000 population at risk Bias: Substantial bias; should be risk-adjusted
Risk Adjustment	Age, sex, DRG, comorbidity categories

### Summary

This indicator is intended to flag cases of nosocomial postoperative sepsis. This indicator limits the code for sepsis to secondary diagnosis codes to eliminate sepsis that was present on admission. This indicator also excludes patients who have a principal diagnosis of infection, patients with a length of stay of less than 3 days, and patients with potential immunocompromised states (e.g., AIDS, cancer, transplant).

### Panel Review

Panelists rated the overall usefulness of this indicator favorably, although they were less sure that this complication was reflective of medical error.

This indicator includes pediatric patients. High-risk neonates are at particularly high risk for catheter-related infections.

### Literature Review

*Coding validity.* No evidence on validity is available from CSP studies. Barbour reported that only 38% of discharge abstracts with a diagnosis of sepsis actually had hospital-

acquired sepsis.<sup>105</sup> However, this review was not limited to cases with a secondary diagnosis of sepsis, and sensitivity could not be evaluated. Geraci et al. confirmed (by blood culture) only 2 of 15 episodes of sepsis or “other infection” reported on discharge abstracts of VA patients hospitalized for CHF, COPD, or diabetes; the sensitivity for a positive blood culture was 50%.<sup>106</sup> In comparison with the VA’s National Surgical Quality Improvement Program database, in which “systemic sepsis” is defined by a positive blood culture and systemic manifestations of sepsis within 30 days after surgery, the ICD-9-CM diagnosis had a sensitivity of 37% and a predictive value of 30%.<sup>107</sup>

<sup>105</sup> Barbour GL. Usefulness of a discharge diagnosis of sepsis in detecting iatrogenic infection and quality of care problems. *Am J Med Qual* 1993;8(1):2-5.

<sup>106</sup> Geraci JM, Ashton CM, Kuykendall DH, Johnson ML, Wu L. In-hospital complications among survivors of admission for congestive heart failure, chronic obstructive pulmonary disease, or diabetes mellitus. *J Gen Intern Med* 1995;10(6):307-14.

<sup>107</sup> Best W, Khuri S, Phelan M, Hur K, Henderson W, Demakis J, et al. Identifying patient preoperative risk factors and postoperative adverse events in administrative databases: Results from the Department of Veterans Affairs national Surgical

*Construct validity.* Needleman and Buerhaus found that nurse staffing was independent of the occurrence of sepsis among both major surgical or medical patients.<sup>108</sup>

## Empirical Analysis

The project team conducted extensive empirical analyses on the PSIs. Postoperative Sepsis generally performs well on several different dimensions, including reliability, bias, relatedness of indicators, and persistence over time.

*Reliability.* The signal ratio—measured by the proportion of the total variation across hospitals that is truly related to systematic differences (signal) in hospital performance rather than random variation (noise)—is lower than many indicators, at 53.9%, suggesting that observed differences in risk-adjusted rates may not reflect true differences across hospitals.

The signal standard deviation for this indicator is lower than many indicators, at 0.00869, indicating that the systematic differences (signal) among hospitals is low and less likely associated with hospital characteristics. The signal share is lower than many indicators, at 0.00790. The signal share is a measure of the share of total variation (hospital and patient) accounted for by hospitals. The lower the share, the less important the hospital in accounting for the rate and the more important other potential factors (e.g., patient characteristics).

*Minimum bias.* The project team assessed the effect of age, gender, DRG, and comorbidity risk adjustment on the relative ranking of hospitals compared to no risk adjustment. They measured (1) the impact of adjustment on the assessment of relative hospital performance, (2) the relative importance of the adjustment, (3) the impact on hospitals with the highest and lowest rates, and (4) the impact throughout the distribution. The detected bias for Postoperative Sepsis is high, indicating that the measures likely are biased based on the characteristics

observed. (It is possible that characteristics that are not observed using administrative data may be related to the patient's risk of experiencing an adverse event.) Risk adjustment is important for this indicator.

## Source

This indicator was originally proposed by Iezzoni et al. as part of the Complications Screening Program (CSP 7, "septicemia").<sup>109</sup> Needleman and Buerhaus identified sepsis as an "Outcome Potentially Sensitive to Nursing" using the same CSP definition.<sup>110</sup>

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Quality Improvement Program. J Am Coll Surg 2002;194(3):257-266.

<sup>108</sup> Needleman J, Buerhaus PI, Mattke S, Stewart M, Zelevinsky K. Nurse Staffing and Patient Outcomes in Hospitals. Boston, MA: Health Resources Services Administration; 2001 February 28. Report No.:230-99-0021.

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<sup>109</sup> Iezzoni LI, Daley J, Heeren T, Foley SM, Fisher ES, Duncan C, et al. Identifying complications of care using administrative data. Med Care 1994;32(7):700-15.

<sup>110</sup> Needleman et al., 2001.

## Postoperative Wound Dehiscence (PSI 14)

### Provider Level Definition

Definition	Cases of reclosure of postoperative disruption of abdominal wall per 1,000 cases of abdominopelvic surgery.
Numerator	Discharges with ICD-9-CM code for reclosure of postoperative disruption of abdominal wall (54.61) in any procedure field.
Denominator	All abdominopelvic surgical discharges. Exclude patients where a procedure for reclosure of postoperative disruption of abdominal wall occurs before or on the same day as the first abdominopelvic surgery procedure. <i>Note: If day of procedure is not available in the input data file, the rate may be slightly lower than if the information was available.</i> Exclude obstetrical patients in MDC 14.
Type of Indicator	Provider level
Empirical Performance	Rate: 1.41 per 1,000 population at risk Bias: Some bias demonstrated
Risk Adjustment	Age, sex, DRG, comorbidity categories

## Postoperative Wound Dehiscence (PSI 24)

### Area Level Definition

Definition	Cases of reclosure of postoperative disruption of abdominal wall per 100,000 population.
Numerator	Discharges with ICD-9-CM code for reclosure of postoperative disruption of abdominal wall (5461) in any procedure field. Exclude obstetrical patients in MDC 14.
Denominator	Population of county or MSA associated with FIPS code of patient's residence or hospital location.
Type of Indicator	Area level
Empirical Performance	Rate: 20.13 per 100,000 population at risk
Risk Adjustment	No risk adjustment

### Summary

This indicator is intended to flag cases of wound dehiscence in patients who have undergone abdominal and pelvic surgery. This indicator is defined both on a provider level (by including cases based on secondary diagnosis associated with the same hospitalization) and on an area level (by including all cases of wound dehiscence).

### Panel Review

Panelists suggested that postoperative wound disruption be excluded from the indicator and that trauma, cancer, and immunocompromised patients

be included. They also reported that the risk of developing wound dehiscence varies with patient factors such as age and comorbidities.

### Literature Review

*Coding validity.* No evidence on validity is available from CSP studies. Hawker et al. found that the sensitivity and predictive value of wound dehiscence were both 100%.<sup>111</sup> Faciszewski et al. aggregated

<sup>111</sup> Hawker BA, Coyte PC, Wright JG, Paul JE, Bombardier C. Accuracy of administrative data for assessing outcomes after knee replacement surgery. *J Clin Epidemiol* 1997;50(3):265-73.

wound dehiscence with postoperative hemorrhage or hematoma and reported a pooled confirmation rate of 17% with 3% sensitivity of coding among patients who underwent spinal fusion.<sup>112</sup> In comparison with the VA's National Surgical Quality Improvement Program database, in which dehiscence is defined as fascial disruption within 30 days after surgery, the ICD-9-CM diagnosis of wound disruption had a sensitivity of 25% and a predictive value of 23%.<sup>113</sup> This code (9983) was ultimately removed from the accepted PSI, because the clinical panel was concerned that the diagnosis definition was too broad and failed to distinguish skin from fascial separation.

*Construct validity.* Based on two-stage review of randomly selected deaths, Hannan et al. reported that cases with a secondary diagnosis of wound disruption were 3.0 times more likely to have received care that departed from professionally recognized standards than cases without that code (4.3% versus 1.7%), after adjusting for patient demographic, geographic, and hospital characteristics.<sup>114</sup>

### Empirical Analysis

The project team conducted extensive empirical analyses on the PSIs. Postoperative Wound Dehiscence generally performs well on several different dimensions, including reliability, bias, relatedness of indicators, and persistence over time.

*Reliability.* The signal ratio—measured by the proportion of the total variation across hospitals that is related to systematic differences (signal) in hospital performance rather than random variation (noise)—is low, at 35.6%, suggesting that observed differences in risk-adjusted rates may not reflect true differences across hospitals.

The signal standard deviation for this indicator is lower than many indicators, at 0.00188, indicating

that the systematic differences (signal) among hospitals is low and less likely associated with hospital characteristics. The signal share is lower than many indicators, at 0.00171. Signal share is a measure of the share of total variation (hospital and patient) accounted for by hospitals. The lower the share, the less important the hospital in accounting for the rate and the more important other potential factors (e.g., patient characteristics).

*Minimum bias.* The project team assessed the effect of age, gender, DRG, and comorbidity risk adjustment on the relative ranking of hospitals compared to no risk adjustment. They measured (1) the impact of adjustment on the assessment of relative hospital performance, (2) the relative importance of the adjustment, (3) the impact on hospitals with the highest and lowest rates, and (4) the impact throughout the distribution. The detected bias for Postoperative Wound Dehiscence is moderate, indicating that the measures may or may not be substantially biased based on the characteristics observed.

### Source

An indicator on this topic (9983) was originally proposed by Hannan et al. to target “cases that would have a higher percentage of quality of care problems than cases without the criterion, as judged by medical record review.”<sup>115</sup> The same code was included within a broader indicator (“adverse events and iatrogenic complications”) in AHRQ’s original HCUP Quality Indicators.<sup>116</sup> Iezzoni et al. identified an associated procedure code for reclosure of an abdominal wall dehiscence (5461), and included both codes in the Complications Screening Program.<sup>117</sup> Miller et al. suggested the use of both codes (as “wound disruption”) in the original “AHRQ PSI Algorithms and Groupings.”<sup>118</sup>

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<sup>112</sup> Faciszewski T, Johnson L, Noren C, Smith MD. Administrative databases' complication coding in anterior spinal fusion procedures. What does it mean? *Spine* 1995;20(16):1783-8.

<sup>113</sup> Best W, Khuri S, Phelan M, Hur K, Henderson W, Demakis J, et al. Identifying patient preoperative risk factors and postoperative adverse events in administrative databases: Results from the Department of Veterans Affairs national Surgical Quality Improvement Program. *J Am Coll Surg* 2002;194(3):257-266.

<sup>114</sup> Hannan EL, Bernard HR, O'Donnell JF, Kilburn H, Jr. A methodology for targeting hospital cases for quality of care record reviews. *Am J Public Health* 1989;79(4):430-6.

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<sup>115</sup> Hannan et al., 1989.

<sup>116</sup> Johantgen M, Elixhauser A, Bali JK, Goldfarb M, Harris DR. Quality indicators using hospital discharge data: state and national applications. *Jt Comm J Qual Improv* 1998;24(2):88-195. Published erratum appears in *Jt Comm J Qual Improv* 1998;24(6):341.

<sup>117</sup> Iezzoni LI, Daley J, Heeren T, Foley SM, Fisher ES, Duncan C, et al. Identifying complications of care using administrative data. *Med Care* 1994;32(7):700-15.

<sup>118</sup> Miller M, Elixhauser A, Zhan C, Meyer G. Patient Safety Indicators: Using administrative data to identify potential patient safety concerns. *Health Services Research* 2001;36(6 Part II):110-132.

## Accidental Puncture or Laceration (PSI 15)

### Provider Level Definition (only secondary diagnosis)

Definition	Cases of technical difficulty (e.g., accidental cut or laceration during procedure) per 1,000 discharges.
Numerator	Discharges with ICD-9-CM code denoting technical difficulty (e.g., accidental cut, puncture, perforation, or laceration) in any secondary diagnosis field.
Denominator	All medical and surgical discharges defined by specific DRGs. Exclude patients with ICD-9-CM code denoting technical difficulty (e.g., accidental cut, puncture, perforation, or laceration) in the principal diagnosis field. Exclude obstetrical patients in MDC 14.
Type of Indicator	Provider level
Empirical Performance	Rate: 3.22 per 1,000 population at risk Bias: Substantial bias; should be risk-adjusted
Risk Adjustment	Age, sex, DRG, comorbidity categories

## Accidental Puncture or Laceration (PSI 25)

### Area Level Definition (principal or secondary diagnosis)

Definition	Cases of technical difficulty (e.g., accidental cut or laceration during procedure) per 100,000 population.
Numerator	Discharges with ICD-9-CM code denoting technical difficulty (e.g., accidental cut, puncture, perforation, or laceration) in any diagnosis field (principal or secondary) of all medical and surgical discharges defined by specific DRGs. Exclude obstetrical patients in MDC 14.
Denominator	Population of county or MSA associated with FIPS code of patient's residence or hospital location.
Type of Indicator	Area level
Empirical Performance	Rate: 354.08 per 100,000 population at risk
Risk Adjustment	No risk adjustment

### Summary

This indicator is intended to flag cases of complications that arise due to technical difficulties in medical care—specifically, those involving an accidental puncture or laceration.

### Panel Review

Panelists were unsure about how the culture of quality improvement in a hospital would affect the coding of this complication. Some physicians may be reluctant to record the occurrence of this

complication for fear of punishment. Panelists also noted that some of these occurrences are not preventable.

### Literature Review

*Coding validity.* No evidence on validity is available from CSP studies. A study of laparoscopic cholecystectomy found that 95% of patients with an ICD-9 code of accidental puncture or laceration had a confirmed injury to

the bile duct or gallbladder.<sup>119</sup> However, only 27% had a clinically significant injury that required any intervention; sensitivity of reporting was not evaluated. A similar study of cholecystectomies reported that these two ICD-9 codes had a sensitivity of 40% and a predictive value of 23% in identifying bile duct injuries.<sup>120</sup> Among 185 total knee replacement patients, Hawker et al. found that the sensitivity and predictive value of codes describing “miscellaneous mishaps during or as a direct result of surgery” (definition not given) were 86% and 55%, respectively.<sup>121</sup> Romano et al. identified 19 of 45 episodes of accidental puncture, laceration, or related procedure using discharge abstracts of diskectomy patients; there was one false positive.<sup>122</sup>

### Empirical Analysis

The project team conducted extensive empirical analyses on the PSIs. Accidental Puncture or Laceration generally performs well on several different dimensions, including reliability, bias, relatedness of indicators, and persistence over time.

**Reliability.** The signal ratio—measured by the proportion of the total variation across hospitals that is truly related to systematic differences (signal) in hospital performance rather than random variation (noise)—is moderately high, relative to other indicators, at 82.9%, suggesting that observed differences in risk-adjusted rates most likely reflect true differences across hospitals.

The signal standard deviation for this indicator is lower than many indicators, at 0.00279, indicating that the systematic differences (signal) among hospitals is low and less likely associated with hospital characteristics. The signal share is lower than many indicators, at 0.00241. The signal share is a measure of the share of total variation (hospital

and patient) accounted for by hospitals. The lower the share, the less important the hospital in accounting for the rate and the more important other potential factors (e.g., patient characteristics).

**Minimum bias.** The project team assessed the effect of age, gender, DRG, and comorbidity risk adjustment on the relative ranking of hospitals compared to no risk adjustment. They measured (1) the impact of adjustment on the assessment of relative hospital performance, (2) the relative importance of the adjustment, (3) the impact on hospitals with the highest and lowest rates, and (4) the impact throughout the distribution. The detected bias for Accidental Puncture or Laceration is high, indicating that the measures likely are biased based on the characteristics observed. (It is possible that characteristics that are not observed using administrative data may be related to the patient’s risk of experiencing an adverse event.) Risk adjustment is important for this indicator.

### Source

This indicator was originally proposed by Iezzoni et al. as part of the Complications Screening Program, although unlike the final PSI, its codes were split between two CSP indicators (CSP 27, “technical difficulty with medical care,” and “sentinel events”).<sup>123</sup> It was also included as one component of a broader indicator (“adverse events and iatrogenic complications”) in AHRQ’s original HCUP Quality Indicators.<sup>124</sup> The University HealthSystem Consortium adopted CSP 27 as an indicator for medical (#2806) and major surgery (#2956) patients. Miller et al. also split this set of ICD-9-CM codes into two broader indicators (“miscellaneous misadventures” and “E codes”) in the original “AHRQ PSI Algorithms and Groupings.”<sup>125</sup> Based on expert consensus panels, McKesson Health Solutions included one component of this PSI (Accidental Puncture or Laceration) in its CareEnhance Resource Management Systems, Quality Profiler Complications Measures Module.

<sup>119</sup> Taylor B. Common bile duct injury during laparoscopic cholecystectomy in Ontario: Does ICD-9 coding indicate true incidence? *CMAJ* 1998;158(4):481-5.

<sup>120</sup> Valinsky LJ, Hockey RI, Hobbs MS, Fletcher DR, Pikora TJ, Parsons RW, et al. Finding bile duct injuries using record linkage: A validated study of complications following cholecystectomy. *J Clin Epidemiol* 1999;52(9):893-901.

<sup>121</sup> Hawker GA, Coyte PC, Wright JG, Paul JE, Bombardier C. Accuracy of administrative data for assessing outcomes after knee replacement surgery. *J Clin Epidemiol* 1997;50(3):265-73.

<sup>122</sup> Romano P. Can administrative data be used to ascertain clinically significant postoperative complications. *American Journal of Medical Quality* Press.

<sup>123</sup> Iezzoni LI, Daley J, Heeren T, Foley SM, Fisher ES, Duncan C, et al. Identifying complications of care using administrative data. *Med Care* 1994;32(7):700-15.

<sup>124</sup> Johantgen M, Elixhauser A, Bali JK, Goldfarb M, Harris DR. Quality indicators using hospital discharge data: State and national applications. *Jt Comm J Qual Improv* 1998;24(2):88-195. Published erratum appears in *Jt Comm J Qual Improv* 1998;24(6):341.

<sup>125</sup> Miller M, Elixhauser A, Zhan C, Meyer G. Patient Safety Indicators: Using administrative data to identify potential patient safety concerns. *Health Services Research* 2001;36(6 Part II):110-132.

## Transfusion Reaction (PSI 16)

### Provider Level Definition (only secondary diagnosis)

Definition	Cases of transfusion reaction per 1,000 discharges.
Numerator	Discharges with ICD-9-CM code for transfusion reaction in any secondary diagnosis field.
Denominator	All medical and surgical discharges defined by specific DRGs. Exclude patients with ICD-9-CM code for transfusion reaction in the principal diagnosis field.
Type of Indicator	Provider level
Empirical Performance	Rate: 0.005 per 1,000 population at risk Bias: Did not undergo empirical testing of bias
Risk Adjustment	No risk adjustment

## Transfusion Reaction (PSI 26)

### Area Level Definition (principal or secondary diagnosis)

Definition	Cases of transfusion reaction per 100,000 population.
Numerator	Discharges with ICD-9-CM code for transfusion reaction in any diagnosis field (principal or secondary ) of all medical and surgical discharges defined by specific DRGs.
Denominator	Population of county or MSA associated with FIPS code of patient's residence or hospital location.
Type of Indicator	Area level
Empirical Performance	Rate: 0.52 per 100,000 population
Risk Adjustment	No risk adjustment

### Summary

This indicator is intended to flag cases of major reactions due to transfusions (ABO and Rh). This indicator is defined both on a provider level (by including cases based on secondary diagnosis associated with the same hospitalization) and on an area level (by including all cases of transfusion reactions).

### Panel Review

The overall usefulness of this indicator was rated as very favorable by panelists. This indicator includes only those events that result in additional medical care. Some minor reactions may be missed, although the panel suggested that these minor reactions are less clearly due to medical error than the Rh or ABO reactions included in the indicator.

### Literature Review

The project team was unable to find evidence on validity from prior studies, most likely because this complication is quite rare.

### Empirical Analysis

The project team conducted extensive empirical analyses on the PSIs. Given the low rates or occurrences for Transfusion Reaction, the project team did not measure reliability or minimum bias. The indicator could not be risk-adjusted due to the small number of numerator cases. Users of the PSI software should note the output will only contain observed rates for Transfusion Reaction.

## Source

This indicator was originally proposed by Iezzoni et al. as part of the Complications Screening Program (CSP “sentinel events”).<sup>126</sup> It was also included as one component of a broader indicator (“adverse events and iatrogenic complications”) in AHRQ’s original HCUP Quality Indicators.<sup>127</sup> It was proposed by Miller et al. in the original “AHRQ PSI Algorithms and Groupings.”<sup>128</sup>

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<sup>126</sup> Iezzoni LI, Daley J, Heeren T, Foley SM, Fisher ES, Duncan C, et al. Identifying complications of care using administrative data. *Med Care* 1994;32(7):700-15.

<sup>127</sup> Johantgen M, Elixhauser A, Bali JK, Goldfarb M, Harris DR. Quality indicators using hospital discharge data: State and national applications. *Jt Comm J Qual Improv* 1998;24(2):88-195. Published erratum appears in *Jt Comm J Qual Improv* 1998;24(6):341.

<sup>128</sup> Miller M, Elixhauser A, Zhan C, Meyer G. Patient safety indicators: Using administrative data to identify potential patient safety concerns. *Health Services Research* 2001;36(6 Part II):110-132.

## Birth Trauma—Injury to Neonate (PSI 17)

Definition	Cases of birth trauma, injury to neonate, per 1,000 liveborn births.
Numerator	Discharges with ICD-9-CM code for birth trauma in any diagnosis field. Exclude infants with a subdural or cerebral hemorrhage (subgroup of birth trauma coding) <b>and</b> any diagnosis code of pre-term infant (denoting birth weight of less than 2,500 grams and less than 37 weeks gestation or 34 weeks gestation or less). Exclude infants with injury to skeleton (767.3, 767.4) <b>and</b> any diagnosis code of osteogenesis imperfecta (756.51).
Denominator	All liveborn births.
Type of Indicator	Provider level
Empirical Performance	Rate: 6.34 per 1,000 population at risk Bias: Did not undergo empirical testing of bias
Risk Adjustment	Sex

### Summary

This indicator is intended to flag cases of birth trauma for infants born alive in a hospital. The indicator excludes patients born pre-term, as birth trauma in these patients may be less preventable than for full-term infants.

### Panel Review

The overall usefulness of this indicator was rated as favorable by panelists

### Literature Review

*Coding validity.* A study of newborns that had a discharge diagnosis of birth trauma found that only 25% had sustained a significant injury to the head, neck, or shoulder.<sup>129</sup> The remaining patients either had superficial injuries or injuries inferior to the neck. The project team was unable to find other evidence on the validity of this indicator. Towner et al. linked California maternal and infant discharge abstracts from 1992 through 1994, but they used only infant discharge abstracts to describe the incidence of neonatal intracranial injury, and they did not

report the extent of agreement between the two data sets.<sup>130</sup>

### Empirical Analysis

The project team conducted extensive empirical analyses on the PSIs. Birth Trauma generally performs well on several different dimensions, including reliability, relatedness of indicators, and persistence over time.

*Reliability.* The signal ratio—measured by the proportion of the total variation across hospitals that is truly related to systematic differences (signal) in hospital performance rather than random variation (noise)—is high, relative to other indicators, at 97.0%, suggesting that observed differences in risk-adjusted rates reflect true differences across hospitals.

The signal standard deviation for this indicator is also high, relative to other indicators, at 0.04128, indicating that the systematic differences (signal) among hospitals is high and more likely associated with hospital characteristics. The signal share is also high, relative to other indicators, at 0.13603. The signal share is a measure of the share of total variation (hospital and patient) accounted for by hospitals. The

<sup>129</sup> Hughes C, Harley E, Milmo G, Bala R, Martorella A. Birth trauma in the head and neck. Arch Otolaryngol Head Neck Surg 1999;125:193-199.

<sup>130</sup> Towner D, Castro MA, Eby-Wilkens E, Gilbert WM. Effect of mode of delivery in nulliparous women on neonatal intracranial injury. N Engl J Med 1999;341(23):1709-14.

lower the share, the less important the hospital in accounting for the rate and the more important other potential factors (e.g., patient characteristics).

*Minimum bias.* The bias for Birth Trauma was not measured, since adequate risk adjustment was not available.

### **Source**

This indicator has been widely used in the obstetric community, although it is most commonly based on chart review rather than administrative data. It was proposed by Miller et al. in the original "AHRQ PSI Algorithms and Groupings."<sup>131</sup> Based on expert consensus panels, McKesson Health Solutions included a broader version of this indicator in its CareEnhance Resource Management Systems, Quality Profiler Complications Measures Module.

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<sup>131</sup> Miller M, Elixhauser A, Zhan C, Meyer G, Patient Safety Indicators: Using administrative data to identify potential patient safety concerns. Health Services Research 2001;36(6 Part II):110-132.

## Obstetric Trauma—Vaginal Delivery with Instrument (PSI 18)

Definition	Cases of obstetric trauma (4 <sup>th</sup> degree lacerations, other obstetric lacerations) per 1,000 instrument-assisted vaginal deliveries.
Numerator	Discharges with ICD-9-CM code for obstetric trauma in any diagnosis or procedure field.
Denominator	All vaginal delivery discharges with any procedure code for instrument-assisted delivery.
Type of Indicator	Provider level
Empirical Performance	Rate: 217.09 per 1,000 population at risk Bias: Did not undergo empirical testing of bias
Risk Adjustment	Age

## Obstetric Trauma with 3<sup>rd</sup> Degree Lacerations—Vaginal Delivery with Instrument (PSI 27)

Definition	Cases of obstetric trauma (3 <sup>rd</sup> or 4 <sup>th</sup> degree lacerations, other obstetric lacerations) per 1,000 instrument-assisted vaginal deliveries.
Numerator	Discharges with ICD-9-CM code for obstetric trauma in any diagnosis or procedure field.
Denominator	All vaginal delivery discharges with any procedure code for instrument-assisted delivery.
Type of Indicator	Provider level
Empirical Performance	Rate: 246.00 per 1,000 population at risk Bias: Did not undergo empirical testing of bias
Risk Adjustment	Age

### Summary

This indicator is intended to flag cases of potentially preventable trauma during vaginal delivery with instrument.

### Panel Review

The overall usefulness of an Obstetric trauma indicator was rated as favorable by panelists. After initial review, the indicator was eventually split into three separate Obstetric Trauma indicators: Vaginal Delivery with Instrument, Vaginal Delivery without Instrument, and Cesarean Delivery.

### Literature Review

*Coding validity.* In a stratified probability sample of vaginal and Cesarean deliveries, the weighted sensitivity and predictive value of coding for third- and fourth-degree lacerations and vulvar/perineal hematomas (based on either diagnosis or procedure codes) were 89% and 90%, respectively.<sup>158</sup> The authors did not report coding validity for third- and fourth-degree lacerations separately. The project team was unable to find other evidence on validity from prior studies.

## Empirical Analysis

The project team conducted extensive empirical analyses on the PSIs. Obstetric Trauma—Vaginal Delivery with Instrument generally performs well on several different dimensions, including reliability, relatedness of indicators, and persistence over time.

*Reliability.* The signal ratio—measured by the proportion of the total variation across hospitals that is truly related to systematic differences (signal) in hospital performance rather than random variation (noise)—is moderately high, relative to other indicators, at 69.9%, suggesting that observed differences in risk-adjusted rates likely reflect true differences across hospitals.

The signal standard deviation for this indicator is also high, relative to other indicators, at 0.09794, indicating that the systematic differences (signal) among hospitals is high and more likely associated with hospital characteristics. The signal share is high, relative to other indicators, at 0.05539. The signal share is a measure of the share of total variation (hospital and patient) accounted for by hospitals. The lower the share, the less important the hospital in accounting for the rate and the more important other potential factors (e.g., patient characteristics).

*Minimum bias.* The bias for Obstetric Trauma—Vaginal Delivery with Instrument was not measured, since adequate risk adjustment was not available.

## Source

An overlapping subset of this indicator (third- or fourth-degree perineal laceration) has been adopted by the Joint Commission for the Accreditation of Healthcare Organizations (JCAHO) as a core performance measure for “pregnancy and related conditions” (PR-25). Based on expert consensus panels, McKesson Health Solutions included the JCAHO indicator in its CareEnhance Resource Management Systems, Quality Profiler Complications Measures Module. Fourth Degree Laceration, one of the codes mapped to this PSI, was included as one component of a broader indicator (“obstetrical complications”) in AHRQ’s original HCUP Quality Indicators.<sup>132</sup>

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<sup>132</sup> Johantgen M, Elixhauser A, Bali JK, Goldfarb M, Harris DR. Quality indicators using hospital discharge data: State and national applications. *Jt Comm J Qual Improv* 1998;24(2):88-195. Published erratum

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appears in *Jt Comm J Qual Improv* 1998;24(6):341.

## Obstetric Trauma—Vaginal Delivery without Instrument (PSI 19)

Definition	Cases of obstetric trauma (4 <sup>th</sup> degree lacerations, other obstetric lacerations) per 1,000 vaginal deliveries without instrument assistance.
Numerator	Discharges with ICD-9-CM code for obstetric trauma in any diagnosis or procedure field per 1,000 vaginal deliveries without instrument assistance.
Denominator	All vaginal delivery discharges. Exclude instrument-assisted delivery.
Type of Indicator	Provider level
Empirical Performance	Rate: 81.98 per 1,000 population at risk Bias: Did not undergo empirical testing of bias
Risk Adjustment	Age

## Obstetric Trauma with 3<sup>rd</sup> Degree Lacerations—Vaginal Delivery without Instrument (PSI 28)

Definition	Cases of obstetric trauma (3 <sup>rd</sup> or 4 <sup>th</sup> degree lacerations, other obstetric lacerations) per 1,000 vaginal deliveries without instrument assistance.
Numerator	Discharges with ICD-9-CM code for obstetric trauma in any diagnosis or procedure field.
Denominator	All vaginal delivery discharges. Exclude instrument-assisted delivery.
Type of Indicator	Provider level
Empirical Performance	Rate: 88.74 per 1,000 population at risk Bias: Did not undergo empirical testing of bias
Risk Adjustment	Age

### Summary

This indicator is intended to flag cases of potentially preventable trauma during a vaginal delivery without instrument.

### Panel Review

The overall usefulness of an Obstetric Trauma Indicator was rated as favorable by panelists. After initial review, the indicator was split into three separate Obstetric Trauma indicators: Vaginal Delivery with Instrument, Vaginal Delivery without Instrument, and Cesarean Delivery.

### Literature Review

*Coding validity.* In a stratified probability sample of vaginal and Cesarean deliveries, the weighted sensitivity and predictive value of coding for third- and fourth-degree lacerations and vulvar/perineal hematomas (based on either diagnosis or procedure codes) were 89% and 90%, respectively.<sup>158</sup> The authors did not report coding validity for third- and fourth-degree lacerations separately. The project team was unable to find other evidence on validity from prior studies.

## Empirical Analysis

The project team conducted extensive empirical analyses on the PSIs. Obstetric Trauma—Vaginal Delivery without Instrument generally performs well on several different dimensions, including reliability, relatedness of indicators, and persistence over time.

*Reliability.* The signal ratio—measured by the proportion of the total variation across hospitals that is truly related to systematic differences (signal) in hospital performance rather than random variation (noise)—is high, relative to other indicators, at 86.4%, suggesting that observed differences in risk-adjusted rates reflect true differences across hospitals.

The signal standard deviation for this indicator is also high, relative to other indicators, at 0.04314, indicating that the systematic differences (signal) among hospitals is high and more likely associated with hospital characteristics. The signal share is lower than many other indicators, at 0.02470. The signal share is a measure of the share of total variation (hospital and patient) accounted for by hospitals. The lower the share, the less important the hospital in accounting for the rate and the more important other potential factors (e.g., patient characteristics).

*Minimum bias.* The bias for Obstetric Trauma—Vaginal Delivery without Instrument was not measured, since adequate risk adjustment was not available.

## Source

An overlapping subset of this indicator (third- or fourth-degree perineal laceration) has been adopted by the Joint Commission for the Accreditation of Healthcare Organizations (JCAHO) as a core performance measure for “pregnancy and related conditions” (PR-25). Based on expert consensus panels, McKesson Health Solutions included the JCAHO indicator in its CareEnhance Resource Management Systems, Quality Profiler Complications Measures Module. Fourth-Degree Laceration, one of the codes mapped to this PSI, was included as one component of a broader indicator (“obstetrical complications”) in AHRQ’s original HCUP Quality Indicators.<sup>133</sup>

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<sup>133</sup> Johantgen M, Elixhauser A, Bali JK, Goldfarb M, Harris DR. Quality indicators using hospital discharge data: State and national applications. *Jt Comm J Qual Improv* 1998;24(2):88-195. Published erratum

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appears in *Jt Comm J Qual Improv* 1998;24(6):341.

## Obstetric Trauma—Cesarean Delivery (PSI 20)

Definition	Cases of obstetric trauma (4 <sup>th</sup> degree lacerations, other obstetric lacerations) per 1,000 Cesarean deliveries.
Numerator	Discharges with ICD-9-CM code for obstetric trauma in any diagnosis or procedure field per 1,000 Cesarean deliveries.
Denominator	All Cesarean delivery discharges.
Type of Indicator	Provider level
Empirical Performance	Rate: 5.93 per 1,000 population at risk Bias: Did not undergo empirical testing of bias
Risk Adjustment	Age

## Obstetric Trauma with 3<sup>rd</sup> Degree Lacerations—Cesarean Delivery (PSI 29)

Definition	Cases of obstetric trauma (3 <sup>rd</sup> or 4 <sup>th</sup> degree lacerations, other obstetric lacerations) per 1,000 Cesarean deliveries.
Numerator	Discharges with ICD-9-CM code for obstetric trauma in any diagnosis or procedure field.
Denominator	All Cesarean delivery discharges.
Type of Indicator	Provider level
Empirical Performance	Rate: 6.20 per 1,000 population at risk Bias: Did not undergo empirical testing of bias
Risk Adjustment	Age

### Summary

This indicator is intended to flag cases of potentially preventable trauma during Cesarean delivery.

### Panel Review

The overall usefulness of an Obstetric Trauma Indicator was rated as favorable by panelists. After initial review, the indicator was eventually split into three separate Obstetric Trauma indicators: Vaginal Delivery with Instrument, Vaginal Delivery without Instrument, and Cesarean Delivery.

### Literature Review

*Coding validity.* In a stratified probability sample of vaginal and Cesarean deliveries, the weighted

sensitivity and predictive value of coding for third- and fourth-degree lacerations and vulvar/perineal hematomas (based on either diagnosis or procedure codes) were 89% and 90%, respectively.<sup>158</sup> The authors did not report coding validity for third- and fourth-degree lacerations separately. The project team was unable to find other evidence on validity from prior studies.

### Empirical Analysis

The project team conducted extensive empirical analyses on the PSIs. Obstetric Trauma—Cesarean Delivery generally performs well on several different dimensions, including reliability, relatedness of indicators, and persistence over time.

*Reliability.* The signal ratio—measured by the proportion of the total variation across hospitals that is truly related to systematic differences (signal) in hospital performance rather than random variation (noise)—is lower than many indicators, at 45.9%, suggesting that observed differences in risk-adjusted rates may not reflect true differences across hospitals.

The signal standard deviation for this indicator is also lower than many indicators, at 0.00590, indicating that the systematic differences (signal) among hospitals is low and less likely associated with hospital characteristics. The signal share is lower than many indicators, at 0.00576. The signal share is a measure of the share of total variation (hospital and patient) accounted for by hospitals. The lower the share, the less important the hospital in accounting for the rate and the more important other potential factors (e.g., patient characteristics).

*Minimum bias.* The bias for Obstetric Trauma—Cesarean Delivery was not measured, since adequate risk adjustment was not available.

## Source

An overlapping subset of this indicator (third- or fourth-degree perineal laceration) has been adopted by the Joint Commission for the Accreditation of Healthcare Organizations (JCAHO) as a core performance measure for “pregnancy and related conditions” (PR-25). Based on expert consensus panels, McKesson Health Solutions included the JCAHO indicator in its CareEnhance Resource Management Systems, Quality Profiler Complications Measures Module. Fourth Degree Laceration, one of the codes mapped to this PSI, was included as one component of a broader indicator (“obstetrical complications”) in AHRQ’s original HCUP Quality Indicators.<sup>134</sup>

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<sup>134</sup> Johantgen M, Elixhauser A, Bali JK, Goldfarb M, Harris DR. Quality indicators using hospital discharge data: State and national applications. *Jt Comm J Qual Improv* 1998;24(2):88-195. Published erratum appears in *Jt Comm J Qual Improv* 1998;24(6):341.

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## Appendix A: Patient Safety Indicators – Detailed Definitions

The ICD-9-CM and DRG codes modified for FY 2004 are identified with the month and year after the code label, e.g., OCT 03.

### Complications of Anesthesia (PSI 1)

#### Numerator:

Discharges with ICD-9-CM diagnosis codes for anesthesia complications in any secondary diagnosis field.

*ICD-9-CM Anesthesia Complications diagnosis codes:*

Adverse effects in therapeutic use, other central nervous system depressants and anesthetics:

E8763 ENDOTRACHEAL TUBE WRONGLY PLACE DURING ANESTHETIC PROCEDURE  
E9381 HALOTHANE  
E9382 OTHER GASEOUS ANESTHETICS  
E9383 INTRAVENOUS ANESTHETICS  
E9384 OTHER AND UNSPECIFIED GENERAL ANESTHETICS  
E9385 SURFACE AND INFILTRATION ANESTHETICS  
E9386 PERIPHERAL NERVE AND PLEXUS BLOCKING ANESTHETICS  
E9387 SPINAL ANESTHETICS  
E9389 OTHER AND UNSPECIFIED LOCAL ANESTHETICS

Poisoning by other central nervous system depressants and anesthetics:

9681 HALOTHANE  
9682 OTHER GASEOUS ANESTHETICS  
9683 INTRAVENOUS ANESTHETICS  
9684 OTHER AND UNSPECIFIED GENERAL ANESTHETICS  
9687 SPINAL ANESTHETICS  
E8551 ACCIDENTAL POISONING, OTHER NERVOUS SYSTEM DEPRESSANTS

#### Denominator:

All surgical discharges defined by specific DRGs and an ICD-9-CM code for an operating room procedure (Appendix C).

*Surgical Discharge DRGs:*

001 CRANIOTOMY, AGE > 17 W/ CC  
002 CRANIOTOMY AGE > 17 W/O CC  
003 CRANIOTOMY, AGE 0-17  
004\* SPINAL PROCEDURES  
005\* EXTRACRANIAL VASCULAR PROCEDURES  
006 CARPAL TUNNEL RELEASE  
007 PERIPHERAL AND CRANIAL NERVE AND OTHER NERVOUS SYSTEM PROCEDURES W/ CC  
008 PERIPHERAL AND CRANIAL NERVE AND OTHER NERVOUS SYSTEM PROCEDURES W/O CC  
036 RETINAL PROCEDURES  
037 ORBITAL PROCEDURES  
038 PRIMARY IRIS PROCEDURES  
039 LENS PROCEDURES W/ OR W/O VITRECTOMY  
040 EXTRAOCULAR PROCEDURES EXCEPT ORBIT, AGE GREATER THAN 17  
041 EXTRAOCULAR PROCEDURES EXCEPT ORBIT, AGE 0-17  
042 INTRAOCULAR PROCEDURES EXCEPT RETINA, IRIS AND LENS  
049 MAJOR HEAD AND NECK PROCEDURES

## Complications of Anesthesia (PSI 1)

050	SIALOADENECTOMY
051	SALIVARY GLAND PROCEDURES EXCEPT SIALOADENECTOMY
052	CLEFT LIP AND PALATE REPAIR
053	SINUS AND MASTOID PROCEDURES, AGE GREATER THAN 17
054	SINUS AND MASTOID PROCEDURES, AGE 0-17
055	MISCELLANEOUS EAR, NOSE, MOUTH AND THROAT PROCEDURES
056	RHINOPLASTY
057	TONSILLECTOMY AND ADENOIDECTOMY PROCEDURES EXCEPT TONSILLECTOMY AND/OR ADENOIDECTOMY ONLY, AGE GREATER THAN 17
058	TONSILLECTOMY AND ADNOIDECTOMY PROCEDURES EXCEPT TONSILLECTOMY AND/OR ADENOIDECTOMY ONLY, AGE 0-17
059	TONSILLECTOMY AND/OR ADENOIDECTOMY ONLY, AGE GREATER THAN 17
060	TONSILLECTOMY AND/OR ADENOIDECTOMY ONLY, AGE 0 – 17
061	MYRINGOTOMY W/ TUBE INSERTION, AGE GREATER THAN 17
062	MYRINGOTOMY W/ TUBE INSERTION, AGE 0-17
063	OTHER EAR, NOSE, MOUTH AND THROAT OR PROCEDURES
075	MAJOR CHEST PROCEDURES
076	OTHER RESPIRATORY SYSTEM OR PROCEDURES W/ CC
077	OTHER RESPIRATORY SYSTEM OR PROCEDURES W/O CC
103	HEART TRANSPLANT
104	CARDIAC VALVE AND OTHER MAJOR CARDIOTHORACIC PROCEDURES W/ CARDIAC CATHETERIZATION
105	CARDIAC VALVE AND OTHER MAJOR CARDIOTHORACIC PROCEDURES W/O CARDIAC CATHETERIZATION
106	CORONARY BYPASS W/ PTCA
107	CORONARY BYPASS W/ CARDIAC CATHETERIZATION
108	OTHER CARDIOTHORACIC PROCEDURES
109	CORONARY BYPASS W/O CARDIAC CATHETERIZATION
110	MAJOR CARDIOVASCULAR PROCEDURES W/ CC
111	MAJOR CARDIOVASCULAR PROCEDURES W/O CC
112*	PERCUTANEOUS CARDIOVASCULAR PROCEDURES
113	AMPUTATION FOR CIRCULATORY SYSTEM DISORDERS EXCEPT UPPER LIMB AND TOE
114	UPPER LIMB AND TOES AMPUTATION FOR CIRCULATORY SITE
115	PERMANENT CARDIAC PACEMAKER IMPLANT W/ ACUTE MYOCARDIAL INFARCTION, HEART FAILURE OR SHOCK OR ACID LEAD OR GENERATOR PROCEDURE
116	OTHER PERMANENT CARDIAC PACEMAKER IMPLANT OR PTCA W/ CORONARY ARTERIAL STENT
117	CARDIAC PACEMAKER REVISION EXCEPT DEVICE REPLACEMENT
118	CARDIAC PACEMAKER DEVICE REPLACEMENT
119	VEIN LIGATION AND STRIPPING
120	OTHER CIRCULATORY SYSTEM OR PROCEDURES
146	RECTAL RESECTION W/ CC
147	RECTAL RESECTION W/O CC
148	MAJOR SMALL AND LARGE BOWEL PROCEDURES W/ CC
149	MAJOR SMALL AND LARGE BOWEL PROCEDURES W/O CC
150	PERITONEAL ADHESIOLYSIS W/ CC
151	PERITONEAL ADHESIOLYSIS W/O CC
152	MINOR SMALL AND LARGE BOWEL PROCEDURES W/ CC
153	MINOR SMALL AND LARGE BOWEL PROCEDURES W/O CC
154	STOMACH, ESOPHAGEAL AND DUODENAL PROCEDURES, AGE GREATER THAN 17 W/ CC
155	STOMACH, ESOPHAGEAL AND DUODENAL PROCEDURES, AGE GREATER THAN 17 WIHOUT CC
156	STOMACH, ESOPHAGEAL AND DUODENAL PROCEDURES, AGE 0-17
157	ANAL AND STOMAL PROCEDURES W/ CC
158	ANAL AND STOMAL PROCEDURES W/O CC
159	HERMIA PROCEDURES EXCEPT INGUINAL AND FEMORAL , AGE GREATER THAN 17 W/ CC
160	HERNIA PROCEDURES EXCEPT INGUINAL AND FEMORAL, AGE GREATER THAN 17 W/O CC
161	INGUINAL AND FEMORAL HERNIA PROCEDURES, AGE GREATER THAN 17 W/ CC
162	INGUINAL AND FEMORAL HERNIA PROCEDURES, AGE GREATER THAN 17 W/O CC
163	HERNIA PROCEDURES, AGE 0-17
164	APPENDECTOMY W/ COMPLICATED PRINCIPAL DIAGNOSIS W/ CC
165	APPENDECTOMY W/ COMPLICATED PRINCIPAL DIAGNOSIS WIHTOUT CC
166	APPENDECTOMY W/O COMPLICATED PRINCIPAL IAGNOSIS W/ CC

**Complications of Anesthesia (PSI 1)**

167	APPENDECTOMY W/O COMPLICATED PRINCIPAL DIAGNOSIS W/O CC
168	MOUTH PROCEDURES W/ CC
169	MOUTH PROCEDURES W/O CC
170	OTHER DIGESTIVE SYSTEM OR PROCEDURES W/ CC
171	OTHER DIGESTIVE SYSTEM OR PROCEDURES W/O CC
191	PANCREAS, LIVER AND SHUNT PROCEDURES W/ CC
192	PANCREAS, LIVER AND SHUNT PROCEDURES W/O CC
193	BILIARY TRACT PROCEDURES EXCEPT ONLY CHOLECYSTECTOMY W/ OR W/O COMMON DUCT EXPLORATION W/ CC
194	BILIARY TRACT PROCEDURES EXCEPT ONLY CHOLECYSTECTOMY W/ OR W/O COMMON DUCT EXPLORATION W/O CC
195	CHOLECYSTECTOMY W/ COMMON DUCT EXPLORATION W/ CC
196	CHOLECYSTECTOMY W/ COMMON DUCT EXPLORATION W/O CC
197	CHOLECYSTECTOMY EXCEPT BY LAPAROSCOPE W/O COMMON DUCT EXPLORATION W/ CC
198	CHOLECYSTECTOMY EXCEPT BY LAPAROSCOPE W/O COMMON DUCT EXPORTATION W/O CC
199	HEPATOBIILIARY DIAGNOSTIC PROCEDURE FOR MALIGNANCY
200	HEPATOBIILIARY DIAGNOSTIC PROCEDURE FOR NONMALIGNANCY
201	OTHER HEPATOBIILIARY OR PANCREAS OR PROCEDURES
209	MAJOR JOINT AND LIMB REATTACHMENT PROCEDURES OF LOWER EXTREMITY
210	HIP AND FEMUR PROCEDURES EXCEPT MAJOR JOINT PROCEDURES, AGE GREATER THAN 17 W/ CC
211	HIP AND FEMUR PROCEDURES EXCEPT MAJOR JOINT PROCEDURES, AGE GREATER THAN 17 W/O CC
212	HIP AND FEMUR PROCEDURES EXCEPT MAJOR JOINT PROCEDURE, AGE 0-17
213	AMPUTATION FOR MUSCULOSKELETAL SYSTEM AND CONNECTIVE TISSUE DISORDERS
214*	BACK & NECK PROCEDURES W CC
215*	BACK & NECK PROCEDURES W/O CC
216	BIOPSIES OF MUSCULOSKELETAL SYSTEM AND CONNECTIVE TISSUE
217	WOUND DEBRIDEMENT AND SKIN GRAFT EXCEPT HAND FOR MUSCULOSKELETAL AND CONNECTIVE TISSUE DISORDERS
218	LOWER EXTREMITY AND HUMERUS PROCEURES EXCEPT HIP, FOOT AND FEMUR, AGE GREATER THAN 17 W/ CC
219	LOWER EXTREMITY AND HUMERUS PROCEDURES EXCEPT HIP, FOOT AND FEMUR, AGE GREATER THAN 17 W/O CC
220	LOWER EXTREMITY AND HUMERUS PROCEDURES EXCEPT HIP, FOOT AND FEMUR, AGE 0-17
221*	KNEE PROCEDURES W CC
222*	KNEE PROCEDURES W/O CC
223	MAJOR SHOULDER/ELBOW PROCEDURES OR OTHER UPPER EXTREMITY PROCEDURES W/ CC
224	SHOULDER, ELBOW OR FOREARM PROCEDURES EXCEPT MAJOR JOINT PROCEDURES W/O CC
225	FOOT PROCEDURES
226	SOFT TISSUE PROCEDURES W/ CC
227	SOFT TISSUE PROCEDURES W/O CC
228	MAJOR THUMB OR JOINT PROCEDURES OR OTHER HAND OR WRIST PROCEDURES W/ CC
229	HAND OR WRIST PROCEDURES EXCEPT MAJOR JOINT PROCEDURES W/O CC
230	LOCAL EXCISION AND REMOVAL OF INTERNAL FIXATION DEVICES OF HIP AND FEMUR
231*	LOCAL EXCISION AND REMOVAL OF INTERNAL FIXATION DEVICES EXCEPT HIP AND FEMUR
232	ARTHROSCOPY
233	OTHER MUSCULOSKELETAL SYSTEM AND CONNECTIVE TISSUE OR PROCEDURES W/ CC
234	OTHER MUSCULOSKELETAL SYSTEM AND CONNECTIVE TISSUE OR PROCEDURES W/O CC
257	TOTAL MASTECTOMY FOR MALIGNANCY W/ CC
258	TOTAL MASTECTOMY FOR MALIGNANCY W/O CC
259	SUBTOTAL MASTECTOMY FOR MALIGNANCY W/ CC
260	SUBTOTAL MASTECTOMY FOR MALIGNANCY W/O CC
261	BREAST PROCEDURE FOR NONMALIGNANCY EXCEPT BIOPSY AND LOCAL EXCISION
262	BREAST BIOPSY AND LOCAL EXCISION FOR NONMALIGNANCY
263	SKIN GRAFT AND/OR DEBRIDEMENT FOR SKIN ULCER OR CELLULITIS W/ CC
264	SKIN GRAFT AND OR DEBRIDEMENT FOR SKIN ULCER OR CELLULITIS W/O CC
265	SKIN GRAFT AND OR DEBRIDEMENT EXCEPT FOR SKIN ULCER OR CELLULITIS W/ CC
266	SKIN GRAFT AND/OR DEBRIDEMENT EXCEPT FOR SKIN ULCER OR CELLUTLITIES W/O CC
267	PERIANAL AND PILONIDAL PROCEDURES
268	SKIN, SUBCUTANEOUS TISSUE AND BREAST PLASTIC PROCEDURES

## Complications of Anesthesia (PSI 1)

269	OTHER SKIN, SUBCUTANEOUS TISSUE AND BREAST PROCEDURES W/ CC
270	OTHER SKIN, SUBCUTANEOUS TISSUE AND BREAST PROCEDURES W/O CC
285	AMPUTATION OF LOWER LIMB FOR ENDOCRINE, NUTRITIONAL AND METABOLIC DISORDERS
286	ADRENAL AND PITUITARY PROCEDURES
287	SKIN GRAFTS AND WOUND DEBRIDEMENTS FOR ENDOCRINE, NUTRITIONAL AND METABOLIC DISORDERS
288	OR PROCEDURES FOR OBESITY
289	PARATHYROID PROCEDURES
290	THYROID PROCEDURES
291	THYROIDECTOMY PROCEDURES
292	OTHER ENDOCRINE, NUTRITIONAL AND METABOLIC OR PROCEDURES W/ CC
293	OTHER ENDOCRINE, NUTRITIONAL AND METABOLIC OR PROCEDURES W/O CC
302	KIDNEY TRANSPLANT
303	KIDNEY, URETER AND MAJOR BLADDER PROCEDURES FOR NEOPLASM
304	KIDNEY, URETER AND MAJOR BLADDER PROCEDURES FOR NONNEOPLASMS W/ CC
305	KIDNEY, URETER AND MAJOR BLADDER PROCEDURES FOR NONNEOPLASMS W/O CC
306	PROSTATECTOMY W/ CC
307	PROSTATECTOMY W/O CC
308	MINOR BLADDER PROCEDURES W/ CC
309	MINOR BLADDER PROCEDURES W/O CC
310	TRANSURETHRAL PROCEDURES W/ CC
311	TRANSURETHRAL PROCEDURES W/O CC
312	URETHRAL PROCEDURES, AGE GREATER THAN 17 W/ CC
313	URETHRAL PROCEDURES, AGE GREATER THAN 17 W/O CC
314	URETHRAL PROCEDURES, AGE 0-17
315	OTHER KIDNEY AND URINARY TRACT OR PROCEDURES
334	MAJOR MALE PELVIC PROCEDURES W/ CC
335	MAJOR MALE PELVIC PROCEDURES W/O CC
336	TRANSURETHRAL PROSTATECTOMY W/ CC
337	TRANSURETHRAL PROSTATECTOMY W/O CC
338	TESTES PROCEDURES FOR MALIGNANCY
339	TESTES PROCEDURES FOR NONMALIGNANCY, AGE GREATER THAN 17
340	TESTES PROCEDURES FOR NONMALIGNANCY, AGE 0-17
341	PENIS PROCEDURES
342	CIRCUMCISION, AGE GREATER THAN 17
343	CIRCUMCISION, AGE 0-17
344	OTHER MALE REPRODUCTIVE SYSTEM OR PROCEDURES FOR MALIGNANCY
345	OTHER MALE REPRODUCTIVE SYSTEM OR PROCEDURES EXCEPT FOR MALIGNANCY
353	PELVIC EVISCERATION, RADICAL HYSTERECTOMY AND RADICAL VULVECTOMY
354	UTERINE AND ADNEXA PROCEDURES FOR NONOVARIAN/ADNEXAL MALIGNANCY W/ CC
355	UTERINE AND ADNEXA PROCEDURES FOR NONOVARIAN/ADNEXA PROCEDURES W/O CC
356	FEMALE REPRODUCTIVE SYSTEM RECONSTRUCTIVE PROCEDURES
357	UTERINE AND ADNEXA PROCEDURES FOR OVARIAN OR ADNEXAL MALIGNANCY
358	UTERINE AND ADNEXA PROCEDURES FOR NONMALIGNANCY W/ CC
359	UTERINE AND ADNEXA PROCEDURES FOR NONMALIGNANCY W/O CC
360	VAGINA, CERVIX AND VULVA PROCEDURES
361	LAPAROSCOPY AND INCISIONAL TUBAL INTERRUPTION
362	ENDOSCOPIC TUBAL INTERRUPTION
363	D AND C, CONIZATION AND RADIOIMPLANT FOR MALIGNANCY
364	D AND C, CONIZATION EXCEPT FOR MALIGNANCY
365	OTHER FEMALE REPRODUCTIVE SYSTEM OR PROCEDURES
370	CESAREAN SECTION W/ CC
371	CESAREAN SECTION W/O CC
374	VAGINAL DELIVERY W/ STERILIZATION AND/OR D AND C
375	VAGINAL DELIVERY W/ OR PROCEDURE EXCEPT STERILIZATION AND/OR D AND C
377	POSTPARTUM AND POSTABORTION DIAGNOSES W/ OR PROCEDURE
381	ABORTION W/ D AND C ASPIRATION CURETTAGE OR HYSTERECTOMY
392	SPLENECTOMY, AGE GREATER THAN 17
393	SPLENECTOMY, AGE 0-17
394	OTHER OR PROCEDURES OF THE BLOOD AND BLOOD-FORMING ORGANS
400*	LYMPHOMA AND LEUKEMIA W/ MAJOR OR PROCEDURES

**Complications of Anesthesia (PSI 1)**

401	LYMPHOMA AND NONACUTE LEUKEMIA W/ OTHER OR PROCEDURE W/ CC
402	LYMPHOMA AND NONACUTE LEUKEMIA W/ OTHER OR PROCEDURE W/O CC
406	MYELOPROLIFERATIVE DISORDERS OR POORLY DIFFERENTIATED NEOPLASMS W/ MAJOR OR PROCEDURES W/ CC
407	MYELOPROLIFERATIVE DISORDERS OR POORLY DIFFERENTIATED NEOPLASMS W/ MAJOR OR PROCEDURES W/O CC
408	MYELOPROLIFERATIVE DISORDERS OR POORLY DIFFERENTIATED NEOPLASMS W/ OTHER OR PROCEDURES
415	OR PROCEDURE FOR INFECTIOUS AND PARASITIC DISEASES
424	OR PROCEDURES W/ PRINCIPAL DIAGNOSIS OF MENTAL ILLNESS
439	SKIN GRAFTS FOR INJURIES
440	WOUND DEBRIDEMENTS FOR INJURIES
441	HAND PROCEDURES FOR INJURIES
442	OTHER OR PROCEDURES FOR INJURIES W/ CC
443	OTHER OR PROCEDURES FOR INJURIES W/O CC
458*	NON-EXTENSIVE BURNS W SKIN GRAFT
459*	NON-EXTENSIVE BURNS W WOUND DEBRIDEMENT OR OTHER O.R. PROC
461	OR PROCEDURES W/ DIAGNOSES OF OTHER CONTACT W/ HEALTH SERVICES
468	EXTENSIVE OR PROCEDURE UNRELATED TO PRINCIPAL DIAGNOSIS
471	BILATERAL OR MULTIPLE MAJOR JOINT PROCEDURES OF LOWER EXTREMITY
472*	EXTENSIVE BURNS W O.R. PROCEDURE
476	PROSTATIC OR PROCEDURE UNRELATED TO PRINCIPAL DIAGNOSIS
477	NONEXTENSIVE OR PROCEDURE UNRELATED TO PRINCIPAL DIAGNOSIS
478	OTHER VASCULAR PROCEDURES W/ CC
479	OTHER VASCULAR PROCEDURES W/O CC
480	LIVER TRANSPLANT
481	BONE MARROW TRANSPLANT
482	TRACHEOSTOMY FOR FACE, MOUTH AND NECK DIAGNOSES
483	TRACHEOSTOMY EXCEPT FOR FACE, MOUTH AND NECK DIAGNOSES
484	CRANIOTOMY FOR MULTIPLE SIGNIFICANT TRAUMA
485	LIMB REATTACHMENT, HIP AND FEMUR PROCEDURES FOR MULTIPLE SIGNIFICANT TRAUMA
486	OTHER OR PROCEDURES FOR MULTIPLE SIGNIFICANT TRAUMA
488	HIV W/ EXTENSIVE OR PROCEDURE
491	MAJOR JOINT AND LIMB REATTACHMENT PROCEDURES OF UPPER EXTREMITY
493	LAPAROSCOPIC CHOLECYSTECTOMY W/O COMMON DUCT EXPLORATION W/ CC
494	LAPAROSCOPIC CHOLECYSTECTOMY W/O COMMON DUCT EXPLORATION W/O CC
495	LUNG TRANSPLANT
496	COMBINED ANTERIOR/POSTERIOR SPINAL FUSION
497	SPINAL FUSION W/ CC
498	SPINAL FUSION W/O CC
499	BACK AND NECK PROCEDURES EXCEPT SPINAL FUSION W/ CC
500	BACK AND NECK PROCEDURES EXCEPT SPINAL FUSION W/O CC
501	KNEE PROCEDURES W/ PRINCIPAL DIAGNOSIS OF INFECTION, W/ CC
502	KNEE PROCEDURES W/ PRINCIPAL DIAGNOSIS OF INFECTION, W/O CC
503	KNEE PROCEDURES W/O PRINCIPAL DIAGNOSIS OF INFECTION
504	EXTENSIVE 3RD DEGREE BURNS W SKIN GRAFT
506	FULL THICKNESS BURN W SKIN GRAFT OR INHAL INJ W CC OR SIG TRAUMA
507	FULL THICKNESS BURN W SKIN GRFT OR INHAL INJ W/O CC OR SIG TRAUMA
512	SIMULTANEOUS PANCREAS/KIDNEY TRANSPLANT
513	PANCREAS TRANSPLANT
514*	CARDIAC DEFIBRILLATOR IMPLANT W CARDIAC CATH
515	CARDIAC DEFIBRILLATOR IMPLANT W/O CARDIAC CATH
516	PERCUTANEOUS CARDIOVASC PROC W AMI
517	PERC CARDIO PROC W NON-DRUG ELUTING STENT W/O AMI
518	PERC CARDIO PROC W/O CORONARY ARTERY STENT OR AMI
519	CERVICAL SPINAL FUSION W CC
520	CERVICAL SPINAL FUSION W/O CC
525	HEART ASSIST SYSTEM IMPLANT (OCT 02)
526	PERCUTNEOUS CARDIOVASULAR PROC W DRUG ELUTING STENT W AMI (APR 03)
527	PERCUTNEOUS CARDIOVASULAR PROC W DRUG ELUTING STENT W/O AMI (APR 03)
528	INTRACRANIAL VASCULAR PROC W PDX HEMORRHAGE (OCT 03)

## Complications of Anesthesia (PSI 1)

529	VENTRICULAR SHUNT PROCEDURES W CC (OCT 03)
530	VENTRICULAR SHUNT PROCEDURES W/O CC (OCT 03)
531	SPINAL PROCEDURES W CC (OCT 03)
532	SPINAL PROCEDURES W/O CC (OCT 03)
533	EXTRACRANIAL PROCEDURES W CC (OCT 03)
534	EXTRACRANIAL PROCEDURES W/O CC (OCT 03)
535	CARDIAC DEFIB IMPLANT W CARDIAC CATH W AMI/HF/SHOCK (OCT 03)
536	CARDIAC DEFIB IMPLANT W CARDIAC CATH W/O AMI/HF/SHOCK (OCT 03)
537	LOCAL EXCIS & REMOV OF INT FIX DEV EXCEPT HIP & FEMUR W CC (OCT 03)
538	LOCAL EXCIS & REMOV OF INT FIX DEV EXCEPT HIP & FEMUR W/O CC (OCT 03)
539	LYMPHOMA & LEUKEMIA W MAJOR OR PROCEDURE W CC (OCT 03)
540	LYMPHOMA & LEUKEMIA W MAJOR OR PROCEDURE W/O CC (OCT 03)

\* No longer valid in FY2004

### Exclude:

Patients with ICD-9-CM diagnosis codes for anesthesia complications in the principal diagnosis field

Patients with codes for poisoning due to anesthetics (E8551, 9681-4, 9687) **and** any diagnosis code for active drug dependence, active nondependent abuse of drugs, or self-inflicted injury.

### ICD-9-CM Active Drug Dependence diagnosis codes:

30400	OPIOID TYPE DEPENDENCE - UNSPECIFIED
30401	OPIOID TYPE DEPENDENCE - CONTINUOUS
30402	OPIOID TYPE DEPENDENCE - EPISODIC
30410	BARBITURATE AND SIMILARLY ACTING SEDATIVE OR HYPNOTIC DEPENDENCE - UNSPECIFIED
30411	BARBITURATE AND SIMILARLY ACTING SEDATIVE OR HYPNOTIC DEPENDENCE - CONTINUOUS
30412	BARBITURATE AND SIMILARLY ACTING SEDATIVE OR HYPNOTIC DEPENDENCE - EPISODIC
30420	COCAINE DEPENDENCE - UNSPECIFIED
30421	COCAINE DEPENDENCE - CONTINUOUS
30422	COCAINE DEPENDENCE - EPISODIC
30430	CANNABIS DEPENDENCE - UNSPECIFIED
30431	CANNABIS DEPENDENCE - CONTINUOUS
30432	CANNABIS DEPENDENCE - EPISODIC
30440	AMPHETAMINE AND OTHER PSYCHO STIMULANT DEPENDENCE - UNSPECIFIED
30441	AMPHETAMINE AND OTHER PSYCHO STIMULANT DEPENDENCE - CONTINUOUS
30442	AMPHETAMINE AND OTHER PSYCHO STIMULANT DEPENDENCE - EPISODIC
30450	HALLUCINOGEN DEPENDENCE - UNSPECIFIED
30451	HALLUCINOGEN DEPENDENCE - CONTINUOUS
30452	HALLUCINOGEN DEPENDENCE - EPISODIC
30460	OTHER SPECIFIED DRUG DEPENDENCE - UNSPECIFIED
30461	OTHER SPECIFIED DRUG DEPENDENCE - CONTINUOUS
30462	OTHER SPECIFIED DRUG DEPENDENCE - EPISODIC
30470	COMBINATIONS OF OPIOID TYPE DRUG W/ ANY OTHER - UNSPECIFIED
30471	COMBINATIONS OF OPIOID TYPE DRUG W/ ANY OTHER - CONTINUOUS
30472	COMBINATIONS OF OPIOID TYPE DRUG W/ ANY OTHER - EPISODIC
30480	COMBINATIONS OF DRUG EXCLUDING OPIOID TYPE DRUG - UNSPECIFIED
30481	COMBINATIONS OF DRUG EXCLUDING OPIOID TYPE DRUG - CONTINUOUS
30482	COMBINATIONS OF DRUG EXCLUDING OPIOID TYPE DRUG - EPISODIC
30490	UNSPECIFIED DRUG DEPENDENCE - UNSPECIFIED
30491	UNSPECIFIED DRUG DEPENDENCE - CONTINUOUS
30492	UNSPECIFIED DRUG DEPENDENCE - EPISODIC

### ICD-9-CM Active Nondependent Abuse of Drugs diagnosis codes:

30520	CANNABIS ABUSE - UNSPECIFIED
30521	CANNABIS ABUSE - CONTINUOUS
30522	CANNABIS ABUSE - EPISODIC

## Complications of Anesthesia (PSI 1)

30530 HALLUCINOGEN ABUSE - UNSPECIFIED  
30531 HALLUCINOGEN ABUSE - CONTINUOUS  
30532 HALLUCINOGEN ABUSE - EPISODIC  
30540 BARBITURATE AND SIMILARLY ACTING SEDATIVE OR HYPNOTIC ABUSE - UNSPECIFIED  
30541 BARBITURATE AND SIMILARLY ACTING SEDATIVE OR HYPNOTIC ABUSE - CONTINUOUS  
30542 BARBITURATE AND SIMILARLY ACTING SEDATIVE OR HYPNOTIC ABUSE - EPISODIC  
30550 OPIOID ABUSE - UNSPECIFIED  
30551 OPIOID ABUSE - CONTINUOUS  
30552 OPIOID ABUSE - EPISODIC  
30560 COCAINE ABUSE - UNSPECIFIED  
30561 COCAINE ABUSE - CONTINUOUS  
30562 COCAINE ABUSE - EPISODIC  
30570 AMPHETAMINE OR RELATED ACTING SYMPATHOMIMETIC ABUSE - UNSPECIFIED  
30571 AMPHETAMINE OR RELATED ACTING SYMPATHOMIMETIC ABUSE - CONTINUOUS  
30572 AMPHETAMINE OR RELATED ACTING SYMPATHOMIMETIC ABUSE - EPISODIC  
30580 ANTIDEPRESSANT TYPE ABUSE - UNSPECIFIED  
30581 ANTIDEPRESSANT TYPE ABUSE - CONTINUOUS  
30582 ANTIDEPRESSANT TYPE ABUSE - EPISODIC  
30590 OTHER, MIXED, OR UNSPECIFIED DRUG ABUSE - UNSPECIFIED  
30591 OTHER, MIXED, OR UNSPECIFIED DRUG ABUSE - CONTINUOUS  
30592 OTHER, MIXED, OR UNSPECIFIED DRUG ABUSE - EPISODIC

### *ICD-9-CM Self-Inflicted Injury diagnosis codes:*

#### Suicide and self-inflicted poisoning by solid or liquid substance:

E9500 ANALGESICS, ANTIPYRETICS, AND ANTIRHEUMATICS  
E9501 BARBITURATES  
E9502 OTHER SEDATIVE AND HYPNOTICS  
E9503 TRANQUILIZERS AND OTHER PSYCHOTROPIC AGENTS  
E9504 OTHER SPECIFIED DRUGS AND MEDICINAL SUBSTANCES  
E9505 UNSPECIFIED DRUG OR MEDICINAL SUBSTANCE  
E9506 AGRICULTURAL AND HORTICULTURAL CHEMICAL AND PHARMACEUTICAL PREPARATIONS  
OTHER THAN PLANT FOODS AND FERTILIZERS  
E9507 CORROSIVE AND CAUSTIC SUBSTANCES  
E9508 ARSENIC AND ITS COMPOUNDS  
E9509 OTHER AND UNSPECIFIED SOLID AND LIQUID SUBSTANCES

#### Suicide and self-inflicted poisoning by gases in domestic use:

E9510 GAS DISTRIBUTED BY PIPELINE  
E9511 LIQUEFIED PETROLEUM GAS DISTRIBUTED IN MOBILE CONTAINERS  
E9518 OTHER UTILITY GASES

#### Suicide and self-inflicted poisoning by other gases and vapors:

E9520 MOTOR VEHICLE EXHAUST GAS  
E9521 OTHER CARBON MONOXIDE  
E9528 OTHER SPECIFIED GASES AND VAPORS  
E9529 UNSPECIFIED GASES AND VAPORS

#### Suicide and self-inflicted injury by hanging, strangulation, and suffocation:

E9530 HANGING  
E9531 SUFFOCATION BY PLASTIC BAG  
E9538 OTHER SPECIFIED MEANS  
E954 SUICIDE AND SELF-INFLECTED INJURY BY SUBMERSION [DROWNING]

### Complications of Anesthesia (PSI 1)

Suicide and self-inflicted injury by firearms and explosives:

E9550 HANDGUN  
E9551 SHOTGUN  
E9552 HUNTING RIFLE  
E9553 MILITARY FIREARMS  
E9554 OTHER AND UNSPECIFIED FIREARMS  
E9555 EXPLOSIVES  
E9559 UNSPECIFIED  
E956 SUICIDE AND SELF INFLICTED INJURY BY CUTTING AND PIERCING INSTRUMENT

Suicide and self-inflicted injury by jumping from a high place:

E9570 RESIDENTIAL PREMISES  
E9571 OTHER MAN-MADE STRUCTURES  
E9572 NATURAL SITES  
E9579 UNSPECIFIED

Suicide and self-inflicted injury by other and unspecified means:

E9580 JUMPING OR LYING BEFORE MOVING OBJECT  
E9581 BURNS, FIRE  
E9582 SCALD  
E9583 EXTREMES OF COLD  
E9584 ELECTROCUTION  
E9585 CRASHING OF MOTOR VEHICLE  
E9586 CRASHING OF AIRCRAFT  
E9587 CAUSTIC SUBSTANCES EXCEPT POISONING  
E9588 OTHER SPECIFIED MEANS  
E9589 UNSPECIFIED MEANS

### Death in Low-Mortality DRGs (PSI 2)

#### Numerator:

Discharges with disposition of "deceased".

#### Denominator:

Discharges in DRGs with less than 0.5% mortality rate, based on NIS 1997 low-mortality DRG. If a DRG is divided into "without/with complications," both DRGs must have mortality rates below 0.5% to qualify for inclusion.

#### *Low-Mortality DRGs:*

#### Adult Medical:

015 TRANSIENT ISCHEMIC ATTACK AND PRECEREBRAL OCCLUSIONS  
021 VIRAL MENINGITIS  
044 ACUTE MAJOR EYE INFECTIONS  
045 NEUROLOGICAL EYE DISORDERS  
065 DYSEQUILIBRIUM  
068 OTITIS MEDIA AND URI, AGE GREATER THAN 17 W/ CC  
071 LARYNGOTRACHEITIS  
096 BRONCHITIS AND ASTHMA, AGE GREATER THAN 17 W/ CC  
097 BRONCHITIS AND ASTHMA, AGE GREATER THAN 17 W/O CC

## Death in Low-Mortality DRGs (PSI 2)

125 CIRCULATORY DISORDERS EXCEPT ACUTE MYOCARDIAL INFARCTION W/ CARDIAC  
CATHETERIZATION W/O COMPLEX DIAGNOSIS  
134 HYPERTENSION  
140 ANGINA PECTORIS  
141 SYNCOPE AND COLLAPSE W/ CC  
142 SYNCOPE AND COLLAPSE W/O CC  
143 CHEST PAIN  
243 MEDICAL BACK PROBLEMS  
246 NONSPECIFIC ARTHROPATHIES  
295 DIABETES, AGE 0-35  
317 ADMISSION FOR RENAL DIALYSIS  
323 URINARY STONES W/ CC AND/OR ESW LITHOTRIPSY  
324 URINARY STONES W/O CC  
351 STERILIZATION, MALE  
369 MENSTRUAL AND OTHER FEMALE REPRODUCTIVE SYSTEM DISORDERS  
421 VIRAL ILLNESS, AGE GREATER THAN 17

### Pediatric Medical:

026 SEIZURE AND HEADACHE, AGE 0-17  
070 OTITIS MEDIA AND URI, AGE 0-17  
074 OTHER EAR, NOSE, MOUTH AND THROAT DIAGNOSES, AGE 0-17  
091 SIMPLE PNEUMONIA AND PLEURISY, AGE 0-17  
098 BRONCHITIS AND ASTHMA, AGE 0-17  
184 ESOPHAGITIS, GASTROENTERITIS AND MISCELLANEOUS DIGESTIVE DISORDERS, AGE 0-17  
190 OTHER DIGESTIVE SYSTEM DIAGNOSES, AGE 0-17  
252 FRACTURES, SPRAINS, STRAINS AND DISLOCATIONS OF FOREARM, HAND AND FOOT, AGE 0-17  
255 FRACTURES, SPRAINS, STRAINS AND DISLOCATIONS OF UPPER ARM AND LOWER LEG EXCEPT  
FOOT, AGE 0-17  
279 CELLULITIS, AGE 0-17  
282 TRAUMA TO SKIN, SUBCUTANEOUS TISSUE AND BREAST, AGE 0-17  
298 NUTRITIONAL AND MISCELLANEOUS METABOLIC DISORDERS, AGE GREATER THAN 17 W/O CC  
322 KIDNEY AND URINARY TRACT INFECTION, AGE 0-17  
333 OTHER KIDNEY AND URINARY TRACT DIAGNOSES, AGE 0-17  
396 RED BLOOD CELL DISORDERS, AGE 0-17  
422 VIRAL ILLNESS AND FEVER OF UNKNOWN ORIGIN, AGE 0-17  
448 ALLERGIC REACTIONS, AGE 0-17  
451 POISONING AND TOXIC EFFECTS OF DRUGS, AGE 0-17

### Adult Surgical:

036 RETINAL PROCEDURES  
037 ORBITAL PROCEDURES  
042 INTRAOCULAR PROCEDURES  
050 SIALOADENECTOMY  
052 CLEFT LIP AND PALATE REPAIR  
053 SINUS AND MASTOID PROCEDURES, AGE GREATER THAN 17  
055 MISCELLANEOUS EAR, NOSE, MOUTH AND THROAT PROCEDURES  
057 TONSILLECTOMY AND ADENOIDECTOMY PROCEDURES EXCEPT TONSILLECTOMY AND/OR  
ADENOIDECTOMY ONLY, AGE GREATER THAN 17  
063 OTHER EAR, NOSE, MOUTH AND THROAT OR PROCEDURES  
166 APPENDECTOMY W/O COMPLICATED PRINCIPAL DIAGNOSIS W/ CC  
167 APPENDECTOMY W/O COMPLICATED PRINCIPAL DIAGNOSIS W/O CC  
218 LOWER EXTREMITY AND HUMERUS PROCEDURES EXCEPT HIP, FOOT AND FEMUR, AGE  
GREATER THAN 17 W/ CC  
219 LOWER EXTREMITY AND HUMERUS PROCEDURES EXCEPT HIP, FOOT AND FEMUR, AGE  
GREATER THAN 17 W/O CC  
223 MAJOR SHOULDER, ELBOW PROCEDURES OR OTHER UPPER EXTREMITY PROCEDURES W/ CC  
224 SHOULDER, ELBOW OR FOREARM PROCEDURES EXCEPT MAJOR JOINT PROCEDURES W/O CC  
225 FOOT PROCEDURES

## Death in Low-Mortality DRGs (PSI 2)

228 MAJOR THUMB OR JOINT PROCEDURES OR OTHER HAND OR WRIST PROCEDURES W/ CC  
229 HAND OR WRIST PROCEDURES EXCEPT MAJOR JOINT PROCEDURES W/O CC  
232 ARTHROSCOPY  
261 BREAST PROCEDURE FOR NONMALIGNANCY EXCEPT BIOPSY AND LOCAL EXCISION  
262 BREAST BIOPSY AND LOCAL EXCISION OF NONMALIGNANCY  
267 PERIANAL AND PILONICAL PROCEDURES  
289 PARATHYROID PROCEDURES  
290 THYROID PROCEDURES  
293 OTHER ENDOCRINE, NUTRITIONAL AND METABOLIC OR PROCEDURES W/O CC  
334 MAJOR MALE PELVIC PROCEDURES W/ CC  
335 MAJOR MALE PELVIC PROCEDURES W/O CC  
336 TRANSURETHRAL PROSTATECTOMY W/ CC  
337 TRANSURETHRAL PROSTATECTOMY W/O CC  
356 FEMALE REPRODUCTION SYSTEM RECONSTRUCTIVE PROCEDURES  
358 UTERINE AND ADNEXA PROCEDURES FOR NONMALIGNANCY W/ CC  
359 UTERINE AND ADNEXA PROCEDURES FOR NONMALIGNANCY W/O CC  
360 VAGINA, CERVIX AND VULVA PROCEDURES  
361 LAPAROSCOPY AND INCISIONAL TUBAL INTERRUPTION  
362 ENDOSCOPIC TUBAL INTERRUPTION  
364 D AND C, CONIZATION EXCEPT FOR MALIGNANCY  
439 SKIN GRAFTS FOR INJURIES  
499 BACK AND NECK PROCEDURES EXCEPT SPINAL FUSION W/ CC  
500 BACK AND NECK PROCEDURES EXCEPT SPINAL FUSION W/O CC

### Pediatric Surgical:

060 TONSILLECTOMY AND/OR ADENOIDECTOMY ONLY, AGE 0-17  
062 MYRINGOTOMY W/ TUBE INSERTION, AGE 0-17  
156 STOMACH, ESOPHAGEAL AND DUODENAL PROCEDURES, AGE 0-17  
163 HERNIA PROCEDURES, AGE 0-17  
212 HIP AND FEMUR PROCEDURES EXCEPT MAJOR JOINT PROCEDURES, AGE 0-17  
220 LOWER EXTREMITY AND HUMEROUS PROCEDURES EXCEPT HIP, FOOT AND FEMUR, AGE 0-17  
393 SPLENECTOMY, AGE 0-17

### Obstetric:

370 CESAREAN SECTION W/ CC  
371 CESAREAN SECTION W/O CC  
372 VAGINAL DELIVERY W/ COMPLICATING DIAGNOSES  
373 VAGINAL DELIVERY W/O COMPLICATING DIAGNOSES  
374 VAGINAL DELIVERY W/ STERILIZATION AND/OR D AND C  
375 VAGINAL DELIVERY W/ OR PROCEDURE EXCEPT STERILIZATION AND OR D AND C  
377 POSTPARTUM AND POSTABORTION DIAGNOSES W/ OR PROCEDURE  
378 ECTOPIC PREGNANCY  
379 THREATENED ABORTION  
380 ABORTION W/O D AND C  
381 ABORTION W/ D AND C, ASPIRATION CURETTAGE OR HYTEROTOMY  
382 FALSE LABOR  
383 OTHER ANTEPARTUM DIAGNOSES W/ MEDICAL COMPLICATIONS  
384 OTHER ANTEPARTUM DIAGNOSES W/O MEDICAL COMPLICATIONS

### Psychiatric:

425 ACUTE ADJUSTMENT REACTIONS AND DISTURBANCES OF PSYCHOSOCIAL DYSFUNCTION  
426 DEPRESSIVE NEUROSES  
427 NEUROSES EXCEPT DEPRESSIVE  
428 DISORDERS OF PERSONALITY AND IMPULSE CONTROL  
431 CHILDHOOD MENTAL DISORDERS  
432 OTHER MENTAL DISORDER DIAGNOSES  
434\* ALCOHOL/DRUG ABUSE OR DEPENDENCE, DETOXIFICATION OR OTHER SYMPTOMATIC TREATMENT W/ CC

## Death in Low-Mortality DRGs (PSI 2)

- 435\* ALCOHOL/DRUG ABUSE OR DEPENDENCE, DETOXIFICATION OR OTHER SYMPTOMATIC TREATMENT W/O CC  
436\* ALCOHOL/DRUG DEPENDENCE W/ REHABILITATION THERAPY

\* No longer valid in FY 2004

### Exclude:

Patients with any code for trauma, immunocompromised state, or cancer.

*ICD-9-CM Trauma diagnosis codes (includes 4<sup>th</sup> and 5<sup>th</sup> digits), New codes are listed through 5<sup>th</sup> digit:*

- 800 FRACTURE OF VAULT OF SKULL  
801 FRACTURE OF BASE OF SKULL  
802 FRACTURE OF FACE BONES  
803 OTHER AND UNQUALIFIED SKULL FRACTURES  
804 MULTIPLE FRACTURES INVOLVING SKULL OR FACE W/ OTHER BONES  
805 FRACTURE OF VERTEBRAL COLUMN W/O MENTION OF SPINAL CORD INJURY  
806 FRACTURE OF VERTEBRAL COLUMN W/ SPINAL CORD INJURY  
807 FRACTURE OF RIB[S] STERNUM, LARYNX, AND TRACHEA  
808 FRACTURE OF PELVIS  
809 ILL-DEFINED FRACTURES OF BONES OF TRUNK  
810 FRACTURE OF CLAVICLE  
811 FRACTURE OF SCAPULA  
812 FRACTURE OF HUMERUS  
813 FRACTURE OF RADIUS AND ULNA  
814 FRACTURE OF CARPAL BONE[S]  
815 FRACTURE OF METACARPAL BONE[S]  
817 MULTIPLE FRACTURE OF HAND BONES  
818 ILL-DEFINED FRACTURES OF UPPER LIMB  
819 MULTIPLE FRACTURES INVOLVING BOTH UPPER LIMBS, AND UPPER LIMB W/ RIB AND STERNUM  
820 FRACTURE OF NECK OF FEMUR  
821 FRACTURE OF OTHER AND UNSPECIFIED PARTS OF FEMUR  
822 FRACTURE OF PATELLA  
823 FRACTURE OF TIBIA AND FIBULA  
824 FRACTURE OF ANKLE  
825 FRACTURE OF ONE OR MORE TARSAL AND METATARSAL BONES  
827 OTHER, MULTIPLE, AND ILL-DEFINED FRACTURES OF LOWER LIMB  
828 MULTIPLE FRACTURES INVOLVING BOTH LOWER LIMBS, LOWER W/ UPPER LIMB, AND LOWER LIMB W/ RIB AND STERNUM  
829 FRACTURE OF UNSPECIFIED BONES  
830 DISLOCATION OF JAW  
831 DISLOCATION OF SHOULDER  
832 DISLOCATION OF ELBOW  
833 DISLOCATION OF WRIST  
835 DISLOCATION OF HIP  
836 DISLOCATION OF KNEE  
837 DISLOCATION OF ANKLE  
838 DISLOCATION OF FOOT  
839 OTHER, MULTIPLE, AND ILL-DEFINED DISLOCATIONS  
850 CONCUSSION  
85011 CONCUSSION W/ BRIEF COMA <31 MINUTES (OCT 03)  
85012 CONCUSSION W/ BRIEF COMA 31-59 MINUTES (OCT 03)  
851 CEREBRAL LACERATION AND CONTUSION  
852 SUBARACHNOID, SUBDURAL, AND EXTRADURAL HEMORRHAGE, FOLLOWING INJURY  
853 OTHER AND UNSPECIFIED INTRACRANIAL HEMORRHAGE FOLLOWING INJURY  
854 INTRACRANIAL INJURY OF OTHER AND UNSPECIFIED NATURE  
860 TRAUMATIC PNEUMOTHORAX  
861 INJURY TO HEART AND LUNG  
862 INJURY TO OTHER AND UNSPECIFIED INTRATHORACIC ORGANS  
863 INJURY TO GASTROINTESTINAL TRACT  
864 INJURY TO LIVER

**Death in Low-Mortality DRGs (PSI 2)**

865	INJURY TO SPLEEN
866	INJURY TO KIDNEY
867	INJURY TO PELVIC ORGANS
868	INJURY TO OTHER INTRA-ABDOMINAL ORGANS
869	INTERNAL INJURY TO UNSPECIFIED OR ILL-DEFINED ORGANS
870	OPEN WOUND OF OCULAR ADNEXA
871	OPEN WOUND OF EYEBALL
872	OPEN WOUND OF EAR
873	OTHER OPEN WOUND OF HEAD
874	OPEN WOUND OF NECK
875	OPEN WOUND OF CHEST [WALL]
876	OPEN WOUND OF BACK
877	OPEN WOUND OF BUTTOCK
878	OPEN WOUND OF GENITAL ORGANS [EXTERNAL] INCLUDING TRAUMATIC AMPUTATION
879	OPEN WOUND OF OTHER AND UNSPECIFIED SITES, EXCEPT LIMBS
880	OPEN WOUND OF SHOULDER AND UPPER ARM
881	OPEN WOUND OF ELBOW, FOREARM, AND WRIST
882	OPEN WOUND OF HAND EXCEPT FINGER ALONE
884	MULTIPLE AND UNSPECIFIED OPEN WOUND OF UPPER LIMB
887	TRAUMATIC AMPUTATION OF ARM AND HAND (COMPLETE) (PARTIAL)
890	OPEN WOUND OF HIP AND THIGH
891	OPEN WOUND OF KNEE, LEG (EXCEPT THIGH) AND ANKLE
892	OPEN WOUND OF FOOT EXCEPT TOE ALONE
894	MULTIPLE AND UNSPECIFIED OPEN WOUND OF LOWER LIMB
896	TRAUMATIC AMPUTATION OF FOOT (COMPLETE) (PARTIAL)
897	TRAUMATIC AMPUTATION OF LEG[S] (COMPLETE) (PARTIAL)
900	INJURY TO BLOOD VESSELS OF HEAD AND NECK
901	INJURY TO BLOOD VESSELS OF THORAX
902	INJURY TO BLOOD VESSELS OF ABDOMEN AND PELVIS
903	INJURY TO BLOOD VESSELS OF UPPER EXTREMITY
904	INJURY TO BLOOD VESSELS OF LOWER EXTREMITY AND UNSPECIFIED SITES
925	CRUSHING INJURY OF FACE, SCALP, AND NECK
926	CRUSHING INJURY OF TRUNK
927	CRUSHING INJURY OF UPPER LIMB
928	CRUSHING INJURY OF LOWER LIMB
929	CRUSHING INJURY OF MULTIPLE AND UNSPECIFIED SITES
940	BURN CONFINED TO EYE AND ADNEXA
941	BURN OF FACE, HEAD, AND NECK
942	BURN OF TRUNK
943	BURN OF UPPER LIMB, EXCEPT WRIST AND HAND
944	BURN OF WRIST[S] AND HAND[S]
945	BURN OF LOWER LIMB[S]
946	BURNS OF MULTIPLE SPECIFIED SITES
947	BURN OF INTERNAL ORGANS
948	BURNS CLASSIFIED ACCORDING TO EXTENT OF BODY SURFACE INVOLVED
949	BURN, UNSPECIFIED
952	SPINAL CHORD INJURY W/O EVIDENCE OF SPINAL BONE INJURY
953	INJURY TO NERVE ROOTS AND SPINAL PLEXUS
958	CERTAIN EARLY COMPLICATIONS OF TRAUMA

*ICD-9-CM Immunocompromised States diagnosis codes:*

042	HUMAN IMMUNODEFICIENCY VIRUS DISEASE
1363	PNEUMOCYSTOSIS
27900	HYPOGAMMAGLOBULINEMIA NOS
27901	SELECTIVE IGA IMMUNODEFICIENCY
27902	SELECTIVE IGM IMMUNODEFICIENCY
27903	OTHER SELECTIVE IMMUNOGLOBULIN DEFICIENCIES
27904	CONGENITAL HYPOGAMMAGLOBULINEMIA
27905	IMMUNODEFICIENCY W/ INCREASED IGM
27906	COMMON VARIABLE IMMUNODEFICIENCY

## Death in Low-Mortality DRGs (PSI 2)

27909 HUMORAL IMMUNITY DEFICIENCY NEC  
27910 IMMUNODEFICIENCY W/ PREDOMINANT T-CELL DEFECT, NOS  
27911 DIGEORGE'S SYNDROME  
27912 WISKOTT-ALDRICH SYNDROME  
27913 NEZELOF'S SYNDROME  
27919 DEFICIENCY OF CELL-MEDIATED IMMUNITY, NOS  
2792 COMBINED IMMUNITY DEFICIENCY  
2793 UNSPECIFIED IMMUNITY DEFICIENCY  
2794 AUTOIMMUNE DISEASE, NOT ELSEWHERE CLASSIFIED  
2798 OTHER SPECIFIED DISORDERS INVOLVING THE IMMUNE MECHANISM  
2799 UNSPECIFIED DISORDER OF IMMUNE MECHANISM

### Complications of transplanted organ:

9968 COMPLICATIONS OF TRANSPLANTED ORGAN  
99680 TRANSPLANTED ORGAN, UNSPECIFIED  
99681 KIDNEY TRANSPLANT  
99682 LIVER TRANSPLANT  
99683 HEART TRANSPLANT  
99684 LUNG TRANSPLANT  
99685 BONE MARROW TRANSPLANT  
99686 PANCREAS TRANSPLANT  
99687 INTESTINE TRANSPLANT  
99689 OTHER SPECIFIED ORGAN TRANSPLANT  
V420 KIDNEY REPLACED BY TRANSPLANT  
V421 HEART REPLACED BY TRANSPLANT  
V426 LUNG REPLACED BY TRANSPLANT  
V427 LIVER REPLACED BY TRANSPLANT  
V428 OTHER SPECIFIED ORGAN OR TISSUE  
V4281 BONE MARROW REPLACED BY TRANSPLANT  
V4282 PERIPHERAL STEM CELLS REPLACED BY TRANSPLANT  
V4283 PANCREAS REPLACED BY TRANSPLANT  
V4284 INTESTINES REPLACE BY TRANSPLANT  
V4289 OTHER REPLACED BY TRANSPLANT

### ICD-9-CM Immunocompromised States procedure codes:

335 LUNG TRANSPLANTATION  
3350 LUNG TRANSPLANTATION, NOS  
3351 UNILATERAL LUNG TRANSPLANTATION  
3352 BILATERAL LUNG TRANSPLANTATION  
336 COMBINED HEART-LUNG TRANSPLANTATION  
375 HEART TRANSPLANTATION  
3751 HEART TRANSPLANTATION (OCT 03)  
410 OPERATIONS ON BONE MARROW AND SPLEEN  
4100 BONE MARROW TRANSPLANT, NOS  
4101 AUTOLOGOUS BONE MARROW TRANSPLANT W/O PURGING  
4102 ALLOGENEIC BONE MARROW TRANSPLANT W/ PURGING  
4103 ALLOGENEIC BONE MARROW TRANSPLANT W/O PURGING  
4104 AUTOLOGOUS HEMATOPOIETIC STEM CELL TRANSPLANT W/O PURGING  
4105 ALLOGENEIC HEMATOPOIETIC STEM CELL TRANSPLANT W/O PURGING  
4106 CORD BLOOD STEM CELL TRANSPLANT  
4107 AUTOLOGOUS HEMATOPOIETIC STEM CELL TRANSPLANT W/ PURGING  
4108 ALLOGENEIC HEMATOPOIETIC STEM CELL TRANSPLANT W/ PURGING  
4109 AUTOLOGOUS BONE MARROW TRANSPLANT W/ PURGING  
5051 AUXILIARY LIVER TRANSPLANT  
5059 LIVER TRANSPLANT, NEC  
5280 PANCREATIC TRANSPLANT, NOS  
5281 REIMPLANTATION OF PANCREATIC TISSUE  
5282 HOMOTRANSPLANT OF PANCREAS  
5283 HETEROTRANSPLANT OF PANCREAS

**Death in Low-Mortality DRGs (PSI 2)**

5285 ALLOTRANSPLANTATION OF CELLS OF ISLETS OF LANGERHANS  
5286 TRANSPLANTATION OF CELLS OF ISLETS OF LANGERHANS, NOS  
5569 OTHER KIDNEY TRANSPLANTATION

*ICD-9-CM Cancer diagnosis codes (includes 4<sup>th</sup> and 5<sup>th</sup> digits):*

140 MALIGNANT NEOPLASM OF LIP  
141 MALIGNANT NEOPLASM OF TONGUE  
142 MALIGNANT NEOPLASM OF MAJOR SALIVARY GLANDS  
143 MALIGNANT NEOPLASM OF GUM  
144 MALIGNANT NEOPLASM OF FLOOR OF MOUTH  
145 MALIGNANT NEOPLASM OF OTHER AND UNSPECIFIED PARTS OF MOUTH  
146 MALIGNANT NEOPLASM OF OROPHARYNX  
147 MALIGNANT NEOPLASM OF NASOPHARYNX  
148 MALIGNANT NEOPLASM OF HYPOPHARYNX  
149 MALIGNANT NEOPLASM OF OTHER AND ILL-DEFINED SITES WITHIN THE LIP, ORAL CAVITY, AND PHARYNX  
150 MALIGNANT NEOPLASM OF ESOPHAGUS  
151 MALIGNANT NEOPLASM OF STOMACH  
152 MALIGNANT NEOPLASM OF SMALL INTESTINE, INCLUDING DUODENUM  
153 MALIGNANT NEOPLASM OF COLON  
154 MALIGNANT NEOPLASM OF RECTUM, RECTOSIGMOID JUNCTION, AND ANUS  
155 MALIGNANT NEOPLASM OF LIVER AND INTRAHEPATIC BILE DUCTS  
156 MALIGNANT NEOPLASM OF GALLBLADDER AND EXTRAHEPATIC BILE DUCTS  
157 MALIGNANT NEOPLASM OF PANCREAS  
158 MALIGNANT NEOPLASM OF RETROPERITONEUM AND PERITONEUM  
159 MALIGNANT NEOPLASM OF OTHER AND ILL-DEFINED SITES WITHIN THE DIGESTIVE ORGANS AND PERITONEUM  
160 MALIGNANT NEOPLASM OF NASAL CAVITIES, MIDDLE EAR, AND ACCESSORY SINUSES  
161 MALIGNANT NEOPLASM OF LARYNX  
162 MALIGNANT NEOPLASM OF TRACHEA, BRONCHUS, AND LUNG  
163 MALIGNANT NEOPLASM OF PLEURA  
164 MALIGNANT NEOPLASM OF THYMUS, HEART, AND MEDIASTINUM  
165 MALIGNANT NEOPLASM OF OTHER AND ILL-DEFINED SITES WITHIN THE RESPIRATORY SYSTEM AND INTRATHORACIC ORGANS  
170 MALIGNANT NEOPLASM OF BONE AND ARTICULAR CARTILAGE  
171 MALIGNANT NEOPLASM OF CONNECTIVE AND OTHER SOFT TISSUE  
172 MALIGNANT MELANOMA OF SKIN  
174 MALIGNANT NEOPLASM OF FEMALE BREAST  
175 MALIGNANT NEOPLASM OF MALE BREAST  
176 KARPOSI'S SARCOMA  
179 MALIGNANT NEOPLASM OF UTERUS, PART UNSPECIFIED  
180 MALIGNANT NEOPLASM OF CERVIX UTERI  
181 MALIGNANT NEOPLASM OF EYE  
182 MALIGNANT NEOPLASM OF BODY OF UTERUS  
183 MALIGNANT NEOPLASM OF OVARY AND OTHER UTERINE ADNEXA  
184 MALIGNANT NEOPLASM OF OTHER AND UNSPECIFIED FEMALE GENITAL ORGANS  
185 MALIGNANT NEOPLASM OF OTHER AND UNSPECIFIED FEMALE GENITAL ORGANS  
186 MALIGNANT NEOPLASM OF TESTES  
187 MALIGNANT NEOPLASM OF PENIS AND OTHER MALE GENITAL ORGANS  
188 MALIGNANT NEOPLASM OF BLADDER  
189 MALIGNANT NEOPLASM OF KIDNEY AND OTHER AND UNSPECIFIED URINARY ORGANS  
190 MALIGNANT NEOPLASM OF EYE  
191 MALIGNANT NEOPLASM OF BRAIN  
192 MALIGNANT NEOPLASM OF OTHER AND UNSPECIFIED PARTS OF NERVOUS SYSTEM  
193 MALIGNANT NEOPLASM OF THYROID GLAND  
194 MALIGNANT NEOPLASM OF OTHER ENDOCRINE GLANDS AND RELATED STRUCTURES  
195 MALIGNANT NEOPLASM OF OTHER, AND ILL-DEFINED SITES  
196 SECONDARY AND UNSPECIFIED MALIGNANT NEOPLASM OF LYMPH NODES  
197 SECONDARY MALIGNANT NEOPLASM OF RESPIRATORY AND DIGESTIVE SYSTEMS  
198 SECONDARY MALIGNANT NEOPLASM OF OTHER SPECIFIED SITES

**Death in Low-Mortality DRGs (PSI 2)**

199	MALIGNANT NEOPLASM W/O SPECIFICATION OF SITE
200	LYMPHOSARCOMA AND RETICULOSARCOMA
201	HODGKIN'S DISEASE
202	OTHER MALIGNANT NEOPLASMS OF LYMPHOID AND HISTIOCYTIC TISSUES
203	MULTIPLE MYELOMA AND IMMUNOPROLIFERATIVE NEOPLASMS
204	LYMPHOID LEUKEMIA
205	MYELOID LEUKEMIA
206	MONOCYTIC LEUKEMIA
207	OTHER SPECIFIED LEUKEMIA
208	LEUKEMIA OF UNSPECIFIED CELL TYPE
2386	NEOPLASM OF UNCERTAIN BEHAVIOR OF OTHER AND UNSPECIFIED SITES AND TISSUES, PLASMA CELLS
2733	MACROGLOBULINEMIA

## Personal history of malignant neoplasm:

V1000	GASTROINTESTINAL TRACT, UNSPECIFIED
V1001	TONGUE
V1002	OTHER AND UNSPECIFIED ORAL CAVITY AND PHARYNX
V1003	ESOPHAGUS
V1004	STOMACH
V1005	LARGE INTESTINE
V1006	RECTUM, RECTOSIGMOID JUNCTION, AND ANUS
V1007	LIVER
V1009	OTHER
V1011	BRONCHUS AND LUNG
V1012	TRACHEA
V1020	RESPIRATORY ORGAN, UNSPECIFIED
V1021	LARYNX
V1022	NASAL CAVITIES, MIDDLE EAR, AND ACCESSORY SINUSES
V1029	OTHER RESPIRATORY AND INTRATHORACIC ORGANS, OTHER
V103	BREAST
V1040	FEMALE GENITAL ORGAN, UNSPECIFIED
V1041	CERVIX UTERI
V1042	OTHER PARTS OF UTERUS
V1043	OVARY
V1044	OTHER FEMALE GENITAL ORGANS
V1045	MALE GENITAL ORGAN, UNSPECIFIED
V1046	PROSTATE
V1047	TESTES
V1048	EPIDIDYMIS
V1049	OTHER MALE GENITAL ORGANS
V1050	URINARY ORGAN, UNSPECIFIED
V1051	BLADDER
V1052	KIDNEY
V1053	RENAL PELVIS
V1059	URINARY ORGANS, OTHER
V1060	LEUKEMIA, UNSPECIFIED
V1061	LYMPHOID LEUKEMIA
V1062	MYELOID LEUKEMIA
V1063	MONOCYTIC LEUKEMIA
V1069	LEUKEMIA, OTHER
V1071	LYMPHOSARCOMA AND RETICULOSARCOMA
V1072	HODGKIN'S DISEASE
V1079	OTHER LYMPHATIC AND HEMATOPOIETIC NEOPLASMS, OTHER
V1081	BONE
V1082	MALIGNANT MELANOMA OF SKIN
V1083	OTHER MALIGNANT NEOPLASM OF SKIN
V1084	EYE
V1085	BRAIN
V1086	OTHER PARTS OF NERVOUS SYSTEM

### Death in Low-Mortality DRGs (PSI 2)

V1087 THYROID  
V1088 OTHER ENDOCRINE GLANDS AND RELATED STRUCTURES  
V1089 OTHER  
V109 UNSPECIFIED PERSONAL HISTORY OF MALIGNANT NEOPLASM

### Decubitus Ulcer (PSI 3)

#### Numerator:

Discharges with ICD-9-CM code of 707.0 in any secondary diagnosis field.

#### Denominator:

All medical and surgical discharges defined by specific DRGs

#### *Surgical Discharge DRGs:*

See PSI 1 **Complications of Anesthesia** for list of surgical discharge DRG codes.

#### *Medical Discharge DRGs:*

009 SPINAL DISORDERS AND INJURIES  
010 NERVOUS SYSTEM NEOPLASMS W/ CC  
011 NERVOUS SYSTEM NEOPLASMS W/ CC  
012 DEGENERATIVE NERVOUS SYSTEM DISORDERS  
013 MULTIPLE SCLEROSIS AND CEREBELLAR ATAXIA  
014 SPECIFIC CEREBROVASCULAR DISORDERS EXCEPT TRANSIENT ISCHEMIC ATTACK  
015 TRANSIENT ISCHEMIC ATTACK AND PRECEREBRAL OCCLUSIONS  
016 NONSPECIFIC CEREBROVASCULAR DISORDERS W/ CC  
017 NONSPECIFIC CEREBROVASCULAR DISORDERS W/O CC  
018 CRANIAL AND PERIPHERAL NERVE DISORDERS W/ CC  
019 CRANIAL AND PERIPHERAL NERVE DISORDERS W/O CC  
020 NERVOUS SYSTEM INFECTION EXCEPT VIRAL MENINGITIS  
021 VIRAL MENINGITIS  
022 HYPERTENSIVE ENCEPHALOPATHY  
023 NONTRAUMATIC STUPOR AND COMA  
024 SEIZURE AND HEADACHE, AGE GREATER THAN 17 W/ CC  
025 SEIZURE AND HEADACHE, AGE GREATER THAN 17 W/O CC  
026 SEIZURE AND HEADACHE, AGE 0-17  
027 TRAUMATIC STUPOR AND COMA, COMA GREATER THAN ONE HOUR  
028 TRAUMATIC STUPOR AND COMA, COMA LESS THAN ONE HOUR, AGE GREATER THAN 17 W/ CC  
029 TRAUMATIC STUPOR AND COMA, COMA LESS THAN ONE HOUR, AGE GREATER THAN 17 W/O CC  
030 TRAUMATIC STUPOR AND COMA, COMA LESS THAN ONE HOUR, AGE 0-17  
031 CONCUSSION, AGE GREATER THAN 17 W/ CC  
032 CONCUSSION, AGE GREATER THAN 17 W/O CC  
033 CONCUSSION, AGE 0-17  
034 OTHER DISORDERS OF NERVOUS SYSTEM W/ CC  
035 OTHER DISORDERS OF NERVOUS SYSTEM W/O CC  
043 HYPHEMA  
044 ACUTE MAJOR EYE INFECTIONS  
045 NEUROLOGICAL EYE DISORDERS  
046 OTHER DISORDERS OF THE EYE, AGE GREATER THAN 17 W/ CC  
047 OTHER DISORDER OF THE EYE, AGE GREATER THAN 17 W/O CC  
048 OTHER DISORDERS OF THE EYE, AGE 0-17  
064 EAR, NOSE, MOUTH AND THROAT MALIGNANCY  
065 DISEQUILIBRIA  
066 EPISTAXIS  
067 EPIGLOTTITIS

**Decubitus Ulcer (PSI 3)**

068	OTITIS MEDIA AND URI, AGE GREATER THAN 17 W/ CC
069	OTITIS MEDIA AND URI, AGE GREATER THAN 17 W/O CC
070	OTITIS MEDIA AND URI, AGE 0-17
071	LARYNGOTRACHEITIS
072	NASAL TRAUMA AND DEFORMITY
073	OTHER EAR, NOSE, MOUTH AND THROAT DIAGNOSES, AGE GREATER THAN 17
074	OTHER EAR, NOSE, MOUTH AND THROAT DIAGNOSES, AGE 0-17
078	PULMONARY EMBOLISM
079	RESPIRATORY INFECTIONS AND INFLAMMATIONS, AGE GREATER THAN 17 W/ CC
080	RESPIRATORY INFECTIONS AND INFLAMMATIONS, AGE GREATER THAN 17 W/O CC
081	RESPIRATORY INFECTIONS AND INFLAMMATIONS, AGE 0-17
082	RESPIRATORY NEOPLASMS
083	MAJOR CHEST TRAUMA W/ CC
084	MAJOR CHEST TRAUMA W/O CC
085	PLEURAL EFFUSION W/ CC
086	PLEURAL EFFUSION W/O CC
087	PULMONARY EDEMA AND RESPIRATORY FAILURE
088	CHRONIC OBSTRUCTIVE PULMONARY DISEASE
089	SIMPLE PNEUMONIA AND PLEURISY, AGE GREATER THAN 17 W/ CC
090	SIMPLE PNEUMONIA AND PLEURISY, AGE GREATER THAN 17 W/O CC
091	SIMPLE PNEUMONIA AND PLEURISY, AGE 0-17
092	INTERSTITIAL LUNG DISEASE W/ CC
093	INTERSTITIAL LUNG DISEASE W/O CC
094	PNEUMOTHORAX W/ CC
095	PNEUMOTHORAX W/O CC
096	BRONCHITIS AND ASTHMA, AGE GREATER THAN 17 W/ CC
097	BRONCHITIS AND ASTHMA, AGE GREATER THAN 17 W/O CC
098	BRONCHITIS AND ASTHMA, AGE 0-17
099	RESPIRATORY SIGNS AND SYMPTOMS W/ CC
100	RESPIRATORY SIGNS AND SYMPTOMS W/O CC
101	OTHER RESPIRATORY SYSTEM DIAGNOSES W/ CC
102	OTHER RESPIRATORY SYSTEM DIAGNOSES W/O CC
121	CIRCULATORY DISORDERS W/ ACUTE MYOCARDIAL INFARCTION AND MAJOR COMPLICATION, DISCHARGED ALIVE
122	CIRCULATORY DISORDERS W/ ACUTE MYOCARDIAL INFARCTION W/O MAJOR COMPLICATION, DISCHARGED ALIVE
123	CIRCULATORY DISORDERS W/ ACUTE MYOCARDIAL INFARCTION, EXPIRED
124	CIRCULATORY DISORDERS EXCEPT ACUTE MYOCARDIAL INFARCTION W/ CARDIAC CATHETERIZATION AND COMPLEX DIAGNOSIS
125	CIRCULATORY DISORDERS EXCEPT ACUTE MYOCARDIAL INFARCTION W/ CARDIAC CATHETERIZATION W/O COMPLEX DIAGNOSIS
126	ACUTE AND SUB ACUTE ENDOCARDITIS
127	HEART FAILURE AND SHOCK
128	DEEP VEIN THROMBOPHLEBITIS
129	CARDIAC ARREST, UNEXPLAINED
130	PERIPHERAL VASCULAR DISORDERS W/ CC
131	PERIPHERAL VASCULAR DISORDERS W/O CC
132	ATHEROSCLEROSIS W/ CC
133	ATHEROSCLEROSIS W/O CC
134	HYPERTENSION
135	CARDIAC CONGENITAL AND VALVULAR DISORDERS, AGE GREATER THAN 17 W/ CC
136	CARDIAC CONGENITAL AND VALVULAR DISORDERS, AGE GREATER THAN 17 W/O CC
137	CARDIAC CONGENITAL AND VALVULAR DISORDERS, AGE 0 - 17
138	CARDIAC ARRHYTHMIA AND CONDUCTION DISORDERS W/ CC
139	CARDIAC ARRHYTHMIA AND CONDUCTION DISORDERS W/O CC
140	ANGINA PECTORIS
141	SYNCOPE AND COLLAPSE W/ CC
142	SYNCOPE AND COLLAPSE W/O CC
143	CHEST PAIN
144	OTHER CIRCULATORY SYSTEM DIAGNOSES W/ CC
145	OTHER CIRCULATORY SYSTEM DIAGNOSES W/O CC

**Decubitus Ulcer (PSI 3)**

172	DIGESTIVE MALIGNANCY W/ CC
173	DIGESTIVE MALIGNANCY W/O CC
174	GI HEMORRHAGE W/ CC
175	GI HEMORRHAGE W/O CC
176	COMPLICATED PEPTIC ULCER
177	UNCOMPLICATED PEPTIC ULCER W/ CC
178	UNCOMPLICATED PEPTIC ULCER W/O CC
179	INFLAMMATORY BOWEL DISEASE
180	GI OBSTRUCTION W/ CC
181	GI OBSTRUCTION W/O CC
182	ESOPHAGITIS, GASTROENTERITIS AND MISCELLANEOUS DIGESTIVE DISORDERS, AGE GREATER THAN 17 W/ CC
183	ESOPHAGITIS, GASTROENTERITIS AND MISCELLANEOUS DIGESTIVE DISORDERS, AGE GREATER THAN 17 W/O CC
184	ESOPHAGITIS, GASTROENTERITIS AND MISCELLANESOU DIGESTIVE DISORDERS, AGE 0-17
185	DENTAL AND ORAL DISEASES EXCEPT EXTRACTIONS AND RESTORATIONS, AGE GREATER THAN 17
186	DENTAL AND ORAL DISEASED EXCEPT EXTRACTIONS AND RESTORATIONS, AGE 0-17
187	DENTAL EXTRACTIONS AND RESTORATIONS
188	OTHER DIGESTIVE SYSTEM DIAGNOSES, AGE GREATER THAN 17 W/ CC
189	OTHER DIGESTIVE SYSTEM DIAGNOSES, AGE GREATER THAN 17 W/O CC
190	OTHER DIGESTIVE SYSTEM DIAGNOSES, AGE 0-17
202	CIRRHOSIS AND ALCOHOLIC HEPATITIS
203	MALIGNANCY OF HEPATOBILIARY SYSTEM OR PANCREAS
204	DISORDERS OF PANCREAS EXCEPT MALIGNANCY
205	DISORDERS OF LIVER EXCEPT MALIGNANCY, CIRRHOSIS AND ALCOHOLIC HEPATITIS W/ CC
206	DISORDERS OF LIVER EXCEPT MALIGNANCY, CIRRHOSIS AND ALCOHOLIC HEPATITIS W/O CC
207	DISORDERS OF THE BILIARY TRACT W/ CC
208	DISORDERS OF THE BILIARY TRACT W/O CC
235	FRACTURES OF FEMUR
236	FRACTURES OF HIP AND PELVIS
237	SPRAINS, STRAINS AND DISLOCATIONS OF HIP, PELVIS AND THIGH
238	OSTEOMYELITIS
239	PATHOLOGICAL FRACTURES AND MUSCULOSKELETAL AND CONNECTIVE TISSUE MALIGNANCY
240	CONNECTIVE TISSUE DISORDERS W/ CC
241	CONNECTIVE TISSUE DISORDERS W/O CC
242	SEPTIC ARTHRITIS
243	MEDICAL BACK PROBLEMS
244	BONE DISEASES AND SPECIFIC ARTHROPATHIES W/ CC
245	BONE DISEASES AND SPECIFIC ARTHROPATHIES W/O CC
246	NONSPECIFIC ARTHROPATHIES
247	SIGNS AND SYMPTOMS OF MUSCULOSKELETAL SYSTEM AND CONNECTIVE TISSUE
248	TENDONITIS, MYOSITIS AND BURSTITIS
249	AFTERCARE, MUSCULOSKELETAL SYSTEM AND CONNECTIVE TISSUE
250	FRACTURES, SPRAINS, STRAINS AND DISLOCATIONS OF FOREARM, HAND AND FOOT, AGE GREATER THAN 17 W/ CC
251	FRACTURES, SPRAINS, STRAINS AND DISLOCATIONS OF FOREARM, HAND AND FOOT, AGE GREATER THAN 17 W/O CC
252	FRACTURES, SPRAINS, STRAINS AND DISLOCATIONS OF FOREARM, HAND AND FOOT, AGE 0-17
253	FRACTURES, SPRAINS, STRAINS AND DISLOCATIONS OF UPPER ARM AND LOWER LEG EXCEPT FOOT, AGE GREATER THAN 17 W/ CC
254	FRACTURES, SPRAINS, STRAINS AND DISLOCATIONS OF UPPER ARM AND LOWER LEG EXCEPT FOOT, AGE GREATER THAN 17 W/O CC
255	FRACTURES, SPRAINS, STRAINS AND DISLOCATIONS OF UPPER ARM AND LOWER LEG EXCEPT FOOT, AGE 0-17
256	OTHER MUSCULOSKELETAL SYSTEM AND CONNECTIVE TISSUE DIAGNOSES
271	SKIN ULCERS
272	MAJOR SKIN DISORDERS W/ CC
273	MAJOR SKIN DISORDERS W/O CC
274	MALIGNANT BREAST DISORDERS W/ CC
275	MALIGNANT BREAST DISORDERS W/O CC

**Decubitus Ulcer (PSI 3)**

276	NONMALIGNANT BREAST DISORDERS
277	CELLULITIS, AGE GREATER THAN 17 W/ CC
278	CELLULITIS, AGE GREATER THAN 17 W/O CC
279	CELLULITIS, AGE 0-17
280	TRAUMA TO SKIN, SUBCUTANEOUS TISSUE AND BREAST, AGE GREATER THAN 17 W/ CC
281	TRAUMA TO SKIN, SUBCUTANEOUS TISSUE AND BREAST, AGE GREATER THAN 17 W/O CC
282	TRAUMA TO SKIN, SUBCUTANEOUS TISSUE AND BREAST, AGE 0-17
283	MINOR SKIN DISORDERS W/ CC
284	MINOR SKIN DISORDERS W/O CC
294	DIABETES, AGE GREATER THAN 35
295	DIABETES, AGE 0-35
296	NUTRITIONAL AND MISCELLANEOUS METABOLIC DISORDERS, AGE GREATER THAN 17 W/ CC
297	NUTRITIONAL AND MISCELLANEOUS METABOLIC DISORDERS, AGE GREATER THAN 17 W/O CC
298	NUTRITIONAL AND MISCELLANEOUS METABOLIC DISORDERS, AGE 0-17
299	INBORN ERRORS OF METABOLISM
300	ENDOCRINE DISORDERS W/ CC
301	ENDOCRINE DISORDERS W/O CC
316	RENAL FAILURE
317	ADMISSION FOR RENAL DIALYSIS
318	KIDNEY AND URINARY TRACT NEOPLASMS W/ CC
319	KIDNEY AND URINARY TRACT NEOPLASMS W/O CC
320	KIDNEY AND URINARY TRACT INFECTIONS, AGE GREATER THAN 17 W/ CC
321	KIDNEY AND URINARY TRACT INFECTIONS, AGE GREATER THAN 17 W/O CC
322	KIDNEY AND URINARY TRACT INFECTION, AGE 0-17
323	URINARY STONES W/ CC AND/ OR ESW LITHOTRIPSY
324	URINARY STONES W/O CC
325	KIDNEY AND URINARY TRACT SIGNS AND SYMPTOMS, AGE GREATER THAN 17 W/ CC
326	KIDNEY AND URINARY TRACT SIGNS AND SYMPTOMS, AGE GREATER THAN 17 W/O CC
327	KIDNEY AND URINARY TRACT SIGNS AND SYMPTOMS, AGE 0-17
328	URETHRAL STRICTURE, AGE GREATER THAN 17 W/ CC
329	URETHRAL STRICTURE, AGE GREATER THAN 17 W/O CC
330	URETHRAL STRICTURE, AGE 0-17
331	OTHER KIDNEY AND URINARY TRACT DIAGNOSES, AGE GREATER THAN 17 W/ CC
332	OTHER KIDNEY AND URINARY TRACT DIAGNOSES, AGE GREATER THAN 17 W/O CC
333	OTHER KIDNEY AND URINARY TRACT DIAGNOSES, AGE 0-17
346	MALIGNANCY OF MALE REPRODUCTIVE SYSTEM W/ CC
347	MALIGNANCY OF MALE REPRODUCTIVE SYSTEM W/O CC
348	BENIGN PROSTATIC HYPERTROPHY W/ CC
349	BENIGN PROSTATIC HYPERTROPHY W/O CC
350	INFLAMMATION OF THE MALE REPRODUCTIVE SYSTEM
351	STERILIZATION, MALE
352	OTHER MALE REPRODUCTIVE SYSTEM DIAGNOSES
366	MALIGNANCY OF FEMALE REPRODUCTIVE SYSTEM W/ CC
367	MALIGNANCY OF FEMALE REPRODUCTIVE SYSTEM W/O CC
368	INFECTIONS OF FEMALE REPRODUCTIVE SYSTEM
369	MENSTRUAL AND OTHER FEMALE REPRODUCTIVE SYSTEM DISORDERS
372	VAGINAL DELIVERY W/ COMPLICATING DIAGNOSES
373	VAGINAL DELIVERY W/O COMPLICATING DIAGNOSES
376	POSTPARTUM AND POSTABORTION DIAGNOSES W/O OR PROCEDURE
378	ENTOPIC PREGNANCY
379	THREATENED ABORTION
380	ABORTION W/O D AND G
382	FALSE LABOR
383	OTHER ANTEPARTUM DIAGNOSES W/ MEDICAL COMPLICATIONS
384	OTHER ANTEPARTUM DIAGNOSES W/O MEDICAL COMPLICATIONS
395	RED BLOOD CELL DISORDERS, AGE GREATER THAN 17
396	RED BLOOD CELL DISORDERS, AGE 0-17
397	COAGULATION DISORDERS
398	RETICULOENDOTHELIAL AND IMMUNITY DISORDERS W/ CC
399	RETICULOENDOTHELIAL AND IMMUNITY DISORDERS W/O CC
403	LYMPHOMA AND NONACUTE LEUKEMIA W/ CC

**Decubitus Ulcer (PSI 3)**

404	LYMPHOMA AND NONACUTE LEUKEMIA W/O CC
405	ACUTE LEUKEMIA W/O MAJOR OR PROCEDURE, AGE 0-17
409	RADIOTHERAPY
410	CHEMOTHERAPY W/O ACUTE LEUKEMIA AS SECONDARY DIAGNOSIS
411	HISTORY OF MALIGNANCY W/O ENDOSCOPY
412	HISTORY OF MALIGNANCY W/ ENDOSCOPY
413	OTHER MYELOPROLIFERATIVE DISORDERS OR POORLY DIFFERENTIATED NEOPLASM DIAGNOSES W/ CC
414	OTHER MYELOPROLIFERATIVE DISORDERS OR POORLY DIFFERENTIATED NEOPLASM DIAGNOSES W/O CC
416	SEPTICEMIA, AGE GREATER THAN 17
417	SEPTICEMIA, AGE 0-17
418	POSTOPERATIVE AND POSTTRAUMATIC INFECTIONS
419	FEVER OF UNKNOWN ORIGIN, AGE GREATER THAN 17 W/ CC
420	FEVER OF UNKNOWN ORIGIN, AGE GREATER THAN 17 W/O CC
421	VIRAL ILLNESS, AGE GREATER THAN 17
422	VIRAL ILLNESS AND FEVER OF UNKNOWN ORIGIN, AGE 0-17
423	OTHER INFECTIOUS AND PARASITIC DISEASES DIAGNOSES
425	ACUTE ADJUSTMENT REACTIONS AND DISTURBANCES OF PSYCHOSOCIAL DYSFUNCTION
426	DEPRESSIVE NEUROSES
427	NEUROSES EXCEPT DEPRESSIVE
428	DISORDERS OF PERSONALITY AND IMPULSE CONTROL
429	ORGANIC DISTURBANCES AND MENTAL RETARDATION
430	PSYCHOSES
431	CHILDHOOD MENTAL DISORDERS
432	OTHER MENTAL DISORDER DIAGNOSES
433	ALCOHOL/DRUG ABUSE OR DEPENDENCE, LEFT AGAINST MEDICAL ADVICE
434*	ALCOHOL/DRUG ABUSE OR DEPENDENCE, DETOXIFICATION OR OTHER SYMPTOMATIC TREATMENT W/ CC
435*	ALCOHOL/DRUG ABUSE OR DEPENDENCE, DETOXIFICATION OR OTHER SYMPTOMATIC TREATMENT W/O CC
436*	ALCOHOL/DRUG DEPENDENCE W/ REHABILITATION THERAPY
437*	ALCOHOL DRUG DEPENDENCE W/ COMBINED REHABILITATION AND DETOXIFICATION THERAPY
444	TRAUMATIC INJURY, AGE GREATER THAN 17 W/ CC
445	TRAUMATIC INJURY, AGE GREATER THAN 17 W/O CC
446	TRAUMATIC INJURY, AGE 0-17
447	ALLERGIC REACTIONS, AGE GREATER THAN 17
448	ALLERGIC REACTIONS, AGE 0-17
449	POISONING AND TOXIC EFFECTS OF DRUGS, AGE GREATER THAN 17 W/ CC
450	POISONING AND TOXIC EFFECTS OF DRUGS, AGE GREATER THAN 17 W/O CC
451	POISONING AND TOXIC EFFECTS OF DRUGS, AGE 0-17
452	COMPLICATIONS OF TREATMENT W/ CC
453	COMPLICATIONS OF TREATMENT W/O CC
454	OTHER INJURY, POISONING AND TOXIC EFFECT DIAGNOSES W/ CC
455	OTHER INJURY, POISONING AND TOXIC EFFECT DIAGNOSES W/O CC
456*	BURNS, TRANSFERRED TO ANOTHER ACUTE CARE FACILITY
457*	EXTENSIVE BURNS W/O O.R. PROCEDURE
460*	NON-EXTENSIVE BURNS W/O O.R. PROCEDURE
462	REHABILITATION
463	SIGNS AND SYMPTOMS W/ CC
464	SIGNS AND SYMPTOMS W/O CC
465	AFTERCARE W/ HISTORY OF MALIGNANCY AS SECONDARY DIAGNOSIS
466	AFTERCARE W/O HISTORY OF MALIGNANCY AS SECONDARY DIAGNOSIS
467	OTHER FACTORS INFLUENCING HEALTH STATUS
473	ACUTE LEUKEMIA W/O MAJOR OR PROCEDURE, AGE GREATER THAN 17
475	RESPIRATORY SYSTEM DIAGNOSIS W/ VENTILATOR SUPPORT
487	OTHER MULTIPLE SIGNIFICANT TRAUMA
489	HIV W/ MAJOR RELATED CONDITION
490	HIV W/ OR W/O OTHER RELATED CONDITION
492	CHEMOTHERAPY W/ ACUTE LEUKEMIA AS SECONDARY DIAGNOSIS
505	EXTENSIVE 3RD DEGREE BURNS W/O SKIN GRAFT

### Decubitus Ulcer (PSI 3)

508 FULL THICKNESS BURN W/O SKIN GRFT OR INHAL INJ W CC OR SIG TRAUMA  
509 FULL THICKNESS BURN W/O SKIN GRFT OR INH INJ W/O CC OR SIG TRAUMA  
510 NON-EXTENSIVE BURNS W CC OR SIGNIFICANT TRAUMA  
511 NON-EXTENSIVE BURNS W/O CC OR SIGNIFICANT TRAUMA  
521 ALCOHOL/DRUG ABUSE OR DEPENDENCE W CC  
522 ALC/DRUG ABUSE OR DEPEND W REHABILITATION THERAPY W/O CC  
523 ALC/DRUG ABUSE OR DEPEND W/O REHABILITATION THERAPY W/O CC  
524 TRANSIENT ISCHEMIA

\* No longer valid in FY2004

Include only patients with a length of stay of 5 or more days.

#### Exclude:

Patients with ICD-9-CM code of 707.0 in the principal diagnosis field.  
Patients in MDC 9 (Skin, Subcutaneous Tissue, and Breast) or MDC 14 (Pregnancy, Childbirth and the Puerperium)  
Patients with any diagnosis of hemiplegia, paraplegia, or quadriplegia.  
Patients admitted from a long-term care facility.

*ICD-9-CM Hemiplegia, Paraplegia, or Quadriplegia diagnosis codes (includes 4<sup>th</sup> and 5<sup>th</sup> digits):*

3420 FLACCID HEMIPLEGIA  
3421 SPASTIC HEMIPLEGIA  
3428 OTHER SPECIFIED HEMIPLEGIA  
3429 HEMIPLEGIA, UNSPECIFIED  
3430 INFANTILE CEREBRAL PALSY, DIPLEGIC  
3431 INFANTILE CEREBRAL PALSY, HEMIPLEGIC  
3432 INFANTILE CEREBRAL PALSY, QUADRIPLEGIC  
3433 INFANTILE CEREBRAL PALSY, MONOPLLEGIC  
3434 INFANTILE CEREBRAL PALSY INFANTILE HEMIPLEGIA  
3438 INFANTILE CEREBRAL PALSY OTHER SPECIFIED INFANTILE CEREBRAL PALSY  
3439 INFANTILE CEREBRAL PALSY, INFANTILE CEREBRAL PALSY, UNSPECIFIED  
3440 QUADRIPLEGIA AND QUADRIPARESIS  
3441 PARAPLEGIA  
3442 DIPLEGIA OF UPPER LIMBS  
3443 MONOPLLEGIA OF LOWER LIMB  
3444 MONOPLLEGIA OF UPPER LIMB  
3445 UNSPECIFIED MONOPLLEGIA  
3446 CAUDA EQUINA SYNDROME  
3448 OTHER SPECIFIED PARALYTIC SYNDROMES  
3449 PARALYSIS, UNSPECIFIED  
4382 HEMIPLEGIA/HEMIPARESIS  
4383 MONOPLLEGIA OF UPPER LIMB  
4384 MONOPLLEGIA OF LOWER LIMB  
4385 OTHER PARALYTIC SYNDROME

#### Long-Term Care Facility

Admission source is recorded as long-term care facility (ASource=3)

## Failure to Rescue (PSI 4)

### Numerator:

All discharges with a disposition of "deceased".

### Denominator:

Discharges with potential complications of care listed in failure to rescue (FTR) definition (e.g., pneumonia, DVT/PE, sepsis, acute renal failure, shock/cardiac arrest, or GI hemorrhage/acute ulcer). **NOTE: Exclusion criteria is specific to each diagnosis.**

### FTR 1 - Acute renal failure

*ICD-9-CM Acute Renal Failure diagnosis codes (includes 4<sup>th</sup> and 5<sup>th</sup> digits):*

5845 W/ LESION OF TUBULAR NECROSIS  
5846 W/ LESION OF RENAL CORTICAL NECROSIS  
5847 W/ LESION OF RENAL MEDULLARY NECROSIS  
5848 W/ OTHER SPECIFIED PATHOLOGICAL LESION  
5849 ACUTE RENAL FAILURE, UNSPECIFIED  
6393 COMPLICATIONS FOLLOWING ABORTION AND ECTOPIC AND MOLAR PREGNANCIES, RENAL FAILURE  
66930 ACUTE RENAL FAILURE FOLLOWING LABOR AND DELIVERY, UNSPECIFIED AS TO EPISODE OF CARE OR NOT APPLICABLE  
66932 ACUTE RENAL FAILURE FOLLOWING LABOR AND DELIVERY, DELIVERED, W/ MENTION OF POSTPARTUM COMPLICATION  
66934 ACUTE RENAL FAILURE FOLLOWING LABOR AND DELIVERY, POSTPARTUM CONDITION OR COMPLICATION

### Exclude:

Principal diagnosis of acute renal failure, abortion-related renal failure, acute myocardial infarction, cardiac arrest, cardiac arrhythmia, hemorrhage, GI hemorrhage, shock, or trauma.

*ICD-9-CM Abortion-related Renal Failure diagnosis codes:*

63430 SPONTANEOUS ABORTION W/ RENAL FAILURE - UNSPECIFIED  
63431 SPONTANEOUS ABORTION W/ RENAL FAILURE - INCOMPLETE  
63432 SPONTANEOUS ABORTION W/ RENAL FAILURE - COMPLETE  
63530 LEGAL ABORTION W/ RENAL FAILURE - UNSPECIFIED  
63531 LEGAL ABORTION W/ RENAL FAILURE - INCOMPLETE  
63532 LEGAL ABORTION W/ RENAL FAILURE - COMPLETE  
63630 ILLEGAL ABORTION W/ RENAL FAILURE - UNSPECIFIED  
63631 ILLEGAL ABORTION W/ RENAL FAILURE - INCOMPLETE  
63632 ILLEGAL ABORTION W/ RENAL FAILURE - COMPLETE  
63730 ABORTION NOS W/ RENAL FAILURE - UNSPECIFIED  
63731 ABORTION NOS W/ RENAL FAILURE - INCOMPLETE  
63732 ABORTION NOS W/ RENAL FAILURE - COMPLETE  
6383 ATTEMPTED ABORTION W/ RENAL FAILURE

*ICD-9-CM Acute Myocardial Infarction diagnosis codes:*

41000 AMI OF ANTEROLATERAL WALL – EPISODE OF CARE UNSPECIFIED  
41001 AMI OF ANTEROLATERAL WALL – INITIAL EPISODE OF CARE  
41010 AMI OF OTHER ANTERIOR WALL – EPISODE OF CARE UNSPECIFIED  
41011 AMI OF OTHER ANTERIOR WALL – INITIAL EPISODE OF CARE  
41020 AMI OF INFEROLATERAL WALL – EPISODE OF CARE UNSPECIFIED  
41021 AMI OF INFEROLATERAL WALL – INITIAL EPISODE OF CARE  
41030 AMI OF INFEROPOSTERIOR WALL – EPISODE OF CARE UNSPECIFIED  
41031 AMI OF INFEROPOSTERIOR WALL – INITIAL EPISODE OF CARE  
41040 AMI OF INFERIOR WALL – EPISODE OF CARE UNSPECIFIED

**Failure to Rescue (PSI 4)**

41041 AMI OF INFERIOR WALL – INITIAL EPISODE OF CARE  
41050 AMI OF OTHER LATERAL WALL – EPISODE OF CARE UNSPECIFIED  
41051 AMI OF OTHER LATERAL WALL – INITIAL EPISODE OF CARE  
41060 AMI TRUE POSTERIOR WALL INFARCTION – EPISODE OF CARE UNSPECIFIED  
41061 AMI TRUE POSTERIOR WALL INFARCTION – INITIAL EPISODE OF CARE  
41070 AMI SUBENDOCARDIAL INFARCTION – EPISODE OF CARE UNSPECIFIED  
41071 AMI SUBENDOCARDIAL INFARCTION – INITIAL EPISODE OF CARE  
41080 AMI OF OTHER SPECIFIED SITES – EPISODE OF CARE UNSPECIFIED  
41081 AMI OF OTHER SPECIFIED SITES – INITIAL EPISODE OF CARE  
41090 AMI UNSPECIFIED SITE – EPISODE OF CARE UNSPECIFIED  
41091 AMI UNSPECIFIED SITE – INITIAL EPISODE OF CARE

*ICD-9-CM Cardiac Arrhythmia diagnosis codes:*

4260 ATRIOVENTRICULAR BLOCK, COMPLETE  
4270 PAROXYSMAL SUPRAVENTRICULAR TACHYCARDIA  
4271 PAROXYSMAL VENTRICULAR TACHYCARDIA  
4272 PAROXYSMAL TACHYCARDIA, UNSPECIFIED  
42731 ATRIAL FIBRILLATION  
42732 ATRIAL FLUTTER  
42741 VENTRICULAR FIBRILLATION  
42742 VENTRICULAR FLUTTER  
4279 CARDIAC DYSRHYTHMIA

*ICD-9-CM Cardiac Arrest diagnosis code:*

4275 CARDIAC ARREST

*ICD-9-CM Hemorrhage diagnosis codes:*

2851 ACUTE POSTHEMORRHAGIC ANEMIA  
4590 OTHER DISORDERS OF CIRCULATORY SYSTEM, HEMORRHAGE, UNSPECIFIED  
9582 CERTAIN EARLY COMPLICATIONS OF TRAUMA, SECONDARY AND RECURRENT HEMORRHAGE  
99811 HEMORRHAGE COMPLICATING A PROCEDURE

*ICD-9-CM Shock diagnosis codes:*

63450 SPONTANEOUS ABORTION W/ SHOCK - UNSPECIFIED  
63451 SPONTANEOUS ABORTION W/ SHOCK - INCOMPLETE  
63452 SPONTANEOUS ABORTION W/ SHOCK - COMPLETE  
63550 LEGAL ABORTION W/ SHOCK - UNSPECIFIED  
63551 LEGAL ABORTION W/ SHOCK - INCOMPLETE  
63552 LEGAL ABORTION W/ SHOCK - COMPLETE  
63650 ILLEGAL ABORTION W/ SHOCK - UNSPECIFIED  
63651 ILLEGAL ABORTION W/ SHOCK - INCOMPLETE  
63652 ILLEGAL ABORTION W/ SHOCK - COMPLETE  
63750 ABORTION NOS W/ SHOCK - UNSPECIFIED  
63751 ABORTION NOS W/ SHOCK - INCOMPLETE  
63752 ABORTION NOS W/ SHOCK - COMPLETE  
6385 ATTEMPTED ABORTION W/ SHOCK  
6395 COMPLICATIONS FOLLOWING ABORTION AND ECTOPIC AND MOLAR PREGNANCIES, SHOCK  
66910 SHOCK DURING OR FOLLOWING LABOR AND DELIVERY, UNSPECIFIED AS TO EPISODE OF CARE OR NOT APPLICABLE  
66911 SHOCK DURING OR FOLLOWING LABOR AND DELIVERY, DELIVERED W/ OR W/O MENTION OF ANTEPARTUM CONDITION  
66912 SHOCK DURING OR FOLLOWING LABOR AND DELIVERY, DELIVERED W/ MENTION OF POSTPARTUM COMPLICATION  
66913 SHOCK DURING OR FOLLOWING LABOR AND DELIVERY, ANTEPARTUM CONDITION OR COMPLICATION  
66914 SHOCK DURING OR FOLLOWING LABOR AND DELIVERY, POSTPARTUM CONDITION OR COMPLICATION

**Failure to Rescue (PSI 4)**

7855 SHOCK W/O MENTION OF TRAUMA  
78550 SHOCK, UNSPECIFIED  
78551 CARDIOGENIC SHOCK  
78552 SEPTIC SHOCK (OCT 03)  
78559 SHOCK W/O MENTION OF TRAUMA, OTHER  
9950 OTHER ANAPHYLACTIC SHOCK  
9954 SHOCK DUE TO ANESTHESIA  
9980 POSTOPERATIVE SHOCK  
9994 ANAPHYLACTIC SHOCK, DUE TO SERUM

*ICD-9-CM Gastrointestinal (GI) Hemorrhage diagnosis codes:*

4560 ESOPHAGEAL VARICES W/ BLEEDING  
45620 ESOPHAGEAL VARICES IN DISEASES CLASSIFIED ELSEWHERE W/ BLEEDING  
5307 GASTROESOPHAGEAL LACERATION – HEMORRHAGE SYNDROME  
53082 ESOPHAGEAL HEMORRHAGE  
53100 GASTRIC ULCER ACUTE W/ HEMORRHAGE – W/O MENTION OF OBSTRUCTION  
53101 GASTRIC ULCER ACUTE W/ HEMORRHAGE – W/ OBSTRUCTION  
53120 GASTRIC ULCER ACUTE W/ HEMORRHAGE AND PERFORATION – W/O MENTION OF OBSTRUCTION  
53121 GASTRIC ULCER ACUTE W/ HEMORRHAGE AND PERFORATION – W/ OBSTRUCTION  
53140 GASTRIC ULCER CHRONIC OR UNSPECIFIED W/ HEMORRHAGE – W/O MENTION OF OBSTRUCTION  
53141 GASTRIC ULCER CHRONIC OR UNSPECIFIED W/ HEMORRHAGE – W/ OBSTRUCTION  
53160 GASTRIC ULCER CHRONIC OR UNSPECIFIED W/ HEMORRHAGE AND PERFORATION – W/O MENTION OF OBSTRUCTION  
53161 GASTRIC ULCER CHRONIC OR UNSPECIFIED W/ HEMORRHAGE AND PERFORATION – W/ OBSTRUCTION  
53200 DUODENAL ULCER ACUTE W/ HEMORRHAGE – W/O MENTION OF OBSTRUCTION  
53201 DUODENAL ULCER ACUTE W/ HEMORRHAGE – W/ OBSTRUCTION  
53220 DUODENAL ULCER ACUTE W/ HEMORRHAGE AND PERFORATION – W/O MENTION OF OBSTRUCTION  
53221 DUODENAL ULCER ACUTE W/ HEMORRHAGE AND PERFORATION – W/ OBSTRUCTION  
53240 DUODENAL ULCER CHRONIC OR UNSPECIFIED W/ HEMORRHAGE – W/O MENTION OF OBSTRUCTION  
53241 DUODENAL ULCER CHRONIC OR UNSPECIFIED W/ HEMORRHAGE – W/ OBSTRUCTION  
53260 DUODENAL ULCER CHRONIC OR UNSPECIFIED W/ HEMORRHAGE AND PERFORATION – W/O MENTION OF OBSTRUCTION  
53261 DUODENAL ULCER CHRONIC OR UNSPECIFIED W/ HEMORRHAGE AND PERFORATION – W/ OBSTRUCTION  
53300 PEPTIC ULCER, SITE UNSPECIFIED, ACUTE W/ HEMORRHAGE – W/O MENTION OF OBSTRUCTION  
53301 PEPTIC ULCER, SITE UNSPECIFIED, ACUTE W/ HEMORRHAGE – W/ OBSTRUCTION  
53320 PEPTIC ULCER, SITE UNSPECIFIED, ACUTE W/ HEMORRHAGE AND PERFORATION – W/O MENTION OF OBSTRUCTION  
53321 PEPTIC ULCER, SITE UNSPECIFIED, ACUTE W/ HEMORRHAGE AND PERFORATION – W/ OBSTRUCTION  
53340 PEPTIC ULCER, SITE UNSPECIFIED, CHRONIC OR UNSPECIFIED W/ HEMORRHAGE – W/O MENTION OF OBSTRUCTION  
53341 PEPTIC ULCER, SITE UNSPECIFIED, CHRONIC OR UNSPECIFIED W/ HEMORRHAGE – W/ OBSTRUCTION  
53360 PEPTIC ULCER, SITE UNSPECIFIED, CHRONIC OR UNSPECIFIED W/ HEMORRHAGE AND PERFORATION – W/O MENTION OF OBSTRUCTION  
53361 PEPTIC ULCER, SITE UNSPECIFIED, CHRONIC OR UNSPECIFIED W/ HEMORRHAGE AND PERFORATION – W/ OBSTRUCTION  
53400 GASTROJEJUNAL ULCER, ACUTE W/ HEMORRHAGE – W/O MENTION OF OBSTRUCTION  
53401 GASTROJEJUNAL ULCER, ACUTE W/ HEMORRHAGE – W/ OBSTRUCTION  
53420 GASTROJEJUNAL ULCER, ACUTE W/ HEMORRHAGE AND PERFORATION – W/O MENTION OF OBSTRUCTION  
53421 GASTROJEJUNAL ULCER, ACUTE W/ HEMORRHAGE AND PERFORATION – W/ OBSTRUCTION  
53440 GASTROJEJUNAL ULCER, CHRONIC OR UNSPECIFIED W/ HEMORRHAGE – W/O MENTION OF OBSTRUCTION

### Failure to Rescue (PSI 4)

53441 GASTROJEJUNAL ULCER, CHRONIC OR UNSPECIFIED W/ HEMORRHAGE – W/ OBSTRUCTION  
53460 GASTROJEJUNAL ULCER, CHRONIC OR UNSPECIFIED W/ HEMORRHAGE AND PERFORATION – W/O MENTION OF OBSTRUCTION  
53461 GASTROJEJUNAL ULCER, CHRONIC OR UNSPECIFIED W/ HEMORRHAGE AND PERFORATION – W/ OBSTRUCTION  
53501 GASTRITIS AND DUODENITIS, ACUTE GASTRITIS W/ HEMORRHAGE  
53511 GASTRITIS AND DUODENITIS, ATROPHIC GASTRITIS W/ HEMORRHAGE  
53521 GASTRITIS AND DUODENITIS, GASTRIC MUCOSAL HYPERTROPHY, W/ HEMORRHAGE  
53531 GASTRITIS AND DUODENITIS, ALCOHOLIC GASTRITIS, W/ HEMORRHAGE  
53541 GASTRITIS AND DUODENITIS, OTHER SPECIFIED GASTRITIS – W/ HEMORRHAGE  
53551 GASTRITIS AND DUODENITIS, UNSPECIFIED GASTRITIS AND GASTRODUODENITIS – W/ HEMORRHAGE  
53561 GASTRITIS AND DUODENITIS, DUODENITIS – W/ HEMORRHAGE  
53783 OTHER SPECIFIED DISORDERS OF STOMACH AND DUODENUM, ANGIODYSPLASIA OF STOMACH AND DUODENUM – W/ HEMORRHAGE  
53784 DIEULAFOY LESION (HEMORRHAGIC) OF STOMACH AND DUODENUM  
56202 DIVERTICULOSIS OF SMALL INTESTINE – W/ HEMORRHAGE  
56203 DIVERTICULITIS OF SMALL INTESTINE – W/ HEMORRHAGE  
56212 DIVERTICULOSIS OF COLON – W/ HEMORRHAGE  
56213 DIVERTICULITIS OF COLON – W/ HEMORRHAGE  
5693 HEMORRHAGE OF RECTUM AND ANUS  
56985 ANGIODYSPLASIA OF INTESTINE - W/ HEMORRHAGE  
56986 DIEULAFOY LESION (HEMORRHAGIC) OF INTESTINE  
5780 GASTROINTESTINAL HEMORRHAGE, HEMATEMESIS  
5781 GASTROINTESTINAL HEMORRHAGE, BLOOD IN STOOL  
5789 GASTROINTESTINAL HEMORRHAGE, HEMORRHAGE OF GASTROINTESTINAL TRACT, UNSPECIFIED

*ICD-9-CM Trauma diagnosis codes:*

See PSI 2 **Death in Low Mortality DRGs** for a list of trauma diagnosis codes

*Trauma DRGs:*

002 CRANIOTOMY FOR TRAUMA, AGE GREATER THAN 17  
027 TRAUMATIC STUPOR AND COMA, COMA GREATER THAN ONE HOUR  
028 TRAUMATIC STUPOR AND COMA, COMA LESS THAN ONE HOUR, AGE GREATER THAN 17 W/ CC  
029 TRAUMATIC STUPOR AND COMA, COMA LESS THAN ONE HOUR, AGE GREATER THAN 17 W/O CC  
030 TRAUMATIC STUPOR AND COMA, COMA LESS THAN ONE HOUR, AGE 0-17  
031 CONCUSSION, AGE GREATER THAN 17 W/ CC  
032 CONCUSSION, AGE GREATER THAN 17 W/O CC  
033 CONCUSSION, AGE 0-17  
072 NASAL TRAUMA AND DEFORMITY  
083 MAJOR CHEST TRAUMA W/ CC  
084 MAJOR CHEST TRAUMA W/O CC  
235 FRACTURES OF FEMUR  
236 FRACTURE OF HIP AND PELVIS  
237 SPRAINS, STRAINS AND DISLOCATIONS OF HIP, PELVIS AND THIGH  
440 WOUND DEBRIDEMENTS FOR INJURIES  
441 HAND PROCEDURES FOR INJURIES  
442 OTHER OR PROCEDURES FOR INJURIES W/ CC  
443 OTHER OR PROCEDURES FOR INJURIES W/O CC  
444 TRAUMATIC INJURY, AGE GREATER THAN 17 W/ CC  
445 TRAUMATIC INJURY, AGE GREATER THAN 17 W/O CC  
446 TRAUMATIC INJURY, AGE 0-17  
456\* BURNS, TRANSFERRED TO ANOTHER ACUTE CARE FACILITY  
457\* EXTENSIVE BURNS W/O O.R. PROCEDURE  
458\* NON-EXTENSIVE BURNS W SKIN GRAFT  
459\* NON-EXTENSIVE BURNS W WOUND DEBRIDEMENT OR OTHER O.R. PROC  
460\* NON-EXTENSIVE BURNS W/O O.R. PROCEDURE  
484 CRANIOTOMY FOR MULTIPLE SIGNIFICANT TRAUMA

## Failure to Rescue (PSI 4)

485	LIMB REATTACHMENT, HIP AND FEMUR PROCEDURES FOR MULTIPLE SIGNIFICANT TRAUMA
486	OTHER OR PROCEDURES FOR MULTIPLE SIGNIFICANT TRAUMA
487	OTHER MULTIPLE SIGNIFICANT TRAUMAS
491	MAJOR JOINT AND LIMB REATTACHMENT PROCEDURES OF UPPER EXTREMITY
504	TOTAL HEPATECTOMY
505	EXTENSIVE 3RD DEGREE BURNS W/O SKIN GRAFT
506	FULL THICKNESS BURN W/ SKIN GRAFT OR INHALATION INJURY W/ CC OR SIGNIFICANT TRAUMA
507	FULL THICKNESS BURN W/ SKIN GRAFT OR INHALATION INJURY W/O CC OR SIGNIFICANT TRAUMA
508	FULL THICKNESS BURN W/O SKIN GRAFT OR INHALATION INJURY W/ CC OR SIGNIFICANT TRAUMA
509	FULL THICKNESS BURN W/O SKIN GRAFT OR INHALATION INJURY W/O CC OR SIGNIFICANT TRAUMA
510	NON-EXTENSIVE BURNS W/ CC OR SIGNIFICANT TRAUMA
511	NON-EXTENSIVE BURNS W/O CC OR SIGNIFICANT TRAUMA

\* No longer valid in FY 2004

## FTR 2 - DVT/PE

*Include ICD-9-CM DVT/PE diagnosis codes:*

4151	PULMONARY EMBOLISM AND INFARCTION
41511	IATROGENIC PULMONARY EMBOLISM
41519	OTHER PULMONARY EMBOLISM AND INFARCTION
45111	PHLEBITIS AND THORBOPHLEBITIS FEMORAL VEIN (DEEP) (SUPERFICIAL)
45119	PHLEBITIS AND THORBOPHLEBITIS, OTHER DEEP VESSEL OF LOWER EXTREMITIES
4512	PHLEBITIS AND THORBOPHLEBITIS, LOWER EXTREMITIES
45181	PHLEBITIS AND THORBOPHLEBITIS, ILIAC VEIN
4519	PHLEBITIS AND THORBOPHLEBITIS, UNSPECIFIED SITE
4538	OTHER VENOUS EMBOLISM AND THROMBOSIS OF OTHER SPECIFIED VEINS
4539	OTHER VENOUS EMBOLISM AND THROMBOSIS OF UNSPECIFIED SITE

Exclude:

Principal diagnosis of pulmonary embolism or deep vein thrombosis, abortion related and postpartum obstetric pulmonary embolism.

*ICD-9-CM Abortion-related and Postpartum Obstetric Pulmonary Embolism diagnosis codes:*

63460	SPONTANEOUS ABORTION W/ EMBOLISM - UNSPECIFIED
63461	SPONTANEOUS ABORTION W/ EMBOLISM - INCOMPLETE
63462	SPONTANEOUS ABORTION W/ EMBOLISM - COMPLETE
63560	LEGAL ABORTION W/ EMBOLISM - UNSPECIFIED
63561	LEGAL ABORTION W/ EMBOLISM - INCOMPLETE
63562	LEGAL ABORTION W/ EMBOLISM - COMPLETE
63660	ILLEGAL ABORTION W/ EMBOLISM - UNSPECIFIED
63661	ILLEGAL ABORTION W/ EMBOLISM - INCOMPLETE
63662	ILLEGAL ABORTION W/ EMBOLISM - COMPLETE
63760	ABORTION NOS W/ EMBOLISM - UNSPECIFIED
63761	ABORTION NOS W/ EMBOLISM - INCOMPLETE
63762	ABORTION NOS W/ EMBOLISM - COMPLETE
6386	ATTEMPTED ABORTION W/ EMBOLISM
6396	POSTABORTION EMBOLISM
67320	OBSTETRICAL BLOOD-CLOT EMBOLISM, UNSPECIFIED AS TO EPISODE OF CARE OR NOT APPLICABLE
67321	OBSTETRICAL BLOOD-CLOT EMBOLISM, DELIVERED, W/ OR W/O MENTION OF ANTEPARTUM CONDITION
67322	OBSTETRICAL BLOOD-CLOT EMBOLISM, DELIVERED, W/ MENTION OF POSTPARTUM COMPLICATION
67323	OBSTETRICAL BLOOD-CLOT EMBOLISM, ANTEPARTUM CONDITION OR COMPLICATION

## Failure to Rescue (PSI 4)

67324 OBSTETRICAL BLOOD-CLOT EMBOLISM, POSTPARTUM CONDITION OR COMPLICATION

### FTR 3 - Pneumonia

*Include ICD-9-CM Pneumonia diagnosis codes:*

4820 PNEUMONIA DUE TO KLEBSIELLA PNEUMONIAE  
4821 PNEUMONIA DUE TO PSEUDOMONAS  
4822 PNEUMONIA DUE TO HEMOPHILUS INFLUENZAE [H. INFLUENZAE]  
4823 PNEUMONIA DUE TO STREPTOCOCCUS  
48230 PNEUMONIA DUE TO STREPTOCOCCUS – STREPTOCOCCUS, UNSPECIFIED  
48231 PNEUMONIA DUE TO STREPTOCOCCUS – GROUP A  
48232 PNEUMONIA DUE TO STREPTOCOCCUS – GROUP B  
48239 PNEUMONIA DUE TO STREPTOCOCCUS – OTHER STREPTOCOCCUS  
4824 PNEUMONIA DUE TO STAPHYLOCOCCUS  
48240 PNEUMONIA DUE TO STAPHYLOCOCCUS – PNEUMONIA DUE TO STAPHYLOCOCCUS, UNSPECIFIED  
48241 PNEUMONIA DUE TO STAPHYLOCOCCUS – PNEUMONIA DUE TO STAPHYLOCOCCUS AUREUS  
48249 PNEUMONIA DUE TO STAPHYLOCOCCUS – OTHER STAPHYLOCOCCUS PNEUMONIA  
4828 PNEUMONIA DUE TO OTHER SPECIFIED BACTERIA  
48281 PNEUMONIA DUE TO OTHER SPECIFIED BACTERIA – ANAEROBES  
48282 PNEUMONIA DUE TO OTHER SPECIFIED BACTERIA – EXCHERICHIA COLI [E COLI]  
48283 PNEUMONIA DUE TO OTHER SPECIFIED BACTERIA – OTHER GRAM-NEGATIVE BACTERIA  
48284 PNEUMONIA DUE TO OTHER SPECIFIED BACTERIA – LEGIONNAIRES' DISEASE  
48289 PNEUMONIA DUE TO OTHER SPECIFIED BACTERIA – OTHER SPECIFIED BACTERIA  
4829 BACTERIAL PNEUMONIA UNSPECIFIED  
485 BRONCHOPNEUMONIA, ORGANISM UNSPECIFIED  
486 PNEUMONIA, ORGANISM UNSPECIFIED  
5070 DUE TO INHALATION OF FOOD OR VOMITUS  
514 PULMONARY CONGESTION AND HYPOSTASIS

Exclude:

Principal diagnosis code for pneumonia or 997.3, any diagnosis code for viral pneumonia, MDC 4, and any diagnosis of immunocompromised state.

*ICD-9-CM Viral Pneumonia diagnosis codes:*

4800 ADENOVIRAL PNEUMONIA  
4801 RESPIRATORY SYNCYTIAL VIRAL PNEUMONIA  
4802 PARAINFLUENZA VIRAL PNEUMONIA  
4803 PNEUMONIA DUE TO SARS (OCT 03)  
4808 VIRAL PNEUMONIA NOT ELSEWHERE CLASSIFIED  
4809 VIRAL PNEUMONIA UNSPECIFIED  
481 PNEUMOCOCCAL PNEUMONIA  
4830 PNEUMONIA DUE TO MYCOPLASMA PNEUMONIAE  
4831 PNEUMONIA DUE TO CHLAMYDIA  
4838 PNEUMONIA DUE TO OTHER SPECIFIED ORGANISM  
4841 PNEUMONIA IN CYTOMEGALIC INCLUSION DISEASE  
4843 PNEUMONIA IN WHOOPING COUGH  
4845 PNEUMONIA IN ANTHRAX  
4846 PNEUMONIA IN ASPERGILLOSIS  
4847 PNEUMONIA IN OTHER SYSTEMIC MYCOSES  
4848 PNEUMONIA IN INFECTIOUS DISEASE NOT ELSEWHERE CLASSIFIED  
4870 INFLUENZA W/ PNEUMONIA  
4871 FLU W/ RESPIRATORY MANIFEST NOT ELSEWHERE CLASSIFIED  
4878 FLU W/ MANIFESTATION NOT ELSEWHERE CLASSIFIED

*ICD-9-CM Immunocompromised States diagnosis codes:*

See PSI 2 **Death in Low Mortality DRGs** for a list of immunocompromised state diagnosis and

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procedure codes.

MDC 4 DISEASES AND DISORDERS OF THE RESPIRATORY SYSTEM

### FTR 4 - Sepsis

*Include ICD-9-CM Sepsis diagnosis codes:*

0380 STREPTOCOCCAL SEPTICEMIA  
0381 STAPHYLOCOCCAL SEPTICEMIA  
03810 STAPHYLOCOCCAL SEPTICEMIA, UNSPECIFIED  
03811 STAPHYLOCOCCUS AUREUS SEPTICEMIA  
03819 OTHER STAPHYLOCOCCAL SEPTICEMIA  
03840 SEPTICEMIA DUE TO GRAM NEGATIVE ORGANISM, UNSPECIFIED  
0382 PNEUMOCOCCAL SEPTICEMIA [STREPTOCOCCUS PNEUMONIAE SEPTICEMIA]  
0383 SEPTICEMIA DUE TO ANAEROBES  
03841 SEPTICEMIA DUE TO OTHER GRAM-NEGATIVE ORGANISMS, HEMOPHILUS INFLUENZAE [H. INFLUENZAE]  
03842 SEPTICEMIA DUE TO OTHER GRAM-NEGATIVE ORGANISMS, ESCHERICHIA COLI [E COLI]  
03843 SEPTICEMIA DUE TO OTHER GRAM-NEGATIVE ORGANISMS, PSEUDOMONAS  
03844 SEPTICEMIA DUE TO OTHER GRAM-NEGATIVE ORGANISMS, SERRATIA  
03849 SEPTICEMIA DUE TO OTHER GRAM-NEGATIVE ORGANISMS, OTHER  
0388 OTHER SPECIFIED SEPTICEMIAS  
0389 UNSPECIFIED SEPTICEMIA  
7907 BACTEREMIA  
99591 SYSTEMIC INFLAMMATORY RESPONSE SYNDROME DUE TO INFECTIOUS PROCESS W/O ORGAN DYSFUNCTION  
99592 SYSTEMIC INFLAMMATORY RESPONSE SYNDROME DUE TO INFECTION PROCESS W/ ORGAN DYSFUNCTION

Exclude:

Any diagnosis of immunocompromised state and principal diagnosis of infection or sepsis and patients with a length of stay 3 days or less<sup>1</sup>.

*ICD-9-CM Immunocompromised States diagnosis codes:*

See PSI 2 **Death in Low Mortality DRGs** for a list of immunocompromised state diagnosis and procedure codes.

*ICD-9-CM Infection diagnosis codes:*

5400 ACUTE APPENDICITIS W/ GENERALIZED PERITONITIS  
5401 ACUTE APPENDICITIS W/ PERITONEAL ABSCESS  
5409 ACUTE APPENDICITIS W/O MENTION OF PERITONITIS  
541 APPENDICITIS, UNQUALIFIED  
542 OTHER APPENDICITIS  
56201 DIVERTICULITIS OF SMALL INTESTINE (W/O MENTION OF HEMORRHAGE)  
56203 DIVERTICULITIS OF SMALL INTESTINE W/ HEMORRHAGE  
56211 DIVERTICULITIS OF COLON (W/O MENTION OF HEMORRHAGE)  
56213 DIVERTICULITIS OF COLON W/ HEMORRHAGE  
566 ABSCESS OF ANAL AND RECTAL REGIONS  
5670 PERITONITIS IN INFECTIOUS DISEASES CLASSIFIED ELSEWHERE  
5671 PNEUMOCOCCAL PERITONITIS  
5672 OTHER SUPPURATIVE PERITONITIS  
5678 OTHER SPECIFIED PERITONITIS  
5679 UNSPECIFIED PERITONITIS

<sup>1</sup> Note: The length of stay exclusion criteria has been corrected in this version of the PSI Guide. The first version noted length of stay of 4 or more days which was incorrect.

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5695 ABSCESS OF INTESTINE  
56961 INFECTION OF COLOSTOMY OR ENTEROSTOMY  
5720 ABSCESS OF LIVER  
5721 PORTAL PYEMIA  
57400 CALCULUS OF GALLBLADDER W/ ACUTE CHOLECYSTITIS - W/OMENTION OF OBSTRUCTION  
57401 CALCULUS OF GALLBLADDER W/ ACUTE CHOLECYSTITIS - W/ OBSTRUCTION  
57430 CALCULUS OF BILE DUCT W/ ACUTE CHOLECYSTITIS – W/OMENTION OF OBSTRUCTION  
57431 CALCULUS OF BILE DUCT W/ ACUTE CHOLECYSTITIS - W/ OBSTRUCTION  
57460 CALCULUS OF GALLBLADDER AND BILE DUCT W/ ACUTE CHOLECYSTITIS - W/OMENTION OF OBSTRUCTION  
57461 CALCULUS OF GALLBLADDER AND BILE DUCT W/ ACUTE CHOLECYSTITIS - W/ OBSTRUCTION  
57480 CALCULUS OF GALLBLADDER AND BILE DUCT W/ ACUTE AND CHRONIC CHOLECYSTITIS - W/OMENTION OF OBSTRUCTION  
57481 CALCULUS OF GALLBLADDER AND BILE DUCT W/ ACUTE AND CHRONIC CHOLECYSTITIS - W/ OBSTRUCTION  
5750 ACUTE CHOLECYSTITIS  
5754 PERFORATION OF GALLBLADDER  
5761 CHOLANGITIS  
5763 PERFORATION OF BILE DUCT

*Infection DRGs:*

020 NERVOUS SYSTEM INFECTION EXCEPT VIRAL MENINGITIS  
068 OTITIS MEDIA AND URI, AGE GREATER THAN 17 W/ CC  
069 OTITIS MEDIA AND URI, AGE GREATER THAN 17 W/O CC  
070 OTITIS MEDIA AND URI, AGE LESS THAN OR EQUAL TO 17  
079 RESPIRATORY INFECTIONS AND INFLAMMATIONS, AGE GREATER THAN 17 W/ CC  
080 RESPIRATORY INFECTIONS AND INFLAMMATIONS, AGE GREATER THAN 17 W/O CC  
081 RESPIRATORY INFECTIONS AND INFLAMMATIONS, AGE 0-17  
089 SIMPLE PNEUMONIA AND PLEURISY, AGE GREATER THAN 17 W/ CC  
090 SIMPLE PNEUMONIA AND PLEURISY, AGE GREATER THAN 17 W/O CC  
091 SIMPLE PNEUMONIA AND PLEURISY, AGE LESS THAN OR EQUAL TO 17  
126 ACUTE AND SUBACUTE ENDOCARDITIS  
238 OSTEOMYELITIS  
242 SEPTIC ARTHRITIS  
277 CELLULITIS, AGE GREATER THAN 17 W/ CC  
278 CELLULITIS, AGE GREATER THAN 17 W/O CC  
279 CELLULITIS, AGE 0-17  
320 KIDNEY AND URINARY TRACT INFECTIONS, AGE GREATER THAN 17 W/ CC  
321 KIDNEY AND URINARY TRACT INFECTIONS, AGE GREATER THAN 17 W/O CC  
322 KIDNEY AND URINARY TRACT INFECTIONS, AGE 0-17  
368 INFECTIONS OF FEMALE REPRODUCTIVE SYSTEM  
415 OR PROCEDURE FOR INFECTIOUS AND PARASITIC DISEASES  
416 SEPTICEMIA, AGE GREATER THAN 17  
417 SEPTICEMIA, AGE 0-17  
423 OTHER INFECTIOUS AND PARASITIC DISEASES DIAGNOSES

**FTR 5 - Shock or Cardiac Arrest***Include ICD-9-CM Shock or Cardiac Arrest diagnosis codes:*

4275 CARDIAC ARREST  
6395 COMPLICATIONS FOLLOWING ABORTION AND ECTOPIC AND MOLAR PREGNANCIES, SHOCK

**Shock during or following labor and delivery:**

66910 SHOCK DURING OR FOLLOWING LABOR AND DELIVERY – UNSPECIFIED AS TO EPISODE OF CARE OR NOT APPLICABLE  
66911 SHOCK DURING OR FOLLOWING LABOR AND DELIVERY – DELIVERED, W/ OR W/O MENTION OF ANTEPARTUM CONDITION

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66912	SHOCK DURING OR FOLLOWING LABOR AND DELIVERY – DELIVERED, W/ MENTION OF POSTPARTUM COMPLICATION
66913	SHOCK DURING OR FOLLOWING LABOR AND DELIVERY – ANTEPARTUM CONDITION OR COMPLICATION
66914	SHOCK DURING OR FOLLOWING LABOR AND DELIVERY – POSTPARTUM CONDITION OR COMPLICATION
7855	SHOCK NOS
78550	SHOCK, UNSPECIFIED
78551	CARDIOGENIC SHOCK
78552	SEPTIC SHOCK (OCT 03)
78559	SHOCK W/O MENTION OF TRAUMA- OTHER
7991	RESPIRATORY ARREST
9950	OTHER ANAPHYLACTIC SHOCK
9954	SHOCK DUE TO ANESTHESIA
9980	POSTOPERATIVE SHOCK
9994	ANAPHYLACTIC SHOCK DUE TO SERUM

### *ICD-9-CM procedure codes:*

9393	NONMECHANICAL METHODS OF RESUSCITATION
9960	CARDIOPULMONARY RESUSCITATION, NOS
9963	CLOSED CHEST CARDIAC MASSAGE

### Exclude:

MDC 4 and 5, principal diagnosis of shock or cardiac arrest, abortion-related shock, hemorrhage, trauma, GI hemorrhage.

MDC 4	DISEASES AND DISORDERS OF THE RESPIRATORY SYSTEM
MDC 5	DISEASES AND DISORDERS OF THE CIRCULATORY SYSTEM

### *ICD-9-CM Abortion-related Shock diagnosis codes:*

63450	SPONTANEOUS ABORTION W/ SHOCK - UNSPECIFIED
63451	SPONTANEOUS ABORTION W/ SHOCK - INCOMPLETE
63452	SPONTANEOUS ABORTION W/ SHOCK - COMPLETE
63550	LEGAL ABORTION W/ SHOCK - UNSPECIFIED
63551	LEGAL ABORTION W/ SHOCK - INCOMPLETE
63552	LEGAL ABORTION W/ SHOCK - COMPLETE
63650	ILLEGAL ABORTION W/ SHOCK - UNSPECIFIED
63651	ILLEGAL ABORTION W/ SHOCK - INCOMPLETE
63652	ILLEGAL ABORTION W/ SHOCK - COMPLETE
63750	ABORTION NOS W/ SHOCK - UNSPECIFIED
63751	ABORTION NOS W/ SHOCK - INCOMPLETE
63752	ABORTION NOS W/ SHOCK - COMPLETE
6385	ATTEMPTED ABORTION W/ SHOCK

### *ICD-9-CM Hemorrhage Diagnosis Codes:*

See FTR 1 **Acute Renal Failure** for a list of hemorrhage diagnosis codes

### *ICD-9-CM Trauma Diagnosis Codes:*

See PSI 2 **Death in Low Mortality DRGs** for a list of trauma diagnosis codes

### *DRGs:*

See FTR 1 **Acute Renal Failure** for list of trauma DRG codes

### *ICD-9-CM GI hemorrhage diagnosis codes:*

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See FTR 1 **Acute Renal Failure** for list of GI hemorrhage diagnosis codes

### FTR 6 - GI Hemorrhage/Acute Ulcer

*Include ICD-9-CM GI Hemorrhage/Acute Ulcer diagnosis codes:*

- 4560 ESOPHAGEAL VARICES W/ BLEEDING
- 45620 ESOPHAGEAL VARICES IN DISEASES CLASSIFIED ELSEWHERE W/ BLEEDING
- 5307 GASTROESOPHAGEAL LACERATION-HEMORRHAGE SYNDROME
- 53082 ESOPHAGEAL HEMORRHAGE

#### Gastric ulcer:

- 53100 ACUTE W/ HEMORRHAGE – W/O MENTION OF OBSTRUCTION
- 53101 ACUTE W/ HEMORRHAGE – W/ OBSTRUCTION
- 53110 ACUTE W/ PERFORATION – W/O MENTION OF OBSTRUCTION
- 53111 ACUTE W/ PERFORATION – W/ OBSTRUCTION
- 53120 ACUTE W/ HEMORRHAGE AND PERFORATION – W/O MENTION OF OBSTRUCTION
- 53121 ACUTE W/ HEMORRHAGE AND PERFORATION – W/ OBSTRUCTION
- 53130 ACUTE W/O MENTION OF HEMORRHAGE OR PERFORATION – W/O MENTION OF OBSTRUCTION
- 53131 ACUTE W/O MENTION OF HEMORRHAGE OR PERFORATION – W/ OBSTRUCTION
- 53190 UNSPECIFIED AS ACUTE OR CHRONIC, W/O MENTION OF HEMORRHAGE OR PERFORATION – W/O MENTION OF OBSTRUCTION
- 53191 UNSPECIFIED AS ACUTE OR CHRONIC, W/O MENTION OF HEMORRHAGE OR PERFORATION – W/ OBSTRUCTION

#### Duodenal ulcer:

- 53200 ACUTE W/ HEMORRHAGE – W/O MENTION OF OBSTRUCTION
- 53201 ACUTE W/ HEMORRHAGE – W/ OBSTRUCTION
- 53210 ACUTE W/ PERFORATION – W/O MENTION OF OBSTRUCTION
- 53211 ACUTE W/ PERFORATION – W/ OBSTRUCTION
- 53220 ACUTE W/ HEMORRHAGE AND PERFORATION – W/O MENTION OF OBSTRUCTION
- 53221 ACUTE W/ HEMORRHAGE AND PERFORATION – W/ OBSTRUCTION
- 53230 ACUTE W/O MENTION OF HEMORRHAGE OR PERFORATION – W/O MENTION OF OBSTRUCTION
- 53231 ACUTE W/O MENTION OF HEMORRHAGE OR PERFORATION – W/ OBSTRUCTION
- 53290 UNSPECIFIED AS ACUTE OR CHRONIC, W/O MENTION OF HEMORRHAGE OR PERFORATION – W/O MENTION OF OBSTRUCTION
- 53291 UNSPECIFIED AS ACUTE OR CHRONIC, W/O MENTION OF HEMORRHAGE OR PERFORATION – W/ OBSTRUCTION

#### Peptic ulcer:

- 53300 SITE UNSPECIFIED ACUTE W/ HEMORRHAGE – W/O MENTION OF OBSTRUCTION
- 53301 SITE UNSPECIFIED ACUTE W/ HEMORRHAGE – W/ OBSTRUCTION
- 53310 SITE UNSPECIFIED ACUTE W/ PERFORATION – W/O MENTION OF OBSTRUCTION
- 53311 SITE UNSPECIFIED ACUTE W/ PERFORATION – W/ OBSTRUCTION
- 53320 SITE UNSPECIFIED ACUTE W/ HEMORRHAGE AND PERFORATION – W/O MENTION OF OBSTRUCTION
- 53321 SITE UNSPECIFIED ACUTE W/ HEMORRHAGE AND PERFORATION – W/O MENTION OF OBSTRUCTION
- 53330 SITE UNSPECIFIED ACUTE W/O MENTION OF HEMORRHAGE AND PERFORATION – W/O MENTION OF OBSTRUCTION
- 53331 SITE UNSPECIFIED ACUTE W/O MENTION OF HEMORRHAGE AND PERFORATION – W/ OBSTRUCTION
- 53390 SITE UNSPECIFIED AS ACUTE OR CHRONIC, W/O MENTION OF HEMORRHAGE OR PERFORATION – W/O MENTION OF OBSTRUCTION
- 53391 UNSPECIFIED AS ACUTE OR CHRONIC, W/O MENTION OF HEMORRHAGE OR PERFORATION – W/ OBSTRUCTION

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### Gastrojejunal ulcer:

- 53400 ACUTE W/ HEMORRHAGE – W/O MENTION OF OBSTRUCTION
- 53401 ACUTE W/ HEMORRHAGE – W/ OBSTRUCTION
- 53410 ACUTE W/ PERFORATION – W/O MENTION OF OBSTRUCTION
- 53411 ACUTE W/ PERFORATION – W/ OBSTRUCTION
- 53420 ACUTE W/ HEMORRHAGE AND PERFORATION – W/O MENTION OF OBSTRUCTION
- 53421 ACUTE W/ HEMORRHAGE AND PERFORATION – W/ OBSTRUCTION
- 53430 ACUTE W/O MENTION OF HEMORRHAGE OR PERFORATION – W/O MENTION OF OBSTRUCTION
- 53431 ACUTE W/O MENTION OF HEMORRHAGE OR PERFORATION – W/ OBSTRUCTION
- 53490 UNSPECIFIED AS ACUTE OR CHRONIC, W/O MENTION OF HEMORRHAGE OR PERFORATION – W/O MENTION OF OBSTRUCTION
- 53491 UNSPECIFIED AS ACUTE OR CHRONIC, W/O MENTION OF HEMORRHAGE OR PERFORATION – W/ OBSTRUCTION

### Gastritis and duodenitis:

- 53501 ACUTE GASTRITIS – W/ HEMORRHAGE
- 53511 ATROPHIC GASTRITIS – W/ HEMORRHAGE
- 53521 GASTRIC MUCOSAL HYPERTROPHY – W/ HEMORRHAGE
- 53531 ALCOHOLIC GASTRITIS – W/ HEMORRHAGE
- 53541 OTHER SPECIFIED GASTRITIS – W/ HEMORRHAGE
- 53551 UNSPECIFIED GASTRITIS AND GASTRODUODENITIS – W/ HEMORRHAGE
- 53561 DUODENITIS – W/ HEMORRHAGE
- 53783 ANGIODYSPLASIA OF STOMACH AND DUODENUM – W/ HEMORRHAGE
- 53784 DIEULAFOY LESION (HEMORRHAGIC) OF STOMACH AND DUODENUM
- 56202 DIVERTICULOSIS OF SMALL INTESTINE – W/ HEMORRHAGE
- 56203 DIVERTICULITIS OF SMALL INTESTINE – W/ HEMORRHAGE
- 56212 DIVERTICULOSIS OF COLON – W/ HEMORRHAGE
- 56213 DIVERTICULITIS OF COLON – W/ HEMORRHAGE
  
- 5693 HEMORRHAGE OF RECTUM AND ANUS
- 56985 ANGIODYSPLASIA OF INTESTINE – W/ HEMORRHAGE
- 56986 DIEULAFOY LESION (HEMORRHAGIC) OF INTESTINE
- 5780 HEMATEMESIS
- 5781 BLOOD IN STOOL
- 5789 HEMORRHAGE OF GASTROINTESTINAL TRACT, UNSPECIFIED

### Exclude:

MDC codes 6, 7, principal diagnosis of GI hemorrhage/Acute Ulcer, trauma, alcoholism and ICD-9-CM diagnosis codes 280.0 and 285.1:

- MDC 6 DISEASES AND DISORDERS OF THE DIGESTIVE SYSTEM
- MDC 7 DISEASES AND DISORDERS OF THE HEPATOBILIARY SYSTEM AND PANCREAS
  
- 2800 SECONDARY TO BLOOD LOSS [CHRONIC]
- 2851 ACUTE POSTHEMORRHAGIC ANEMIA

### ICD-9-CM Trauma Diagnosis Codes:

See PSI 2 **Death in Low Mortality DRGs** for a list of trauma diagnosis codes

### DRGs:

See FTR 1 **Acute Renal Failure** for list of trauma DRG codes

### ICD-9-CM Alcoholism diagnosis codes:

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2910 ALCOHOL WITHDRAWAL DELIRIUM  
2911 ALCOHOL AMNESTIC SYNDROME  
2912 OTHER ALCOHOLIC DEMENTIA  
2913 ALCOHOL WITHDRAWAL HALLUCINOSIS  
2914 IDIOSYNCRATIC ALCOHOL INTOXICATION  
2915 ALCOHOLIC JEALOUSY  
29181 OTHER SPECIFIED ALCOHOLIC PSYCHOSES, ALCOHOL WITHDRAWAL  
29189 OTHER SPECIFIED ALCOHOLIC PSYCHOSES, OTHER  
2919 UNSPECIFIED ALCOHOLIC PSYCHOSIS  
30300 ACUTE ALCOHOLIC INTOXICATION - UNSPECIFIED  
30301 ACUTE ALCOHOLIC INTOXICATION - CONTINUOUS  
30302 ACUTE ALCOHOLIC INTOXICATION - EPISODIC  
30303 ACUTE ALCOHOLIC INTOXICATION - IN REMISSION  
30390 OTHER AND UNSPECIFIED ALCOHOL DEPENDENCE - UNSPECIFIED  
30391 OTHER AND UNSPECIFIED ALCOHOL DEPENDENCE - CONTINUOUS  
30392 OTHER AND UNSPECIFIED ALCOHOL DEPENDENCE - EPISODIC  
30393 OTHER AND UNSPECIFIED ALCOHOL DEPENDENCE - IN REMISSION  
30500 NONDEPENDENT ABUSE OF DRUGS, ALCOHOL ABUSE - UNSPECIFIED  
30501 NONDEPENDENT ABUSE OF DRUGS, ALCOHOL ABUSE - CONTINUOUS  
30502 NONDEPENDENT ABUSE OF DRUGS, ALCOHOL ABUSE - EPISODIC  
30503 NONDEPENDENT ABUSE OF DRUGS, ALCOHOL ABUSE - IN REMISSION  
4255 ALCOHOLIC CARDIOMYOPATHY  
53530 ALCOHOLIC GASTRITIS, W/O MENTION OF HEMORRHAGE  
53531 ALCOHOLIC GASTRITIS, W/ HEMORRHAGE  
5710 ALCOHOLIC FATTY LIVER  
5711 ACUTE ALCOHOLIC HEPATITIS  
5712 ALCOHOLIC CIRRHOSIS OF LIVER  
5713 ALCOHOLIC LIVER DAMAGE, UNSPECIFIED  
9800 TOXIC EFFECT OF ALCOHOL, ETHYL ALCOHOL  
9809 TOXIC EFFECT OF ALCOHOL, UNSPECIFIED ALCOHOL

**Exclude:**

Patients age 75 years and older.

Neonatal patients in MDC 15 (Newborns and Other Neonates with Conditions Originating in the Neonatal Period).

Patients transferred to an acute care facility  
Patients transferred from an acute care facility  
Patients admitted from a long-term care facility

**Transferred to Acute Care Facility:**

Discharge disposition recorded as transfer to another acute care facility (Discharge Disposition = 2)

**Transferred from Acute Care or Long-Term Care Facility:**

Admission source is recorded as acute care facility (Admission Source = 2)  
Admission source is recorded as long-term care facility (Admission Source=3)

**Foreign Body Left During Procedure, Secondary Diagnosis Field (PSI 5)****Numerator:**

Discharges with ICD-9-CM codes for foreign body left in during procedure in any secondary diagnosis field.

*ICD-9-CM Foreign Body Left in During Procedure diagnosis codes:*

**Foreign Body Left During Procedure, Secondary Diagnosis Field (PSI 5)**

9984 FOREIGN BODY ACCIDENTALLY LEFT DURING A PROCEDURE  
9987 ACUTE REACTIONS TO FOREIGN SUBSTANCE ACCIDENTALLY LEFT DURING A PROCEDURE

Foreign body left in during:

E8710 SURGICAL OPERATION  
E8711 INFUSION OR TRANSFUSION  
E8712 KIDNEY DIALYSIS OR OTHER PERFUSION  
E8713 INJECTION OR VACCINATION  
E8714 ENDOSCOPIC EXAMINATION  
E8715 ASPIRATION OF FLUID OR TISSUE, PUNCTURE, AND CATHETERIZATION  
E8716 HEART CATHETERIZATION  
E8717 REMOVAL OF CATHETER OR PACKING  
E8718 OTHER SPECIFIED PROCEDURES  
E8719 UNSPECIFIED PROCEDURE

**Denominator:**

All medical and surgical discharges defined by specific DRGs

*Surgical Discharge DRGs:*

See PSI 1 **Complications of Anesthesia** for a list of surgical DRG codes.

*Medical Discharge DRGs:*

See PSI 3 **Decubitus Ulcer** for a list of medical DRG codes.

Exclude:

Patients with ICD-9-CM codes for foreign body left in during procedure in the principal diagnosis field

**Iatrogenic Pneumothorax, Secondary Diagnosis Field (PSI 6)**

**Numerator:**

Discharges with ICD-9-CM code of 512.1 in any secondary diagnosis field.

**Denominator:**

All medical and surgical discharges defined by specific DRGs

*Surgical Discharge DRGs:*

See PSI 1 **Complications of Anesthesia** for a list of surgical DRG codes.

*Medical Discharge DRGs:*

See PSI 3 **Decubitus Ulcer** for a list of medical DRG codes.

Exclude:

Patients with ICD-9-CM code of 512.1 in the principal diagnosis field.  
Patients with any diagnosis of trauma.  
Patients with any code indicating thoracic surgery, lung or pleural biopsy, or assigned to cardiac surgery DRGs  
Obstetrical patients in MDC 14 (Pregnancy, Childbirth and the Puerperium).

*ICD-9-CM Trauma diagnosis codes (includes 4<sup>th</sup> and 5<sup>th</sup> digits):*

## iatrogenic Pneumothorax, Secondary Diagnosis Field (PSI 6)

See PSI 2 **Death In Low Mortality DRGs** for a list of trauma diagnosis codes.

*DRGs:*

See FTR 1 **Acute Renal Failure** for a list of trauma DRG codes.

*ICD-9-CM Thoracic Surgery procedure codes:*

3121	MEDIASTINAL TRACHEOSTOMY
3145	OPEN BIOPSY OF LARYNX OR TRACHEA
3173	CLOSURE OF OTHER FISTULA OF TRACHEA
3179	OTHER REPAIR AND PLASTIC OPERATIONS ON TRACHEA
3199	OTHER OPERATIONS ON TRACHEA
3209	OTHER LOCAL EXCISION OR DESTRUCTION OF LESION OR TISSUE OF BRONCHUS
321	OTHER EXCISION OF BRONCHUS

Local excision or destruction of lesion or tissue of lung:

3221	PLICATION OF EMPHYSEMATIOUS BLEB
3222	LUNG VOLUME REDUCTION SURGERY
3228	ENDOSCOPIC EXCISION OR DESTRUCTION OF LESION OR TISSUE OF LUNG
3229	OTHER LOCAL EXCISION OR DESTRUCTION OF LESION OR TISSUE OF LUNG
323	SEGMENTAL RESECTION OF LUNG
324	LOBECTOMY OF LUNG
325	COMPLETE PNEUMONECTOMY
326	RADICAL DISSECTION OF THORACIC STRUCTURES
329	OTHER EXCISION OF LUNG
330	INCISION OF BRONCHUS
331	INCISION OF LUNG
3325	OPEN BIOPSY OF BRONCHUS
3326	CLOSE [PERCUTANEOUS][NEEDLE] BIOPSY OF LUNG
3327	CLOSED ENDOSCOPIC BIOPSY OF LUNG
3328	OPEN BIOPSY OF LUNG
3331	DESTRUCTION OF PHRENIC NERVE FOR COLLAPSE OF LUNG (NO LONGER PERFORMED)
3332	ARTIFICIAL PNEUMOTHORAX FOR COLLAPSE OF LUNG
3334	THORACOPLASTY
3339	OTHER SURGICAL COLLAPSE OF LUNG

Repair and plastic operation on lung and bronchus:

3341	SUTURE OF LACERATION OF BRONCHUS
3342	CLOSURE OF BRONCHIAL FISTULA
3343	CLOSURE OF LACERATION OF LUNG
3348	OTHER REPAIR AND PLASTIC OPERATIONS ON BRONCHUS
3349	OTHER REPAIR AND PLASTIC OPERATIONS ON LUNG

Lung transplant:

335	LUNG TRANSPLANTATION
3350	LUNG TRANSPLANTATION, NOS
3351	UNILATERAL LUNG TRANSPLANTATION
3352	BILATERAL LUNG TRANSPLANTATION
336	COMBINED HEART-LUNG TRANSPLANTATION
3392	LIGATION OF BRONCHUS
3393	PUNCTURE OF LUNG
3398	OTHER OPERATIONS ON BRONCHUS
3399	OTHER OPERATIONS ON LUNG
3329	OTHER DIAGNOSTIC PROCEDURE ON LUNG AND BRONCHUS
3333	PNEUMOPERITONEUM FOR COLLAPSE OF LUNG

**Iatrogenic Pneumothorax, Secondary Diagnosis Field (PSI 6)**

- 3401 INCISION OF CHEST WALL
- 3402 EXPLORATORY THORACOTOMY
- 3403 REOPENING OF RECENT THORACOTOMY SITE
- 3405 CREATION OF PLEUROPERITONEAL SHUNT
- 3409 OTHER INCISION OF PLEURA
- 341 INCISION OF MEDIASTINUM

## Diagnostic procedures on chest wall, pleura, mediastinum, and diaphragm:

- 3421 TRANSPLEURAL THORACOSCOPY
- 3422 MEDIASTINOSCOPY
- 3423 BIOPSY OF CHEST WALL
- 3424 PLEURAL BIOPSY
- 3425 CLOSED [PERCUTANEOUS][NEEDLE] BIOPSY OF MEDIASTINUM
- 3426 OPEN BIOPSY OF MEDIASTINUM
- 3427 BIOPSY OF DIAPHRAGM
- 3428 OTHER DIAGNOSTIC PROCEDURES ON CHEST WALL, PLEURA, AND DIAPHRAGM
- 3429 OTHER DIAGNOSTIC PROCEDURES ON MEDIASTINUM
- 343 EXCISION OR DESTRUCTION OF LESION OR TISSUE OF MEDIASTINUM
- 344 EXCISION OR DESTRUCTION OF LESION OF CHEST WALL
- 3451 DECORTICATION OF LUNG
- 3459 OTHER EXCISION OF PLEURA

## Repair of chest wall:

- 3471 SUTURE OF LACERATION OF CHEST WALL
- 3472 CLOSURE OF THORACOSTOMY
- 3473 CLOSURE OF OTHER FISTULA OF THORAX
- 3474 REPAIR OF PECTUS DEFORMITY
- 3479 OTHER REPAIR OF CHEST WALL

## Operations on diaphragm:

- 3481 EXCISION OF LESION OR TISSUE OF DIAPHRAGM
- 3482 SUTURE OF LACERATION OF DIAPHRAGM
- 3483 CLOSURE OF FISTULA OF DIAPHRAGM
- 3484 OTHER REPAIR OF DIAPHRAGM
- 3485 IMPLANTATION OF DIAPHRAGMATIC PACEMAKER
- 3489 OTHER OPERATIONS ON DIAPHRAGM
- 3493 REPAIR OF PLEURA
- 3499 OTHER OPERATIONS ON THORAX, OTHER

## Operations on thoracic duct:

- 4061 CANNULATION OF THORACIC DUCT
- 4062 FISTULIZATION OF THORACIC DUCT
- 4063 CLOSURE OF FISTULA OF THORACIC DUCT
- 4064 LIGATION OF THORACIC DUCT
- 4069 OTHER OPERATIONS ON THORACIC DUCT

## Esophagotomy:

- 4201 INCISION OF ESOPHAGEAL WEB
- 4209 OTHER INCISION OF ESOPHAGUS
- 4210 ESOPHAGOSTOMY, NOS
- 4211 CERVICAL ESOPHAGOSTOMY
- 4212 EXTERIORIZATION OF ESOPHAGEAL POUCH
- 4219 OTHER EXTERNAL FISTULIZATION OF ESOPHAGUS
- 4221 OPERATIVE ESOPHAGOSCOPY BY INCISION
- 4225 OPEN BIOPSY OF ESOPHAGUS

**Iatrogenic Pneumothorax, Secondary Diagnosis Field (PSI 6)**

4231 LOCAL EXCISION OF ESOPHAGEAL DIVERTICULUM  
4232 LOCAL EXCISION OF OTHER LESION OR TISSUE OF ESOPHAGUS  
4239 OTHER DESTRUCTION OF LESION OR TISSUE OF ESOPHAGUS

## Excision of esophagus:

4240 ESOPHAGECTOMY, NOS  
4241 PARTIAL ESOPHAGECTOMY  
4242 TOTAL ESOPHAGECTOMY

## Intrathoracic anastomosis of esophagus

4251 INTRATHORACIC ESOPHAGOESOPHAGOSTOMY  
4252 INTRATHORACIC ESOPHAGOGASTROSTOMY  
4253 INTRATHORACIC ESOPHAGEAL ANASTOMOSIS W/ INTERPOSITION OF SMALL BOWEL  
4254 OTHER INTRATHORACIC ESOPHAGOENTEROSTOMY  
4255 INTRATHORACIC ESOPHAGEAL ANASTOMOSIS W/ INTERPOSITION OF COLON  
4256 OTHER INTRATHORACIC ESOPHAGOCOLOSTOMY  
4258 INTRATHORACIC ESOPHAGEAL ANASTOMOSIS W/ OTHER INTERPOSITION  
4259 OTHER INTRATHORACIC ANASTOMOSIS OF ESOPHAGUS

## Antesternal anastomosis

4261 ANTESTERNAL ESOPHAGOESOPHAGOSTOMY  
4262 ANTESTERNAL ESOPHAGOGASTROSTOMY  
4263 ANTESTERNAL ESOPHAGEAL ANASTOMOSIS W/ INTERPOSITION OF SMALL BOWEL  
4264 OTHER ANTESTERNAL ESOPHAGOENTEROSTOMY  
4265 ANTESTERNAL ESOPHAGEAL ANASTOMOSIS W/ INTERPOSITION OF COLON  
4266 OTHER ANTESTERNAL ESOPHAGOCOLOSTOMY  
4268 OTHER ANTESTERNAL ESOPHAGEAL ANASTOMOSIS W/ INTERPOSITION  
4269 OTHER ANTESTERNAL ANASTOMOSIS OF ESOPHAGUS  
427 ESOPHAGOMYOTOMY

## Other repair of esophagus

4281 INSERTION OF PERMANENT TUBE INTO ESOPHAGUS  
4282 SUTURE OF LACERATION OF ESOPHAGUS  
4283 CLOSURE OF ESOPHAGOSTOMY  
4284 REPAIR OF ESOPHAGEAL FISTULA, NEC  
4285 REPAIR OF ESOPHAGEAL STRICTURE  
4286 PRODUCTION OF SUBCUTANEOUS TUNNEL W/O ESOPHAGEAL ANASTOMOSIS  
4287 OTHER GRAFT OF ESOPHAGUS  
4289 OTHER REPAIR OF ESOPHAGUS  
4465 ESOPHAGOGASTROPLASTY  
4466 OTHER PROCEDURES FOR CREATION OF ESOPHAGOGASTRIC SPHINCTERIC COMPETENCE  
8104 DORSAL AND DORSO-LUMBAR FUSION, ANTERIOR TECHNIQUE  
8134 REFUSION OF DORSAL AND DORSOLUMBAR SPINE, ANTERIOR TECHNIQUE

*ICD-9-CM Lung or Pleural Biopsy procedure codes:*

3326 CLOSED [PERCUTANEOUS] [NEEDLE] BIOPSY OF LUNG  
3328 OPEN BIOPSY OF LUNG  
3424 PLEURAL BIOPSY

*Cardiac Surgery DRGs:*

103 HEART TRANSPLANT  
104 CARDIAC VALVE AND OTHER MAJOR CARDIOTHORACIC PROCEDURES W/ CARDIAC CATHETERIZATION  
105 CARDIAC VALVE AND OTHER MAJOR CARDIOTHORACIC PROCEDURES W/O CARDIAC

**Iatrogenic Pneumothorax, Secondary Diagnosis Field (PSI 6)**

	CATHETERIZATION
106	CORONARY BYPASS W/ PTCA
107	CORONARY BYPASS W/ CARDIAC CATHETERIZATION
108	OTHER CARDIOTHORACIC PROCEDURES
109	CORONARY BYPASS W/O CARDIAC CATHETERIZATION
110	MAJOR CARDIOVASCULAR PROCEDURES W/ CC
111	MAJOR CARDIOVASCULAR PROCEDURES W/O CC
525	HEART ASSIST SYSTEM IMPLANT (OCT 02)

**Selected Infections Due to Medical Care, Secondary Diagnosis Field (PSI 7)****Numerator:**

Discharges with ICD-9-CM code of 999.3 or 996.62 in any secondary diagnosis field.

**Denominator:**

All medical and surgical discharges defined by specific DRGs

*Surgical Discharge DRGs:*

See PSI 1 **Complications of Anesthesia** for a list of surgical DRG codes.

*Medical Discharge DRGs:*

See PSI 3 **Decubitus Ulcer** for a list of medical DRG codes.

**Exclude:**

Patients with ICD-9-CM code of 999.3 or 996.62 in the principal diagnosis field

Patients with any code for immunocompromised state or cancer.

*ICD-9-CM Immunocompromised States diagnosis codes:*

See PSI 2 **Death in Low Mortality DRGs** for a list of immunocompromised states diagnosis codes.

*ICD-9-CM procedure codes:*

See PSI 2 **Death in Low Mortality DRGs** for a list of immunocompromised states procedure codes.

**Cancer:**

See PSI 2 **Death in Low Mortality DRGs** for a list of cancer diagnosis codes

*DRGs:*

010	NERVOUS SYSTEM NEOPLASMS W/ CC
011	NERVOUS SYSTEM NEOPLASMS W/O CC
064	EAR, NOSE, MOUTH AND THROAT MALIGNANCY
082	RESPIRATORY NEOPLASMS
172	DIGESTIVE MALIGNANCY W/ CC
173	DIGESTIVE MALIGNANCY W/O CC
199	HEPATOBIILIARY DIAGNOSTIC PROCEDURE FOR MALIGNANCY
203	MALIGNANCY OF HEPATOBIILIARY SYSTEM OR PANCREAS
239	PATHOLOGICAL FRACTURES AND MUSCULOSKELETAL AND CONNECTIVE TISSUE MALIGNANCY
257	TOTAL MASTECTOMY FOR MALIGNANCY W/ CC
258	TOTAL MASTECTOMY FOR MALIGNANCY W/O CC
259	SUBTOTAL MASTECTOMY FOR MALIGNANCY W/ CC
260	SUBTOTAL MASTECTOMY FOR MALIGNANCY W/O CC

**Selected Infections Due to Medical Care, Secondary Diagnosis Field (PSI 7)**

274	MALIGNANT BREAST DISORDERS W/ CC
275	MALIGNANT BREAST DISORDERS W/O CC
303	KIDNEY, URETER AND MAJOR BLADDER PROCEDURES FOR NEOPLASM
318	KIDNEY AND URINARY TRACT NEOPLASMS W/ CC
319	KIDNEY AND URINARY TRACT NEOPLASMS W/O CC
338	TESTES PROCEDURES FOR MALIGNANCY
344	OTHER MALE REPRODUCTIVE SYSTEM OR PROCEDURES FOR MALIGNANCY
346	MALIGNANCY OF MALE REPRODUCTIVE SYSTEM W/ CC
347	MALIGNANCY OF MALE REPRODUCTIVE SYSTEM W/O CC
354	UTERINE AND ADNEXA PROCEDURES FOR NONOVARIAN/ADNEXAL MALIGNANCY W/ CC
355	UTERINE AND ADNEXA PROCEDURES FOR NONOVARIAN/ADNEXAL MALIGNANCY W/O CC
357	UTERINE AND ADNEXA PROCEDURES FOR OVARIAN OR ADNEXAL MALIGNANCY
363	D AND C, CONIZATION AND RADIOIMPLANT FOR MALIGNANCY
367	MALIGNANCY OF FEMALE REPRODUCTIVE SYSTEM W/O CC
400*	LYMPHOMA AND LEUKEMIA W/ MAJOR OR PROCEDURES
401	LYMPHOMA AND NONACUTE LEUKEMIA W/ OTHER OR PROCEDURE W/ CC
402	LYMPHOMA AND NONACUTE LEUKEMIA W/ OTHER OR PROCEDURE W/O CC
403	LYMPHOMA AND NONACUTE LEUKEMIA W/ CC
404	LYMPHOMA AND NONACUTE LEUKEMIA W/O CC
405	ACUTE LEUKEMIA W/O MAJOR OR PROCEDURE, AGE 0-17
406	MYELOPROLIFERATIVE DISORDERS OR POORLY DIFFERENTIATED NEOPLASMS W/ MAJOR OR PROCEDURES W/ CC
407	MYELOPROLIFERATIVE DISORDERS OR POORLY DIFFERENTIATED NEOPLASMS W/ MAJOR OR PROCEDURE W/O CC
408	MYELOPROLIFERATIVE DISORDERS OR POORLY DIFFERENTIATED NEOPLASMS W/ OTHER OR PROCEDURES
409	RADIOTHERAPY
410	CHEMOTHERAPY W/O ACUTE LEUKEMIA AS SECONDARY DIAGNOSIS
411	HISTORY OF MALIGNANCY W/O ENDOSCOPY
412	HISTORY OF MALIGNANCY W/ ENDOSCOPY
413	OTHER MYELOPROLIFERATIVE DISORDERS OR POORLY DIFFERENTIATED NEOPLASM DIAGNOSES W/ CC
414	OTHER MYELOPROLIFERATIVE DISORDERS OR POORLY DIFFERENTIATED NEOPLASM DIAGNOSES W/O CC
473	ACUTE LEUKEMIA W/O MAJOR OR PROCEDURE, AGE GREATER THAN 17
492	CHEMOTHERAPY W/ ACUTE LEUKEMIA AS SECONDARY DIAGNOSIS
539	LYMPHOMA & LEUKEMIA W MAJOR OR PROCEDURE W/ CC (OCT 03)
540	LYMPHOMA & LEUKEMIA W MAJOR OR PROCEDURE W/O CC (OCT 03)

\*No Longer valid in FY2004

**Postoperative Hip Fracture (PSI 8)****Numerator:**

Discharges with ICD-9-CM code for hip fracture in any secondary diagnosis field

*ICD-9-CM Hip Fracture diagnosis codes (includes all 5<sup>th</sup> digits):*

8200	FRACTURE OF NECK OF FEMUR – TRANSCERVICAL FRACTURE, CLOSED
8201	FRACTURE OF NECK OF FEMUR – TRANSCERVICAL FRACTURE, OPEN
8202	FRACTURE OF NECK OF FEMUR – PERTROCHANTERIC FRACTURE, CLOSED
8203	FRACTURE OF NECK OF FEMUR – PERTROCHANTERIC FRACTURE, OPEN
8208	UNSPECIFIED PART OF NECK OF FEMUR, CLOSED
8209	UNSPECIFIED PART OF NECK OF FEMUR, OPEN

**Denominator:**

## Postoperative Hip Fracture (PSI 8)

All surgical discharges defined by specific DRGs and an ICD-9-CM code for an operating room procedure (Appendix C).

### *Surgical Discharge DRGs:*

See PSI 1 **Complications of Anesthesia** for a list of surgical DRG codes.

### Exclude:

Patients with ICD-9-CM code for hip fracture in the principal diagnosis field.

Patients where the only operating room procedure is hip fracture repair.

Patients where a procedure for hip fracture repair occurs before the first operating room procedure.

*Note: If day of procedure is not available in the input data file, the rate may be slightly lower than if the information was available*

Patients who have diseases and disorders of the musculoskeletal system and connective tissue (MDC 8).

Patients with principal diagnosis codes for seizure, syncope, stroke, coma, cardiac arrest, poisoning, trauma, delirium and other psychoses, or anoxic brain injury.

Patients with any diagnosis of metastatic cancer, lymphoid malignancy or bone malignancy, or self-inflicted injury.

Obstetrical patients in MDC14 (Pregnancy, Childbirth and the Puerperium).

Patients 17 years of age and younger.

### *ICD-9-CM Hip Fracture Repair procedure codes:*

7855	INTERNAL FIXATION-FEMUR
7915	CLOSED RED-INT FIX FEMUR
7925	OPEN REDUCTION-FEMUR FX
7935	OPEN REDUC-INT FIX FEMUR
8151	TOTAL HIP REPLACEMENT
8152	PARTIAL HIP REPLACEMENT

### *ICD-9-CM Seizure diagnosis codes:*

34500	GENERALIZED NONCONVULSIVE EPILEPSY – W/O MENTION OF INTRACTABLE EPILEPSY
34501	GENERALIZED NONCONVULSIVE EPILEPSY – W/ INTRACTABLE EPILEPSY
34510	GENERALIZED CONVULSIVE EPILEPSY – W/O MENTION OF INTRACTABLE EPILEPSY
34511	GENERALIZED CONVULSIVE EPILEPSY – W/ INTRACTABLE EPILEPSY
3452	EPILEPSY – PETIT MAL STATUS
3453	EPILEPSY – GRAND MAL STATUS
34540	PARTIAL EPILEPSY, W/ IMPAIRMENT OF CONSCIOUSNESS – W/ INTRACTABLE EPILEPSY
34541	PARTIAL EPILEPSY, W/ IMPAIRMENT OF CONSCIOUSNESS – W/O MENTION OF INTRACTABLE EPILEPSY
34550	PARTIAL EPILEPSY, W/O MENTION OF IMPAIRMENT OF CONSCIOUSNESS – W/O MENTION OF INTRACTABLE EPILEPSY
34551	PARTIAL EPILEPSY, W/O MENTION OF IMPAIRMENT OF CONSCIOUSNESS – W/ INTRACTABLE EPILEPSY
34560	INFANTILE SPASMS – W/O MENTION OF INTRACTABLE EPILEPSY
34561	INFANTILE SPASMS – W/ INTRACTABLE EPILEPSY
34570	EPILEPSIA PARTIALIS CONTINUA – W/O MENTION OF INTRACTABLE EPILEPSY
34571	EPILEPSIA PARTIALIS CONTINUA – W/ INTRACTABLE EPILEPSY
34580	OTHER FORMS OF EPILEPSY – W/O MENTION OF INTRACTABLE EPILEPSY
34581	OTHER FORMS OF EPILEPSY – W/ INTRACTABLE EPILEPSY
34590	EPILEPSY, UNSPECIFIED – W/O MENTION OF INTRACTABLE EPILEPSY

## Postoperative Hip Fracture (PSI 8)

34591 EPILEPSY, UNSPECIFIED – W/ INTRACTABLE EPILEPSY  
7803 CONVULSIONS  
78031 FEBRILE CONVULSIONS  
78039 OTHER CONVULSIONS  
7803 CONVULSIONS (OLD CODE NO LONGER VALID)

### *ICD-9-CM Syncope diagnosis codes:*

7802 SYNCOPE AND COLLAPSE

### *ICD-9-CM Stroke diagnosis codes:*

430 SUBARACHNOID HEMORRHAGE  
431 INTRACEREBRAL HEMORRHAGE  
4320 NONTRAUMATIC EXTRADURAL HEMORRHAGE  
4321 SUBDURAL HEMORRHAGE  
4329 UNSPECIFIED INTRACRANIAL HEMORRHAGE  
436 ACUTE, BUT ILL-DEFINED CEREBROVASCULAR DISEASE  
99702 POSTOPERATIVE CEREBROVASCULAR ACCIDENT

### *Occlusion and stenosis of precerebral arteries:*

43301 BASILAR ARTERY, W/ CEREBRAL INFARCTION  
43311 CAROTID ARTERY, W/ CEREBRAL INFARCTION  
43321 VERTEBRAL ARTERY - W/ CEREBRAL INFARCTION  
43331 MULTIPLE AND BILATERAL W/ CEREBRAL INFARCTION  
43381 OTHER SPECIFIED PRECEREBRAL ARTERY W/ CEREBRAL INFARCTION  
43391 OCCLUSION AND STENOSIS OF PRECEREBRAL ARTERIES, UNSPECIFIED PRECEREBRAL ARTERY W/ CEREBRAL INFARCTION

### *Occlusion of cerebral arteries:*

43401 CEREBRAL THROMBOSIS – W/ CEREBRAL INFARCTION  
43411 CEREBRAL EMBOLISM – W/ CEREBRAL INFARCTION  
43491 CEREBRAL ARTERY OCCLUSION, UNSPECIFIED - W/ CEREBRAL INFARCTION

### *ICD-9-CM Coma diagnosis codes:*

25020 DIABETES W/ HYPEROSMOLARITY, TYPE 2 [NONINSULIN DEPENDENT TYPE][NIDDM TYPE][ADULT-ONSET] OR UNSPECIFIED TYPE, NOT STATED AS UNCONTROLLED  
25021 DIABETES W/ HYPEROSMOLARITY, TYPE 1 [INSULIN DEPENDENT TYPE][IDDM-TYPE] [JUVENILE TYPE], NOT STATED AS UNCONTROLLED  
25022 DIABETES W/ HYPEROSMOLARITY, TYPE 2  
25023 DIABETES MELLITUS, DIABETES W/ HYPEROSMOLARITY, TYPE 1 [INSULIN DEPENDENT TYPE][IDDM-TYPE][JUVENILE TYPE] UNCONTROLLED  
25030 DIABETES W/ OTHER COMA, TYPE 2 NOT STATED AS UNCONTROLLED  
25031 DIABETES W/ OTHER COMA, TYPE 1 NOT STATED AS UNCONTROLLED  
25032 DIABETES MELLITUS, DIABETES W/ OTHER COMA, TYPE 2 UNCONTROLLED  
25033 DIABETES MELLITUS, DIABETES W/ OTHER COMA, TYPE 1 UNCONTROLLED  
2510 OTHER DISORDERS OF PANCREATIC INTERNAL SECRETION, HYPOGLYCEMIC COMA  
5722 LIVER ABSCESS AND SEQUELAE OF CHRONIC LIVER DISEASE, HEPATIC COMA  
78001 GENERAL SYMPTOMS, ALTERATION OF CONSCIOUSNESS, COMA  
78003 GENERAL SYMPTOMS, ALTERATION OF CONSCIOUSNESS PERSISTENT VEGETATIVE STATE

### *ICD-9-CM Cardiac Arrest diagnosis code:*

See FTR 1 **Acute Renal Failure** for a list of cardiac arrest diagnosis codes.

### *ICD-9-CM Poisoning diagnosis codes (includes 4<sup>th</sup> and 5<sup>th</sup> digits):*

## Postoperative Hip Fracture (PSI 8)

960	POISONING BY ANTIBIOTICS
961	POISONING BY OTHER ANTI-INFECTIVES
962	POISONING BY HORMONES AND SYNTHETIC SUBSTITUTES
963	POISONING BY PRIMARILY SYSTEMIC AGENTS
964	POISONING BY AGENTS PRIMARILY AFFECTING BLOOD CONSTITUENTS
965	POISONING BY ANALGESICS, ANTIPYRETICS, AND ANTIRHEUMATICS
966	POISONING BY ANTICONVULSANTS AND ANTI-PARKINSONISM DRUGS
967	POISONING BY SEDATIVES AND HYPNOTICS
968	POISONING BY OTHER CENTRAL NERVOUS SYSTEM DEPRESSANTS AND ANESTHETICS
969	POISONING BY PSYCHOTROPIC AGENTS
970	POISONING BY CENTRAL NERVOUS SYSTEM STIMULANTS
971	POISONING BY DRUGS PRIMARILY AFFECTING THE AUTONOMIC NERVOUS SYSTEM
972	POISONING BY AGENTS PRIMARILY AFFECTING THE CARDIOVASCULAR SYSTEM
973	POISONING BY AGENTS PRIMARILY AFFECTING THE GASTROINTESTINAL SYSTEM
974	POISONING BY WATER, MINERAL, AND URIC ACID METABOLISM DRUGS
975	POISONING BY AGENTS PRIMARILY ACTING ON THE SMOOTH AND SKELETAL MUSCLES AND RESPIRATORY SYSTEM
976	POISONING BY AGENTS PRIMARILY AFFECTING SKIN AND MUCOUS MEMBRANE, OPHTHAMOLOGICAL, OTORHINOLARYNGOLOGICAL AND DENTAL DRUGS
977	POISONING BY OTHER AND UNSPECIFIED DRUGS AND MEDICINAL SUBSTANCES
978	POISONING BY BACTERIAL VACCINES
979	POISONING BY OTHER VACCINES AND BIOLOGICAL SUBSTANCES
E850	ACCIDENTAL POISONING BY ANALGESICS, ANTIPYRETICS, AND ANTIRHEUMATICS
E851	ACCIDENTAL POISONING BY BARBITURATES
E852	ACCIDENTAL POISONING BY OTHER SEDATIVES AND HYPNOTICS
E853	ACCIDENTAL POISONING BY TRANQUILIZERS
E854	ACCIDENTAL POISONING BY OTHER PSYCHOTROPIC AGENTS
E855	ACCIDENTAL POISONING BY OTHER DRUGS ACTING ON CENTRAL AND AUTONOMIC NERVOUS SYSTEM
E856	ACCIDENTAL POISONING BY ANTIBIOTICS
E857	ACCIDENTAL POISONING BY OTHER ANTI-INFECTIVES
E858	ACCIDENTAL POISONING BY OTHER DRUGS
E860	ACCIDENTAL POISONING BY ALCOHOL, NEC
E861	ACCIDENTAL POISONING BY CLEANING AND POLISHING AGENTS, DISINFECTANTS, PAINTS, AND VARNISHES
E862	ACCIDENTAL POISONING BY PETROLEUM PRODUCTS, OTHER SOLVENTS AND THEIR VAPORS, NEC
E863	ACCIDENTAL POISONING BY AGRICULTURAL AND HORTICULTURAL CHEMICAL AND PHARMACEUTICAL PREPARATIONS OTHER THAN PLANT FOODS AND FERTILIZERS
E864	ACCIDENTAL POISONING BY CORROSIVES AND CAUSTICS, NEC
E865	ACCIDENTAL POISONING FROM POISONOUS FOODSTUFFS AND POISONOUS PLANTS
E866	ACCIDENTAL POISONING BY OTHER AND UNSPECIFIED SOLID AND LIQUID SUBSTANCES
E867	ACCIDENTAL POISONING BY GAS DISTRIBUTED BY PIPELINE
E868	ACCIDENTAL POISONING BY OTHER UTILITY GAS AND OTHER CARBON MONOXIDE
E869	ACCIDENTAL POISONING BY OTHER GASES AND VAPORS
E951	SUICIDE AND SELF-INFLICTED POISONING BY GASES IN DOMESTIC USE
E952	SUICIDE AND SELF-INFLICTED POISONING BY OTHER GASES AND VAPORS
E962	ASSAULT BY POISONING
E980	POISONING BY SOLID OR LIQUID SUBSTANCES, UNDETERMINED WHETHER ACCIDENTALLY OR PURPOSELY INFLICTED
E981	POISONING BY GASES IN DOMESTIC USE, UNDETERMINED WHETHER ACCIDENTALLY OR PURPOSELY INFLICTED
E982	POISONING BY OTHER GASES, UNDETERMINED WHETHER ACCIDENTALLY OR PURPOSELY INFLICTED

*ICD-9-CM Trauma diagnosis codes (includes 4<sup>th</sup> and 5<sup>th</sup> digits):*

See PSI 2 **Death in Low Mortality** DRGs for a list of trauma diagnosis codes.

*DRGs:*

## Postoperative Hip Fracture (PSI 8)

See FTR 1 **Acute Renal Failure** for a list of trauma DRG codes.

*ICD-9-CM Delirium and Other Psychoses diagnosis codes (includes 4<sup>th</sup> and 5<sup>th</sup> digits):*

290 SENILE AND PRESENILE ORGANIC PSYCHOTIC CONDITIONS  
291 ALCOHOLIC PSYCHOSES  
292 DRUG PSYCHOSES  
293 TRANSIENT ORGANIC PSYCHOTIC CONDITIONS  
294 OTHER ORGANIC PSYCHOTIC CONDITIONS  
295 SCHIZOPHRENIC DISORDERS  
296 AFFECTIVE PSYCHOSES  
297 PARANOID STATES  
298 OTHER NONORGANIC PSYCHOSES  
299 PSYCHOSES W/ ORIGIN SPECIFIC TO CHILDHOOD

*ICD-9-CM Anoxic Brain Injury diagnosis code:*

3481 ANOXIC BRAIN DAMAGE

*ICD-9-CM Metastatic Cancer diagnosis codes (includes 4<sup>th</sup> and 5<sup>th</sup> digits):*

196 SECONDARY AND UNSPECIFIED MALIGNANT NEOPLASM OF LYMPH NODES  
197 SECONDARY MALIGNANT NEOPLASM OF RESPIRATORY AND DIGESTIVE SYSTEMS  
198 SECONDARY MALIGNANT NEOPLASM OF OTHER SPECIFIED SITES  
1990 MALIGNANT NEOPLASM W/O SPECIFICATION OF SITE, DISSEMINATED

*ICD-9-CM Lymphoid Malignancy diagnosis codes (includes 4<sup>th</sup> and 5<sup>th</sup> digits):*

200 LYMPHOSARCOMA AND RETICULOSARCOMA  
201 HODGKIN'S DISEASE  
202 OTHER MALIGNANT NEOPLASMS OF LYMPHOID AND HISTIOCYTIC TISSUE  
203 MULTIPLE MYELOMA AND IMMUNOPROLIFERATIVE NEOPLASMS  
204 LYMPHOID LEUKEMIA  
205 MYELOID LEUKEMIA  
206 MONOCYTIC LEUKEMIA  
207 OTHER SPECIFIED LEUKEMIA  
208 LEUKEMIA OF UNSPECIFIED CELL TYPE

*ICD-9-CM Bone Malignancy diagnosis code (includes 4<sup>th</sup> and 5<sup>th</sup> digits):*

170 MALIGNANT NEOPLASM OF BONE AND ARTICULAR CARTILAGE

*ICD-9-CM Self-Inflicted Injury diagnosis codes:*

See PSI 1 **Complications of Anesthesia** for a list of self-inflicted injury diagnosis codes.

## Postoperative Hemorrhage or Hematoma (PSI 9)

### Numerator:

Discharges with ICD-9-CM codes for postoperative hemorrhage or postoperative hematoma in any secondary diagnosis field and codes for postoperative control of hemorrhage or drainage of hematoma in any procedure code field.

*ICD-9-CM Postoperative Hematoma diagnosis code:*

## Postoperative Hemorrhage or Hematoma (PSI 9)

99812 HEMATOMA COMPLICATING A PROCEDURE

*ICD-9-CM Postoperative Hemorrhage diagnosis code:*

99811 HEMORRHAGE COMPLICATING A PROCEDURE

*ICD-9-CM Control of Postoperative Hemorrhage procedure codes:*

287 CONTROL OF HEMORRHAGE AFTER TONSILLECTOMY AND ADENOIDECTOMY  
3880 OTHER SURGICAL OCCLUSION OF UNSPECIFIED SITE  
3881 OTHER SURGICAL OCCLUSION OF INTRACRANIAL VESSELS  
3882 OTHER SURGICAL OCCLUSION OF OTHER VESSELS OF HEAD AND NECK  
3883 OTHER SURGICAL OCCLUSION OF UPPER LIMB VESSELS  
3884 OTHER SURGICAL OCCLUSION OF AORTA, ABDOMINAL  
3885 OTHER SURGICAL OCCLUSION OF THORACIC VESSEL  
3886 OTHER SURGICAL OCCLUSION OF ABDOMINAL ARTERIES  
3887 OTHER SURGICAL OCCLUSION OF ABDOMINAL VEINS  
3888 OTHER SURGICAL OCCLUSION OF LOWER LIMB ARTERIES  
3889 OTHER SURGICAL OCCLUSION OF LOWER LIMB VEINS  
3941 CONTROL OF HEMORRHAGE FOLLOWING VASCULAR SURGERY  
3998 CONTROL OF HEMORRHAGE NOS  
4995 CONTROL OF (POSTOPERATIVE) HEMORRHAGE OF ANUS  
5793 CONTROL OF (POSTOPERATIVE) HEMORRHAGE OF BLADDER  
6094 CONTROL OF (POSTOPERATIVE) HEMORRHAGE OF PROSTATE

*ICD-9-CM Drainage of Hematoma procedure codes:*

1809 OTHER INCISION OF EXTERNAL EAR  
540 INCISION OF ABDOMINAL WALL  
5412 REOPENING OF RECENT LAPAROTOMY SITE  
5919 OTHER INCISION OF PERIVESICLE TISSUE  
610 INCISION AND DRAINAGE OF SCROTUM AND TUNICA AND VAGINALIS  
6998 OTHER OPERATIONS ON SUPPORTING STRUCTURES OF UTERUS  
7014 OTHER VAGINOTOMY  
7109 OTHER INCISION OF VULVA AND PERINEUM  
7591 EVACUATION OF OBSTETRICAL INCISIONAL HEMATOMA OF PERINEUM  
7592 EVACUATION OF OTHER HEMATOMA OF VULVA OR VAGINA  
8604 OTHER INCISION W/ DRAINAGE OF SKIN AND SUBCUTANEOUS TISSUE

### Denominator:

All surgical discharges defined by specific DRGs and an ICD-9-CM code for an operating room procedure (Appendix C).

*Surgical Discharge DRGs:*

See PSI 1 **Complications of Anesthesia** for a list of surgical DRG codes.

Exclude:

Patients with ICD-9-CM codes for postoperative hemorrhage or postoperative hematoma in the principal diagnosis field

Patients where the only operating room procedure is postoperative control of hemorrhage or drainage of hematoma.

Patients where a procedure for postoperative control of hemorrhage or drainage of hematoma occurs before the first operating room procedure.

*Note: If day of procedure is not available in the input data file, the rate may be slightly lower than*

**Postoperative Hemorrhage or Hematoma (PSI 9)**

*if the information was available.*

Obstetrical patients in MDC 14 (Pregnancy, Childbirth and the Puerperium).

**Postoperative Physiologic and Metabolic Derangement (PSI 10)****Numerator:**

Discharges with ICD-9-CM codes for physiologic and metabolic derangements in any secondary diagnosis field.

Discharges with acute renal failure (subgroup of physiologic and metabolic derangements) must be accompanied by a procedure code for dialysis (39.95, 54.98).

*ICD-9-CM Physiologic and Metabolic Derangements diagnosis codes:*

Diabetes with ketoacidosis:

25010 TYPE 2, OR UNSPECIFIED TYPE, NOT STATED AS UNCONTROLLED  
25011 TYPE 1 NOT STATED AS UNCONTROLLED  
25012 TYPE 2, OR UNSPECIFIED TYPE, UNCONTROLLED  
25013 TYPE 1 UNCONTROLLED

Acute renal failure:

5845 W/ LESION OF TUBULAR NECROSIS  
5846 W/ LESION OF RENAL CORTICAL NECROSIS  
5847 W/ LESION OF RENAL MEDULLARY [PAPILLARY] NECROSIS  
5848 W/ OTHER SPECIFIED PATHOLOGICAL LESION IN KIDNEY  
5849 ACUTE RENAL FAILURE, UNSPECIFIED

Diabetes with hyperosmolarity:

25020 TYPE 2, OR UNSPECIFIED TYPE, NOT STATED AS UNCONTROLLED  
25021 TYPE 1 NOT STATED AS UNCONTROLLED  
25022 TYPE 2, OR UNSPECIFIED TYPE, UNCONTROLLED  
25023 TYPE 1 UNCONTROLLED

Diabetes with other coma:

25030 TYPE 2, OR UNSPECIFIED TYPE, NOT STATED AS UNCONTROLLED  
25031 TYPE 1 NOT STATED AS UNCONTROLLED  
25032 TYPE 2, OR UNSPECIFIED TYPE, UNCONTROLLED  
25033 TYPE 1 UNCONTROLLED

**Denominator:**

All elective\* surgical discharges defined by specific DRGs and an ICD-9-CM code for an operating room procedure (Appendix C).

Elective

Admission type # is recorded as elective (ATYPE = 3)

*Surgical Discharge DRGs:*

## Postoperative Physiologic and Metabolic Derangement (PSI 10)

See PSI 1 **Complications of Anesthesia** for a list of surgical DRG codes.

Exclude:

Patients with ICD-9-CM codes for physiologic and metabolic derangements in the principal diagnosis field.

Patients with acute renal failure where a procedure for dialysis occurs before or on the same day as the first operating room procedure.

*Note: If day of procedure is not available in the input data file, the rate may be slightly lower than if the information was available.*

Patients with both a diagnosis code of ketoacidosis, hyperosmolarity, or other coma (subgroups of physiologic and metabolic derangements coding) and a principal diagnosis of diabetes.

Patients with both a secondary diagnosis code for acute renal failure (subgroup of physiologic and metabolic derangements coding) and a principal diagnosis of acute myocardial infarction, cardiac arrhythmia, cardiac arrest, shock, hemorrhage, or gastrointestinal hemorrhage.

Obstetrical patients in MDC 14 (Pregnancy, Childbirth and the Puerperium).

*ICD-9-CM Diabetes diagnosis codes (includes 4<sup>th</sup> and 5<sup>th</sup> digits):*

2500	DIABETES MELLITUS W/O MENTION OF COMPLICATION
2501	DIABETES W/ KETOACIDOSIS
2502	DIABETES W/ HYPEROSMOLARITY
2503	DIABETES W/ OTHER COMA
2504	DIABETES W/ RENAL MANIFESTATIONS
2505	DIABETES W/ OPHTHALMIC MANIFESTATIONS
2506	DIABETES W/ NEUROLOGICAL MANIFESTATIONS
2507	DIABETES W/ PERIPHERAL CIRCULATORY DISORDERS
2508	DIABETES W/ OTHER SPECIFIED MANIFESTATIONS
2509	DIABETES W/ OTHER UNSPECIFIED COMPLICATIONS

*ICD-9-CM Acute Myocardial Infarction diagnosis codes:*

See FTR 1 **Acute Renal Failure** for a list of acute myocardial infarction diagnosis codes.

*ICD-9-CM Cardiac Arrhythmia diagnosis codes:*

See FTR 1 **Acute Renal Failure** for a list of cardiac arrhythmia diagnosis codes.

*DRGs:*

138	CARDIAC ARRHYTHMIA AND CONDUCTION DISORDERS W/ CC
139	CARDIAC ARRHYTHMIA AND CONDUCTION DISORDERS W/O CC

*ICD-9-CM Cardiac Arrest diagnosis code:*

See FTR 1 **Acute Renal Failure** for a list of cardiac arrest diagnosis codes.

*ICD-9-CM Shock diagnosis codes:*

See FTR 1 **Acute Renal Failure** for a list of shock diagnosis codes.

*ICD-9-CM Hemorrhage diagnosis codes:*

See FTR 1 **Acute Renal Failure** for a list of hemorrhage diagnosis codes.

### Postoperative Physiologic and Metabolic Derangement (PSI 10)

*ICD-9-CM Gastrointestinal (GI) Hemorrhage diagnosis codes:*

See FTR 1 **Acute Renal Failure** for a list of GI hemorrhage diagnosis codes.

### Postoperative Respiratory Failure (PSI 11)

#### Numerator:

Discharges with ICD-9-CM codes for acute respiratory failure (518.81) in any secondary diagnosis field. (After 1999, include 518.84).

#### Denominator:

All elective\* surgical discharges defined by specific DRGs and an ICD-9-CM code for an operating room procedure (Appendix C).

Elective:

Admission type # is recorded as elective (ATYPE = 3).

*Surgical Discharge DRGs:*

See PSI 1 **Complications of Anesthesia** for a list of surgical DRG codes.

Exclude:

Patients with ICD-9-CM codes for acute respiratory failure in the principal diagnosis field.

Patients where a procedure for tracheostomy is the only operating room procedure.

Patients where a procedure for tracheostomy occurs before the first operating room procedure.

*Note: If day of procedure is not available in the input data file, the rate may be slightly lower than if the information was available.*

Patients with respiratory or circulatory diseases (MDC 4 and 5).

Obstetrical patients in MDC 14 (Pregnancy, Childbirth, and the Puerperium).

*ICD-9-CM Tracheostomy procedure codes:*

3121	MEDIASTINAL TRACHEOSTOMY
3129	OTHER PERM TRACHEOSTOMY
3174	REVISION OF TRACHEOSTOMY

### Postoperative Pulmonary Embolism or Deep Vein Thrombosis (PSI 12)

#### Numerator:

Discharges with ICD-9-CM codes for deep vein thrombosis or pulmonary embolism in any secondary diagnosis field.

*ICD-9-CM Deep Vein Thrombosis diagnosis codes:*

45111	PHLEBITIS AND THROMBOSIS OF FEMORAL VEIN (DEEP) (SUPERFICIAL)
45119	PHLEBITIS AND THROMBOPHLEBITIS OF DEEP VESSEL OF LOWER EXTREMITIES – OTHER
4512	PHLEBITIS AND THROMBOPHLEBITIS OF LOWER EXTREMITIES UNSPECIFIED
45181	PHLEBITIS AND THROMBOPHLEBITIS OF ILIAC VEIN

### Postoperative Pulmonary Embolism or Deep Vein Thrombosis (PSI 12)

4519 PHLEBITIS AND THROMBOPHLEBITIS OF OTHER SITES - OF UNSPECIFIED SITE  
4538 OTHER VENOUS EMBOLISM AND THROMBOSIS OF OTHER SPECIFIED VEINS  
4539 OTHER VENOUS EMBOLISM AND THROMBOSIS OF UNSPECIFIED SITE

#### *ICD-9-CM Pulmonary Embolism diagnosis codes:*

4151 PULMONARY EMBOLISM AND INFARCTION  
41511 IATROGENIC PULMONARY EMBOLISM AND INFARCTION  
41519 PULMONARY EMBOLISM AND INFARCTION, OTHER

#### **Denominator:**

All surgical discharges defined by specific DRGs and an ICD-9-CM code for an operating room procedure (Appendix C).

#### *Surgical Discharge DRGs:*

See PSI 1 **Complications of Anesthesia** for a list of surgical DRG codes.

#### Exclude:

Patients with ICD-9-CM codes for deep vein thrombosis or pulmonary embolism in the principal diagnosis field.

Patients where a procedure for interruption of vena cava is the only operating room procedure

Patients where a procedure for interruption of vena cava occurs before or on the same day as the first operating room procedure.

*Note: If day of procedure is not available in the input data file, the rate may be slightly lower than if the information was available.*

Obstetrical patients in MDC 14 (Pregnancy, Childbirth and the Puerperium).

#### *ICD-9-CM Interruption Of Vena Cava procedure code:*

387 INTERRUPTION OF VENA CAVA

### Postoperative Sepsis (PSI 13)

#### **Numerator:**

Discharges with ICD-9-CM code for sepsis in any secondary diagnosis field.

#### *ICD-9-CM Sepsis diagnosis codes:*

0380 STREPTOCOCCAL SEPTICEMIA  
0381 STAPHYLOCOCCAL SEPTICEMIA  
03810 STAPHYLOCOCCAL SEPTICEMIA, UNSPECIFIED  
03811 STAPHYLOCOCCUS AUREUS SEPTICEMIA  
03819 OTHER STAPHYLOCOCCAL SEPTICEMIA  
0382 PNEUMOCOCCAL SEPTICEMIA (STREPTOCOCCUS PNEUMONIAE SEPTICEMIA)  
0383 SEPTICEMIA DUE TO ANAEROBES

#### Septicemia due to:

03840 GRAM-NEGATIVE ORGANISM, UNSPECIFIED  
03841 HEMOPHILUS INFLUENZAE

### Postoperative Sepsis (PSI 13)

03842	ESCHERICHIA COLI
03843	PSEUDOMONAS
03844	SERRATIA
03849	SEPTICEMIA DUE TO OTHER GRAM-NEGATIVE ORGANISMS
0388	OTHER SPECIFIED SEPTICEMIAS
0389	UNSPECIFIED SEPTICEMIA
99591	SYSTEMIC INFLAMMATORY RESPONSE SYNDROME DUE TO INFECTIOUS PROCESS W/O ORGAN DYSFUNCTION
99592	SYSTEMIC INFLAMMATORY RESPONSE SYNDROME DUE TO INFECTIOUS PROCESS W/ ORGAN DYSFUNCTION

#### Denominator:

All elective\* surgical defined by specific DRGs and an ICD-9-CM code for an operating room procedure (Appendix C).

#### *Surgical Discharge DRGs:*

See PSI 1 **Complications of Anesthesia** for a list of surgical DRG codes.

#### Elective:

Admission type # is recorded as elective (ATYPE = 3)

#### Exclude:

Patients with ICD-9-CM codes for sepsis in the principal diagnosis field,

Patients with a principal diagnosis of infection, or any code for immunocompromised state, or cancer.

Obstetrical patients in MDC 14 (Pregnancy, Childbirth and the Puerperium).

Include only patients with a length of stay of 4 or more days.

#### *ICD-9-CM Infection diagnosis codes:*

See FTR 4 **Sepsis** for a list of infection diagnosis codes.

#### *Infection DRGs:*

See FTR 4 **Sepsis** for a list of infection DRG codes.

#### *ICD-9-CM Immunocompromised States diagnosis codes:*

See PSI 2 **Death in Low Mortality DRGs** for a list of immunocompromised state diagnosis codes.

#### *ICD-9-CM Immunocompromised States procedure codes:*

See PSI 2 **Death in Low Mortality DRGs** for a list of immunocompromised state procedure codes.

#### *ICD-9-CM Cancer diagnosis codes (includes 4<sup>th</sup> and 5<sup>th</sup> digits):*

See PSI 2 **Death in Low Mortality DRGs** for a list of cancer diagnosis codes.

#### *Cancer DRGs:*

See PSI 7 **Infection due to Medical Care** for a list of cancer DRG codes.

**Postoperative Wound Dehiscence, Secondary Diagnosis Field (PSI 14)**

**Numerator:**

Discharges with ICD-9-CM code for reclosure of postoperative disruption of abdominal wall (54.61) in any procedure field.

**Denominator:**

All abdominopelvic surgical discharges.

**Exclude:**

Patients where a procedure for reclosure of postoperative disruption of abdominal wall occurs before or on the same day as the first abdominopelvic surgery procedure.

*Note: If day of procedure is not available in the input data file, the rate may be slightly lower than if the information was available*

Obstetrical patients in MDC 14 (Pregnancy, Childbirth and the Puerperium).

*ICD-9-CM Abdominopelvic procedure codes:*

3804 INCISION OF AORTA  
3806 INCISION OF ABDOMINAL ARTERIES  
3807 INCISION OF ABDOMINAL VEINS  
3814 ENDARTERECTOMY OF AORTA  
3816 ENDARTERECTOMY OF ABDOMINAL ARTERIES  
3834 RESECTION OF AORTA W/ ANASTOMOSIS  
3836 RESECTION OF ABDOMINAL ARTERIES W/ ANASTOMOSIS  
3837 RESECTION OF ABDOMINAL VEINS W/ ANASTOMOSIS  
3844 RESECTION OF AORTA, ABDOMINAL W/ REPLACEMENT  
3846 RESECTION OF ABDOMINAL ARTERIES W/ REPLACEMENT  
3847 RESECTION OF ABDOMINAL VEINS W/ REPLACEMENT  
3857 LIGATION AND STRIPPING OF VARICOSE VEINS, ABDOMINAL VEINS  
3864 OTHER EXCISION OF AORTA, ABDOMINAL  
3866 OTHER EXCISION OF ABDOMINAL ARTERIES  
3867 OTHER EXCISION OF ABDOMINAL VEINS  
3884 OTHER SURGICAL OCCLUSION OF AORTA, ABDOMINAL  
3886 OTHER SURGICAL OCCLUSION OF ABDOMINAL ARTERIES  
3887 OTHER SURGICAL OCCLUSION OF ABDOMINAL VEINS  
391 INTRA-ABDOMINAL VENOUS SHUNT  
3924 AORTA-RENAL BYPASS  
3925 AORTA-ILIAC-FEMORAL BYPASS  
3926 OTHER INTRA-ABDOMINAL VASCULAR SHUNT OR BYPASS  
4052 RADICAL EXCISION OF PERIAORTIC LYMPH NODES  
4053 RADICAL EXCISION OF ILIAC LYMPH NODES  
412 SPLENOTOMY  
4133 OPEN BIOPSY OF SPLEEN  
4141 MARSUPIALIZATION OF SPLENIC CYST  
4142 EXCISION OF LESION OR TISSUE OF SPLEEN  
4143 PARTIAL SPLENECTOMY  
415 TOTAL SPLENECTOMY  
4193 EXCISION OF ACCESSORY SPLEEN  
4194 TRANSPLANTATION OF SPLEEN  
4195 REPAIR AND PLASTIC OPERATIONS ON SPLEEN  
4199 OTHER OPERATIONS ON SPLEEN  
4240 ESOPHAGECTOMY, NOS  
4241 PARTIAL ESOPHAGECTOMY  
4242 TOTAL ESOPHAGECTOMY  
4253 INTRATHORACIC ESOPHAGEAL ANASTOMOSIS W/ INTERPOSITION OF SMALL BOWEL  
4254 OTHER INTRATHORACIC ESOPHAGOENTEROSTOMY  
4255 INTRATHORACIC ESOPHAGEAL ANASTOMOSIS W/ INTERPOSITION OF COLON

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4256 OTHER INTRATHORACIC ESOPHAGOCOLOSTOMY  
4263 ANTESTERNAL ESOPHAGEAL ANASTOMOSIS W/ INTERPOSITION OF SMALL BOWEL  
4264 OTHER ANTESTERNAL ESOPHAGOENTEROSTOMY  
4265 ANTESTERNAL ESOPHAGEAL ANASTOMOSIS W/ INTERPOSITION OF COLON  
4266 OTHER ANTESTERNAL ESOPHAGOCOLOSTOMY  
4291 LIGATION OF ESOPHAGEAL VARICES  
430 GASTROSTOMY  
433 PYLOROMYOTOMY  
4342 LOCAL EXCISION OF OTHER LESION OR TISSUE OF STOMACH  
4349 OTHER DESTRUCTION OF LESION OR TISSUE OF STOMACH  
435 PARTIAL GASTRECTOMY W/ ANASTOMOSIS TO ESOPHAGUS  
436 PARTIAL GASTRECTOMY W/ ANASTOMOSIS TO DUODENUM  
437 PARTIAL GASTRECTOMY W/ ANASTOMOSIS TO JEJUNUM  
4381 PARTIAL GASTRECTOMY W/ JEJUNA TRANSPOSITION  
4389 OTHER PARTIAL GASTRECTOMY  
4391 TOTAL GASTRECTOMY W/ INTESTINAL INTERPOSITION  
4399 OTHER TOTAL GASTRECTOMY  
4400 VAGOTOMY, NOS  
4401 TRUNCAL VAGOTOMY  
4402 HIGHLY SELECTIVE VAGOTOMY  
4403 OTHER SELECTIVE VAGOTOMY  
4411 TRANSABDOMINAL GASTROSCOPY  
4415 OPEN BIOPSY OF STOMACH  
4421 DILATION OF PYLORUS BY INCISION  
4429 OTHER PYLOROPLASTY  
4431 HIGH GASTRIC BYPASS  
4439 OTHER GASTROENTEROSTOMY  
4440 SUTURE OF PEPTIC ULCER, NOS  
4441 SUTURE OF GASTRIC ULCER SITE  
4442 SUTURE OF DUODENAL ULCER SITE  
445 REVISION OF GASTRIC ANASTOMOSIS  
4461 SUTURE OF LACERATION OF STOMACH  
4463 CLOSURE OF OTHER GASTRIC FISTULA  
4464 GASTROPEXY  
4465 ESOPHAGOGASTROPLASTY  
4466 OTHER PROCEDURES FOR CREATION OF ESOPHAGOGASTRIC SPHINCTERIC COMPETENCE  
4469 OTHER REPAIR OF STOMACH  
4491 LIGATION OF GASTRIC VARICES  
4492 INTRAOPERATIVE MANIPULATION OF STOMACH  
4500 INCISION OF INTESTINE, NOS  
4501 INCISION OF DUODENUM  
4502 OTHER INCISION OF SMALL INTESTINE  
4503 INCISION OF LARGE INTESTINE  
4531 OTHER LOCAL EXCISION OF LESION OF DUODENUM  
4532 OTHER DESTRUCTION OF LESION OF DUODENUM  
4533 LOCAL EXCISION OF LESION OR TISSUE OF SMALL INTESTINE, EXCEPT DUODENUM  
4534 OTHER DESTRUCTION OF LESION OF SMALL INTESTINE, EXCEPT DUODENUM  
4541 EXCISION OF LESION OR TISSUE OF LARGE INTESTINE  
4549 OTHER DESTRUCTION OF LESION OF LARGE INTESTINE  
4550 ISOLATION OF INTESTINAL SEGMENT, NOS  
4551 ISOLATION OF SEGMENT OF SMALL INTESTINE  
4552 ISOLATION OF SEGMENT OF LARGE INTESTINE  
4561 MULTIPLE SEGMENTAL RESECTION OF SMALL INTESTINE  
4562 OTHER PARTIAL RESECTION OF SMALL INTESTINE  
4563 TOTAL REMOVAL OF SMALL INTESTINE  
4571 MULTIPLE SEGMENTAL RESECTION OF LARGE INTESTINE  
4572 CESECTOMY  
4573 RIGHT HEMICOLECTOMY  
4574 RESECTION OF TRANSVERSE COLON  
4575 LEFT HEMICOLECTOMY  
4576 SIGMOIDECTOMY  
4579 OTHER PARTIAL EXCISION OF LARGE INTESTINE

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458 TOTAL INTRA-ABDOMINAL COLECTOMY  
4590 INTESTINAL ANASTOMOSIS, NOS  
4591 SMALL-TO-SMALL INTESTINAL ANASTOMOSIS  
4592 ANASTOMOSIS OF SMALL INTESTINE TO RECTAL STUMP  
4593 OTHER SMALL-TO-LARGE INTESTINAL ANASTOMOSIS  
4594 LARGE-TO-LARGE INTESTINAL ANASTOMOSIS  
4595 ANASTOMOSIS TO ANUS  
4601 EXTERIORIZATION OF SMALL INTESTINE  
4603 EXTERIORIZATION OF LARGE INTESTINE  
4610 COLOSTOMY, NOS  
4611 TEMPORARY COLOSTOMY  
4613 PERMANENT COLOSTOMY  
4620 ILEOSTOMY, NOS  
4621 TEMPORARY ILESOSTOMY  
4622 CONTINENT ILEOSTOMY  
4623 OTHER PERMANENT ILEOSTOMY  
4640 REVISION OF INTESTINA STOMA, NOS  
4641 REVISION OF STOMA OF SMALL INTESTINE  
4642 REPAIR OF PERICOLOSTOMY HERNIA  
4643 OTHER REVISION OF STOMA OF LARGE INTESTINE  
4650 CLOSURE OF INTESTINAL STOMA, NOS  
4651 CLOSURE OF STOMA OF SMALL INTESTINE  
4652 CLOSURE OF STOMA OF LARGE INTESTINE  
4660 FIXATION OF INTESTINE, NOS  
4661 FIXATION OF SMALL INTESTINE TO ABDOMINAL WALL  
4662 OTHER FIXATION OF SMALL INTESTINE  
4663 FIXATION OF LARGE INTESTINE TO ABDOMINAL WALL  
4664 OTHER FIXATION OF LARGE INTESTINE  
4672 CLOSURE OF FISTULA OF DUODENUM  
4674 CLOSURE OF FISTULA OF SMALL INTESTINE, EXCEPT DUODENUM  
4676 CLOSURE OF FISTULA OF LARGE INTESTINE  
4680 INTRA-ABDOMINAL MANIPULATION OF INTESTINE, NOS  
4681 INTRA-ABDOMINAL MANIPULATION OF SMALL INTESTINE  
4682 INTRA-ABDOMINAL MANIPULATION OF LARGE INTESTINE  
4691 MYOTOMY OF SIGMOID COLON  
4692 MYOTOMY OF OTHER PARTS OF COLON  
4693 REVISION OF ANASTOMOSIS OF SMALL INTESTINE  
4694 REVISION OF ANASTOMOSIS OF LARGE INTESTINE  
4699 OTHER OPERATIONS ON INTESTINES  
4709 OTHER APPENDECTOMY  
4719 OTHER INCIDENTAL APPENDECTOMY  
472 DRAINAGE OF APPENDICEAL ABSCESS  
4791 APPENDECTOMY  
4792 CLOSURE OF APPENDICEAL FISTULA  
4799 OTHER OPERATIONS ON APPENDIX, OTHER  
4841 SUBMUCOSAL RESECTION OF RECTUM  
4849 OTHER PULL-THROUGH RESECTION OF RECTUM  
485 ABDOMINOPERINEAL RESECTION OF RECTUM  
4875 ABDOMINAL PROCTOPEXY  
500 HEPATOTOMY  
5012 OPEN BIOPSY OF LIVER  
5021 MARSUPIALIZATION OF LESION OF LIVER  
5022 PARTIAL HEPATECTOMY  
5029 OTHER DESTRUCTION OF LESION OF LIVER  
503 LOBECTOMY OF LIVER  
504 TOTAL HEPATECTOMY  
5051 AUXILIARY LIVER TRANSPLANT  
5059 OTHER TRANSPLANT OF LIVER  
5069 OTHER REPAIR OF LIVER  
5103 OTHER CHOLECYSTOSTOMY  
5104 OTHER CHOLECYSTOTOMY  
5113 OPEN BIOPSY OF GALLBLADDER OR BILE DUCTS

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5121 OTHER PARTIAL CHOLECYSTECTOMY  
5122 CHOLECYSTECTOMY  
5131 ANASTOMOSIS OF GALLBLADDER TO HEPATIC DUCTS  
5132 ANASTOMOSIS OF GALLBLADDER TO INTESTINE  
5133 ANASTOMOSIS OF GALLBLADDER TO PANCREAS  
5134 ANASTOMOSIS OF GALLBLADDER TO STOMACH  
5135 OTHER GALLBLADDER ANASTOMOSIS  
5136 CHOLEDOCHOENTEROSTOMY  
5137 ANASTOMOSIS OF HEPATIC DUCT TO GASTROINTESTINAL TRACT  
5139 OTHER BILE DUCT ANASTOMOSIS  
5141 COMMON DUCT EXPLORATION FOR REMOVAL OF CALCULUS  
5142 COMMON DUCT EXPLORATION FOR RELIEF OF OTHER OBSTRUCTION  
5143 INSERTION OF CHOLEDOCHOHEPATIC TUBE FOR DECOMPRESSION  
5149 INCISION OF OTHER BILE DUCTS FOR RELIEF OF OBSTRUCTION  
5151 EXPLORATION OF COMMON DUCT  
5159 INCISION OF OTHER BILE DUCT  
5161 EXCISION OF CYSTIC DUCT REMNANT  
5162 EXCISION OF AMPULLA OF VATER W/ REIMPLANTATION OF COMMON DUCT  
5163 OTHER EXCISION OF COMMON DUCT  
5169 EXCISION OF OTHER BILE DUCT  
5171 SIMPLE SUTURE OF COMMON BILE DUCT  
5172 CHOLEDOCHOPLASTY  
5179 REPAIR OF OTHER BILE DUCTS  
5181 DILATION OF SPHINCTER OF ODDI  
5182 PANCREATIC SPHINCTEROTOMY  
5183 PANCREATIC SPHINCTEROPLASTY  
5189 OTHER OPERATIONS ON SPHINCTER OF ODDI  
5192 CLOSURE OF CHOLECYSTOSTOMY  
5193 CLOSURE OF OTHER BILIARY FISTULA  
5194 REVISION OF ANASTOMOSIS OF BILIARY TRACT  
5195 REMOVAL OF PROSTHETIC DEVICE FROM BILE DUCT  
5199 OTHER OPERATIONS ON BILIARY TRACT  
5201 DRAINAGE OF PANCREATIC CYST BY CATHETER  
5209 OTHER PANCREATOTOMY  
5212 OPEN BIOPSY OF PANCREAS  
5222 OTHER EXCISION OR DESTRUCTION OF LESION OR TISSUE OF PANCREAS OR PANCREATIC DUCT  
523 MARSUPIALIZATION OF PANCREATIC CYST  
524 INTERNAL DRAINAGE OF PANCREATIC CYST  
5251 PROXIMAL PANCREATECTOMY  
5252 DISTAL PANCREATECTOMY  
5253 RADICAL SUBTOTAL PANCREATECTOMY  
5259 OTHER PARTIAL PANCREATECTOMY  
526 TOTAL PANCREATECTOMY  
527 RADICAL PANCREATICODUODENECTOMY  
5280 PANCREATIC TRANSPLANT, NOS  
5281 REIMPLANTATION  
5282 HOMOTRANSPLANT OF PANCREAS  
5283 HETEROTRANSPLANT OF PANCREAS  
5292 CANNULATION OF PANCREATIC DUCT  
5295 OTHER REPAIR OF PANCREAS  
5296 ANASTOMOSIS OF PANCREAS  
5299 OTHER OPERATIONS ON PANCREAS  
5300 UNILATERAL REPAIR OF INGUINAL HERNIA, NOS  
5301 REPAIR OF DIRECT INGUINAL HERNIA  
5302 REPAIR OF INDIRECT INGUINAL HERNIA  
5303 REPAIR OF DIRECT INGUINAL HERNIA W/ GRAFT OR PROSTHESIS  
5304 REPAIR OF INDIRECT INGUINAL HERNIA W/ GRAFT OR PROSTHESIS  
5305 REPAIR OF INGUINAL HERNIA W/ GRAFT OR PROSTHESIS, NOS  
5310 BILATERAL REPAIR OF INGUINAL HERNIA, NOS  
5311 BILATERAL REPAIR OF DIRECT INGUINAL HERNIA  
5312 BILATERAL REPAIR OF INDIRECT INGUINAL HERNIA

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5313 BILATERAL REPAIR OF INGUINAL HERNIA, ONE DIRECT AND ONE INDIRECT  
5314 BILATERAL REPAIR OF DIRECT INGUINAL HERNIA W/ GRAFT OR PROSTHESIS  
5315 BILATERAL REPAIR OF INDIRECT INGUINAL HERNIA W/ GRAFT OR PROSTHESIS  
5316 BILATERAL REPAIR OF INGUINAL HERNIA, ONE DIRECT AND ONE INDIRECT, W/ GRAFT OR PROSTHESIS  
5317 BILATERAL INGUINAL HERNIA REPAIR W/ GRAFT OR PROSTHESIS, NOS  
5321 UNILATERAL REPAIR OF FEMORAL HERNIA  
5329 OTHER UNILATERAL FEMORAL HERNIORRHAPHY  
5331 BILATERAL REPAIR OF FEMORAL HERNIA W/ GRAFT OR PROSTHESIS  
5339 OTHER BILATERAL FEMORAL HERNIORRHAPHY  
5341 REPAIR OF UMBILICAL HERNIA W/ PROSTHESIS  
5349 OTHER UMBILICAL HERNIORRHAPHY  
5351 INCISIONAL HERNIA REPAIR  
5359 REPAIR OF OTHER HERNIA OF ANTERIOR ABDOMINAL WALL  
5361 INCISIONAL HERNIA REPAIR W/ PROSTHESIS  
5369 REPAIR OF OTHER HERNIA OF ANTERIOR ABDOMINAL WALL W/ PROSTHESIS  
537 REPAIR OF DIAPHRAGMATIC HERNIA, ABDOMINAL APPROACH  
540 INCISION OF ABDOMINAL WALL  
5411 EXPLORATORY LAPAROTOMY  
5419 OTHER LAPAROTOMY  
5422 BIOPSY OF ABDOMINAL WALL OR UMBILICUS  
5423 BIOPSY OF ABDOMINAL WALL OR UMBILICUS  
543 EXCISION OR DESTRUCTION OF LESION OR TISSUE OF ABDOMINAL WALL OR UMBILICUS  
544 EXCISION OR DESTRUCTION OF PERITONEAL TISSUE  
5459 OTHER LYSIS OF PERITONEAL ADHESIONS  
5463 OTHER SUTURE OF ABDOMINAL WALL  
5464 SUTURE OF PERITONEUM  
5471 REPAIR OF GASTROSCHISIS  
5472 OTHER REPAIR OF ABDOMINAL WALLS  
5473 OTHER REPAIR OF PERITONEUM  
5474 OTHER REPAIR OF OMENTUM  
5475 OTHER REPAIR OF MESENTERY  
5492 REMOVAL OF FOREIGN BODY FROM PERITONEAL CAVITY  
5493 CREATION OF CUTANEOPERITONEAL FISTULA  
5494 CREATION OF PERITONEOVASCULAR SHUNT  
5495 INCISION OF PERITONEUM  
5551 NEPHROURETERECTOMY  
5552 NEPHRECTOMY OF REMAINING KIDNEY  
5553 REMOVAL OF TRANSPLANTED OR REJECTED KIDNEY  
5554 BILATERAL NEPHRECTOMY  
5561 RENAL AUTOTRANSPLANTATION  
5569 ULCERATIVE COLITIS, UNSPECIFIED  
557 NEPHROPEXY  
5583 CLOSURE OF OTHER FISTULA OF KIDNEY  
5584 REDUCTION OF TORSION OF RENAL  
5585 SYMPHYSIOTOMY FOR HOESHOE KIDNEY  
5586 ANASTOMOSIS OF KIDNEY  
5587 CORRECTION OF URETEROPELVIC JUNCTION  
5591 DECAPSULATION OF KIDNEY  
5597 IMPLANTATION OR REPLACEMENT OF MECHANICAL KIDNEY  
5598 REMOVAL OF MECHANICAL KIDNEY  
5651 FORMATION OF CUTANEOUS URETERO-ILEOSTOMY  
5652 REVISION OF CUTANEOUS URETERO-ILEOSTOMY  
5661 FORMATION OF OTHER CUTANEOUS URETEROSTOMY  
5662 REVISION OF OTHER CUTANEOUS URETEROSTOMY  
5671 URINARY DIVERSION TO INTESTINE  
5672 REVISION OF URETEROINTESTINAL ANASTOMOSIS  
5673 NEPHROCYSTANASTOMOSIS, NOS  
5674 URETERONEOXYSTOSTOMY  
5675 TRANSURETEROURETEROSTOMY  
5683 CLOSURE OF URETEROSTOMY  
5684 CLOSURE OF OTHER FISTULA OF URETER

**Postoperative Wound Dehiscence, Secondary Diagnosis Field (PSI 14)**

5685 URETEROPEXY  
5686 REMOVAL OF LIGATURE FROM URETER  
5689 OTHER REPAIR OF URETER  
5695 LIGATION OF URETER  
5771 RADICAL CYSTECTOMY  
5779 OTHER TOTAL CYSTECTOMY  
5782 CLOSURE OF CYSTOSTOMY  
5787 RECONSTRUCTION OF URINARY BLADDER  
5900 RETROPERITONEAL DISSECTION, NOS  
5902 OTHER LYSIS OF PERIRENAL OR PERIURETERAL ADHESIONS  
5909 OTHER INCISION OF PERIRENAL OR PERIURETERAL TISSUE  
6012 OPEN BIOPSY OF PROSTATE  
6014 OPEN BIOPSY OF SEMINAL VESICLES  
6015 BIOPSY OF PERIPROSTATIC TISSUE  
603 SUPRAPUBIC PROSTATECTOMY  
604 RETROPUBIC PROSTATECTOMY  
605 RADICAL PROSTATECTOMY  
6061 LOCAL EXCISION OF LESION OF PROSTATE  
6072 INCISION OF SEMINAL VESICLE  
6073 EXCISION OF SEMINAL VESICLE  
6079 OTHER OPERATIONS ON SEMINAL VESICLES  
6093 REPAIR OF PROSTATE  
6509 OTHER OOPHORECTOMY  
6512 OTHER BIOPSY OF OVARY  
6521 MARSUPIALIZATION OF OVARIAN CYST  
6522 WEDGE RESECTION OF OVARY  
6529 OTHER LOCAL EXCISION OR DESTRUCTION OF OVARY  
6539 OTHER UNILATERAL OOPHORECTOMY  
6549 OTHER UNILATERAL SALPINGOOPHORECTOMY  
6551 OTHER REMOVAL OF BOTH OVARIES AT SAME OPERATIVE EPISODE  
6552 OTHER REMOVAL OF REMAINING OVARY  
6561 OTHER REMOVAL OF BOTH OVARIES AND TUBES AT SAME OPERATIVE EPISODE  
6562 OTHER REMOVAL OF REMAINING OVARY AND TUBE  
6571 OTHER SIMPLE SUTURE OF OVARY  
6572 OTHER REIMPLANTATION OF OVARY  
6573 OTHER SALPINGO OOPHOROPLASTY  
6579 OTHER REPAIR OF OVARY  
6589 OTHER LYSIS OF ADHESIONS OF OVARY AND FALLOPIAN TUBE  
6592 TRANSPLANTATION OF OVARY  
6593 MANUAL RUPTURE OF OVARIAN CYST  
6594 OVARIAN DENERVATION  
6595 RELEASE OF TORSION OF OVARY  
6599 OTHER OPERATIONS ON OVARY  
6601 SALPINGOTOMY  
6602 SALPINGOSTOMY  
6631 OTHER BILATERAL LIGATION AND CRUSHING OF FALLOPIAN TUBES  
6632 OTHER BILATERAL LIGATION AND DIVISION OF FALLOPIAN TUBES  
6639 OTHER BILATERAL DESTRUCTION OR OCCLUSION OF FALLOPIAN TUBES  
664 TOTAL UNILATERAL SALPINGECTOMY  
6651 REMOVAL OF BOTH FALLOPIAN TUBES AT SAME OPERATIVE EPISODE  
6652 REMOVAL OF REMAINING FALLOPIAN TUBE  
6661 EXCISION OR DESTRUCTION OF LESION OF FALLOPIAN TUBE  
6662 SALPINGECTOMY W/ REMOVAL OF TUBAL PREGNANCY  
6663 BILATERAL PARTIAL SALPINGECTOMY, NOS  
6669 OTHER PARTIAL SALPINGECTOMY  
6671 SIMPLE SUTURE OF FALLOPIAN TUBE  
6672 SALPINGO-OOPHOROSTOMY  
6673 SALPINGO-SALPINGOSTOMY  
6674 SALPINGO-UTEROSTOMY  
6679 OTHER REPAIR OF FALLOPIAN TUBE  
6692 UNILATERAL DESTRUCTION OR OCCLUSION OF FALLOPIAN TUBE  
6697 BURYING OF FIMBRIAE IN UTERINE WALL

**Postoperative Wound Dehiscence, Secondary Diagnosis Field (PSI 14)**

680 OTHER INCISION AND EXCISION OF UTERUS  
6813 OPEN BIOPSY OF UTERUS  
6814 OPEN BIOPSY OF UTERINE LIGAMENTS  
683 SUBTOTAL ABDOMINAL HYSTERECTOMY  
6839 OTHER SUBTOTAL ABDOMINAL HYSTERECTOMY (OCT 03)  
684 TOTAL ABDOMINAL HYSTERECTOMY  
686 RADICAL ABDOMINAL HYSTERECTOMY  
688 PELVIC EVISCERATION  
6922 OTHER UTERINE SUSPENSION  
693 PARACERVICAL UTERINE DENERVATION  
6941 SUTURE OF LACERATION OF UTERUS  
6942 CLOSURE OF FISTULA OF UTERUS  
6949 OTHER REPAIR OF UTERUS

**Accidental Puncture or Laceration, Secondary Diagnosis Field (PSI 15)**

**Numerator:**

Discharges with ICD-9-CM code denoting accidental cut, puncture, perforation or laceration during a procedure in any secondary diagnosis field.

*ICD-9-CM Accidental Puncture or Laceration diagnosis codes:*

Accidental cut, puncture, perforation, or hemorrhage during medical care:

E8700 SURGICAL OPERATION  
E8701 INFUSION OR TRANSFUSION  
E8702 KIDNEY DIALYSIS OR OTHER PERFUSION  
E8703 INJECTION OR VACCINATION  
E8704 ENDOSCOPIC EXAMINATION  
E8705 ASPIRATION OF FLUID OR TISSUE, PUNCTURE, AND CATHETERIZATION  
E8706 HEART CATHETERIZATION  
E8707 ADMINISTRATION OF ENEMA  
E8708 OTHER SPECIFIED MEDICAL CARE  
E8709 UNSPECIFIED MEDICAL CARE  
  
9982 ACCIDENTAL PUNCTURE OR LACERATION DURING A PROCEDURE

**Denominator:**

All medical and surgical discharges defined by specific DRGs.

*Surgical Discharge DRGs:*

See PSI 1 **Complications of Anesthesia** for a list of surgical DRG codes.

*Medical Discharge DRGs:*

See PSI 3 **Decubitus Ulcer** for a list of medical DRG codes.

**Exclude:**

Patients with ICD-9-CM code denoting technical difficulty (e.g., accidental cut, puncture, perforation, or laceration) in the principal diagnosis field

Obstetrical patients in MDC 14 (Pregnancy, Childbirth and the Puerperium).

### Transfusion Reaction, Secondary Diagnosis Field (PSI 16)

#### Numerator:

Discharges with ICD-9-CM codes for transfusion reaction in any secondary diagnosis field.

#### *ICD-9-CM Transfusion Reaction diagnosis codes:*

9996 ABO INCOMPATIBILITY REACTION  
9997 RH INCOMPATIBILITY REACTION  
E8760 MISMATCHED BLOOD IN TRANSFUSION

#### Denominator:

All medical and surgical discharges defined by specific DRGs.

#### *Surgical Discharge DRGs:*

See PSI 1 **Complications of Anesthesia** for a list of surgical DRG codes.

#### *Medical Discharge DRGs:*

See PSI 3 **Decubitus Ulcer** for a list of medical DRG codes.

#### Exclude:

Patients with ICD-9-CM code for transfusion reaction in the principal diagnosis field

### Birth Trauma—Injury to Neonate (PSI 17)

#### Numerator:

Discharges with ICD-9-CM codes for birth trauma in any diagnosis field.

#### *ICD-9-CM Birth Trauma diagnosis codes:*

7670 SUBDURAL AND CEREBRAL HEMORRHAGE (DUE TO TRAUMA OR TO INTRAPARTUM ANOXIA OR HYPOXIA)  
76711 EPICRANIAL SUBAPONEUROTIC HEMORRHAGE (MASSIVE) (OCT 03)  
7673 INJURIES TO SKELETON (EXCLUDES CLAVICLE)  
7674 INJURY TO SPINE AND SPINAL CORD  
7677 OTHER CRANIAL AND PERIPHERAL NERVE INJURIES  
7678 OTHER SPECIFIED BIRTH TRAUMA  
7679 BIRTH TRAUMA, UNSPECIFIED

*Note: Because 767.1 was not previously included in the numerator specification, the addition of 767.11 may cause an increase in the rate.*

#### Exclude:

Infants with a subdural or cerebral hemorrhage (subgroup of birth trauma coding) **and** any diagnosis code of pre-term infant (denoting birth weight of less than 2,500 grams and less than 37 weeks gestation or 34 weeks gestation or less).  
Infants with injury to skeleton (767.3, 767.4) **and** any diagnosis code of osteogenesis imperfecta (756.51).

**Birth Trauma—Injury to Neonate (PSI 17)**

*ICD-9-CM Preterm Infant diagnosis codes:*

76501 EXTREME IMMATURETY, LESS THAN 500 GRAMS  
76502 EXTREME IMMATURETY, 500 – 749 GRAMS  
76503 EXTREME IMMATURETY, 750 – 999 GRAMS  
76504 EXTREME IMMATURETY, 1000 – 1249 GRAMS  
76505 EXTREME IMMATURETY, 1250 – 1499 GRAMS  
76506 EXTREME IMMATURETY, 1500 – 1749 GRAMS  
76507 EXTREME IMMATURETY, 1750 – 1999 GRAMS  
76508 EXTREME IMMATURETY, 2000 – 2499 GRAMS  
76511 OTHER PRETERM INFANTS, LESS THAN 500 GRAMS  
76512 OTHER PRETERM INFANTS, 500 – 749 GRAMS  
76513 OTHER PRETERM INFANTS, 750 – 999 GRAMS  
76514 OTHER PRETERM INFANTS, 1000 – 1249 GRAMS  
76515 OTHER PRETERM INFANTS, 1250 – 1499 GRAMS  
76516 OTHER PRETERM INFANTS, 1500 – 1749 GRAMS  
76517 OTHER PRETERM INFANTS, 1750 – 1999 GRAMS  
76518 OTHER PRETERM INFANTS, 2000 – 2499 GRAMS  
76521 LESS THAN 24 COMPLETED WEEKS OF GESTATION  
76522 24 COMPLETED WEEKS OF GESTATION  
76523 25-26 COMPLETED WEEKS OF GESTATION  
76524 27-28 COMPLETED WEEKS OF GESTATION  
76525 29-30 COMPLETED WEEKS OF GESTATION  
76526 31-32 COMPLETED WEEKS OF GESTATION  
76527 33-34 COMPLETED WEEKS OF GESTATION

**Denominator:**

All liveborn births.

Admission type recorded as (4):

*AND*

*Liveborn DRGs:*

385 NEONATES, DIED OR TRANSFERRED TO ANOTHER ACUTE CARE FACILITY  
386 EXTREME IMMATURETY OR RESPIRATORY DISTRESS SYNDROME OF NEONATE  
387 PREMATURITY W/ MAJOR PROBLEMS  
388 PREMATURITY W/O MAJOR PROBLEMS  
389 FULL TERM NEONATE W/ MAJOR PROBLEMS  
390 NEONATE W/ OTHER SIGNIFICANT PROBLEMS  
391 NORMAL NEWBORN

**OR**

*ICD-9-CM Liveborn diagnosis codes (includes 4th and 5th digits\*):*

764 SLOW FETAL GROWTH AND FETAL MALNUTRITION  
765 DISORDERS RELATING TO SHORT GESTATION AND UNSPECIFIED LOW BIRTH WEIGHT  
766 DISORDERS RELATING TO LONG GESTATION AND HIGH BIRTH WEIGHT  
76621 POST-TERM INFANT (OCT 03)  
76622 PROLONGED GESTATION - INFANT (OCT 03)  
767 BIRTH TRAUMA  
76711 EPICRANIAL SUBAPONEUROTIC HEMORRHAGE (MASSIVE) (OCT 03)  
76719 OTHER INJURIES TO SCALP (OCT 03)  
768 INTRAUTERINE HYPOXIA AND BIRTH ASPHYXIA  
769 RESPIRATORY DISTRESS SYNDROME  
770 OTHER RESPIRATORY CONDITIONS OF FETUS AND NEWBORN

**Birth Trauma—Injury to Neonate (PSI 17)**

77081	PRIMARY APNEA OF NEWBORN (OCT 02)
77082	OTHER APNEA OF NEWBORN (OCT 02)
77083	CYANOTIC ATTACKS OF NEWBORN (OCT 02)
77084	RESPIRATORY FAILURE OF NEWBORN (OCT 02)
77089	OTHER RESPIRATORY PROBLEMS AFTER BIRTH (OCT 02)
771	INFECTIONS SPECIFIC TO THE PERINATAL PERIOD
77181	SEPTICEMIA [SEPSIS] OF NEWBORN (OCT 02)
77182	URINARY TRACT INFECTION OF NEWBORN (OCT 02)
77183	BACTEREMIA OF NEWBORN (OCT 02)
77189	OTHER INFECTIONS SPECIFIC TO THE PERINATAL PERIOD (OCT 02)
772	FETAL AND NEONATAL HEMORRHAGE
77210	BLEEDING WITH ENLARGEMENT OF VENTRICLE, UNSPECIFIED GRADE (OCT 01)
77211	BLEEDING WITH ENLARGEMENT OF VENTRICLE, GRADE I (OCT 01)
77212	BLEEDING WITH ENLARGEMENT OF VENTRICLE, GRADE II (OCT 01)
77213	BLEEDING WITH ENLARGEMENT OF VENTRICLE, GRADE III (OCT 01)
77214	BLEEDING WITH ENLARGEMENT OF VENTRICLE, GRADE IV (OCT 01)
773	HEMOLYTIC DISEASE OF FETUS OR NEWBORN, DUE TO ISOIMMUNIZATION
774	OTHER PERINATAL JAUNDICE
775	ENDOCRINE AND METABOLIC DISTURBANCES SPECIFIC TO THE FETUS AND NEWBORN
776	HEMATOLOGICAL DISORDERS OF FETUS AND NEWBORN
777	PERINATAL DISORDERS OF DIGESTIVE SYSTEM
778	CONDITIONS INVOLVING THE INTEGUMENT AND TEMPERATURE REGULATION OF FETUS AND NEWBORN
779	OTHER AND ILL-DEFINED CONDITIONS ORIGINATING IN THE PERINATAL PERIOD
77981	NEONATAL BRADYCARDIA (OCT 02)
77982	NEONATAL TACHYCARDIA (OCT 02)
77983	DELAYED SEPARATION OF UMBILICAL CORD (OCT 03)
77989	OTHER SPECIFIED CONDITIONS ORIGINATING IN THE PERINATAL PERIOD (OCT 02)
V30	SINGLE LIVEBORN
V31	TWIN, MATE LIVEBORN
V32	TWIN, MATE STILLBORN
V33	TWIN, UNSPECIFIED
V34	OTHER MULTIPLE, MATES ALL LIVEBORN
V35	OTHER MULTIPLE, MATES ALL STILLBORN
V36	OTHER MULTIPLE, MATES LIVE- AND STILLBORN
V37	OTHER MULTIPLE, UNSPECIFIED
V39	UNSPECIFIED

\* Does not include diagnosis codes 768.0, 768.1 and 779.6

**Obstetric Trauma—Vaginal Delivery with Instrument (PSI 18 and 27)****Numerator:**

Discharges with ICD-9-CM codes for obstetric trauma in any diagnosis or procedure field.

*ICD-9-CM Obstetric Trauma diagnosis codes:*

66420,1,4	TRAUMA TO PERINEUM AND VULVA DURING DELIVERY, THIRD DEGREE PERINEAL LACERATION (PSI 27 ONLY)
66430,1,4	TRAUMA TO PERINEUM AND VULVA DURING DELIVERY, FOURTH DEGREE PERINEAL LACERATION
66530,1,4	OTHER OBSTETRICAL TRAUMA, LACERATION OF CERVIX
66540,1,4	OTHER OBSTETRICAL TRAUMA, HIGH VAGINAL LACERATIONS
66550,1,4	OTHER OBSTETRICAL TRAUMA, OTHER INJURY TO PELVIC ORGANS

*ICD-9-CM Obstetric Trauma procedure codes:*

**Obstetric Trauma—Vaginal Delivery with Instrument (PSI 18 and 27)**

7550 REPAIR OF CURRENT OBSTETRIC LACERATIONS OF UTERUS  
7551 REPAIR OF CURRENT OBSTETRIC LACERATIONS OF CERVIX  
7552 REPAIR OF CURRENT OBSTETRIC LACERATIONS OF CORPUS UTERI  
7561 REPAIR OF CURRENT OBSTETRIC LACERATION OF BLADDER AND URETHRA  
7562 REPAIR OF CURRENT OBSTETRIC LACERATION OF RECTUM AND SPHINCTER ANI

**Denominator:**

All vaginal delivery discharges with any procedure code for instrument-assisted delivery.

*Vaginal Delivery DRGs:*

372 VAGINAL DELIVERY W/ COMPLICATING DIAGNOSES  
373 VAGINAL DELIVERY W/O COMPLICATING DIAGNOSES  
374 VAGINAL DELIVERY W/ STERILIZATION AND/OR D AND C  
375 VAGINAL DELIVERY W/ OR PROCEDURE EXCEPT STERILIZATION AND/OR D AND C

*ICD-9-CM Instrument-Assisted Delivery procedure codes:*

720 LOW FORCEPS OPERATION  
721 LOW FORCEPS OPERATION W/ EPISIOTOMY  
7221 MID FORCEPS OPERATION W/ EPISIOTOMY  
7229 OTHER MID FORCEPS OPERATION  
7231 HIGH FORCEPS OPERATION W/ EPISIOTOMY  
7239 OTHER HIGH FORCEPS OPERATION  
724 FORCEPS ROTATION OF FETAL HEAD  
7251 PARTIAL BREECH EXTRACTION W/ FORCEPS TO AFTERCOMING HEAD  
7253 TOTAL BREECH EXTRACTION W/ FORCEPS TO AFTERCOMING HEAD  
726 FORCEPS APPLICATION TO AFTERCOMING HEAD  
7271 VACUUM EXTRACTION W/ EPISIOTOMY  
7279 VACUUM EXTRACTION DELIVERY NEC  
728 OTHER SPECIFIED INSTRUMENTAL DELIVERY  
729 UNSPECIFIED INSTRUMENTAL DELIVERY

**Obstetric Trauma—Vaginal Delivery without Instrument (PSI 19 and 28)****Numerator:**

Discharges with ICD-9-CM codes for obstetric trauma in any diagnosis or procedure field.

*ICD-9-CM Obstetric Trauma diagnosis codes:*

66420,1,4 TRAUMA TO PERINEUM AND VULVA DURING DELIVERY, THIRD DEGREE PERINEAL LACERATION (PSI 28 ONLY)  
66430,1,4 TRAUMA TO PERINEUM AND VULVA DURING DELIVERY, FOURTH DEGREE PERINEAL LACERATION  
66530,1,4 OTHER OBSTETRICAL TRAUMA, LACERATION OF CERVIX  
66540,1,4 OTHER OBSTETRICAL TRAUMA, HIGH VAGINAL LACERATIONS  
66550,1,4 OTHER OBSTETRICAL TRAUMA, OTHER INJURY TO PELVIC ORGANS

*ICD-9-CM Obstetric Trauma procedure codes:*

7550 REPAIR OF CURRENT OBSTETRIC LACERATIONS OF UTERUS  
7551 REPAIR OF CURRENT OBSTETRIC LACERATIONS OF CERVIX  
7552 REPAIR OF CURRENT OBSTETRIC LACERATIONS OF CORPUS UTERI  
7561 REPAIR OF CURRENT OBSTETRIC LACERATION OF BLADDER AND URETHRA

**Obstetric Trauma—Vaginal Delivery without Instrument (PSI 19 and 28)**

7562 REPAIR OF CURRENT OBSTETRIC LACERATION OF RECTUM AND SPHINCTER ANI

**Denominator:**

All vaginal delivery discharge patients.

*Vaginal Delivery DRGs:*

372 VAGINAL DELIVERY W/ COMPLICATING DIAGNOSES  
 373 VAGINAL DELIVERY W/COMPLICATING DIAGNOSES  
 374 VAGINAL DELIVERY W/ STERILIZATION AND/OR D AND C  
 375 VAGINAL DELIVERY W/ OR PROCEDURE EXCEPT STERILIZATION AND/OR D AND C

**Exclude:**

Instrument-assisted delivery.

*ICD-9-CM Instrument-Assisted Delivery procedure codes*

720 LOW FORCEPS OPERATION  
 721 LOW FORCEPS OPERATION W/ EPISIOTOMY  
 7221 MID FORCEPS OPERATION W/ EPISIOTOMY  
 7229 OTHER MID FORCEPS OPERATION  
 7231 HIGH FORCEPS OPERATION W/ EPISIOTOMY  
 7239 OTHER HIGH FORCEPS OPERATION  
 724 FORCEPS ROTATION OF FETAL HEAD  
 7251 PARTIAL BREECH EXTRACTION W/ FORCEPS TO AFTERCOMING HEAD  
 7253 TOTAL BREECH EXTRACTION W/ FORCEPS TO AFTERCOMING HEAD  
 726 FORCEPS APPLICATION TO AFTERCOMING HEAD  
 7271 VACUUM EXTRACTION W/ EPISIOTOMY  
 7279 VACUUM EXTRACTION DELIVERY NEC  
 728 OTHER SPECIFIED INSTRUMENTAL DELIVERY  
 729 UNSPECIFIED INSTRUMENTAL DELIVERY

**Obstetric Trauma—Cesarean Delivery (PSI 20 and 29)****Numerator:**

Discharges with ICD-9-CM codes for obstetric trauma in any diagnosis or procedure field.

*ICD-9-CM Obstetric Trauma diagnosis codes:*

66420,1,4 TRAUMA TO PERINEUM AND VULVA DURING DELIVERY, THIRD DEGREE PERINEAL LACERATION (PSI 29 ONLY)  
 66430,1,4 TRAUMA TO PERINEUM AND VULVA DURING DELIVERY, FOURTH DEGREE PERINEAL LACERATION  
 66530,1,4 OTHER OBSTETRICAL TRAUMA, LACERATION OF CERVIX  
 66540,1,4 OTHER OBSTETRICAL TRAUMA, HIGH VAGINAL LACERATIONS  
 66550,1,4 OTHER OBSTETRICAL TRAUMA, OTHER INJURY TO PELVIC ORGANS

*ICD-9-CM Obstetric Trauma procedure codes:*

7550 REPAIR OF CURRENT OBSTETRIC LACERATIONS OF UTERUS  
 7551 REPAIR OF CURRENT OBSTETRIC LACERATIONS OF CERVIX  
 7552 REPAIR OF CURRENT OBSTETRIC LACERATIONS OF CORPUS UTERI  
 7561 REPAIR OF CURRENT OBSTETRIC LACERATION OF BLADDER AND URETHRA  
 7562 REPAIR OF CURRENT OBSTETRIC LACERATION OF RECTUM AND SPHINCTER ANI

**Denominator:**

**Obstetric Trauma—Cesarean Delivery (PSI 20 and 29)**

All cesarean delivery discharges.

*Cesarean Delivery DRGs:*

370	CESAREAN SECTION W/ CC
371	CESAREAN SECTION W/OCC

## Appendix B: Detailed Methods

Empirical analyses were conducted to provide additional information about the indicators. These analyses were intended not as decision making tools, but rather explorations into the characteristics of the indicators. Specifically, these analyses explore the frequency and variation of the indicators, the potential bias, based on limited risk adjustment, and the relationship between indicators.

### Analysis Approach

*Data sources.* The data sources used in the empirical analyses were the 1997 Florida State Inpatient Database (SID) (for initial testing and development; 1995-1997 used for persistence analysis) and the 1997 State Inpatient Databases (SID) for 19 HCUP participating States, referred to in this report as the National SID (for the final empirical analysis). The Florida SID consists of about 2 million discharges from over 200 hospitals, and was chosen because Florida is a large diverse State. The National SID consists of about 19 million discharges from over 2,300 hospitals. The National SID contains all-payer data on hospital inpatient stays from participating States (Arizona, California, Colorado, Connecticut, Florida, Illinois, Iowa, Kansas, Maryland, Massachusetts, Missouri, New Jersey, New York, Oregon, Pennsylvania, South Carolina, Tennessee, Washington, and Wisconsin). All discharges from participating States' community hospitals are included in the SID database, which defines community hospitals as non-Federal, short-term, general, and other specialty hospitals, excluding long-term hospitals and hospital units of long-term care institutions, psychiatric hospitals, and alcoholism and chemical dependency treatment facilities.

A complete description of the content of the SID, including details of the participating States' discharge abstracts, can be found on the Agency for Healthcare Research and Quality Web site (<http://www.hcup-us.ahrq.gov/sidoverview.jsp>). Because the Florida SID was used only for initial testing and development, the empirical results reported are from the National SID. Descriptive results from the Florida SID are reported for comparison to ensure that the hospital-level results were similar in both data sources. Differences between Florida and national results are pointed out in the text. The National SID data were also used for the construction of area measures, with data from the U.S. Census Bureau used to construct the denominator of these rates.

*Reported patient safety indicators.* Three sets of patient safety indicators were examined. First, the Accepted patient safety indicators met the face validity criteria established through the literature review and clinician panel review. Second, the Experimental patient safety indicators did not meet those criteria, but appeared to warrant further testing and evaluation. Third, several Accepted patient safety indicators were modified into *area* indicators, which were designed to assess the total incidence of the adverse event within geographic areas. For example, the project team constructed an indicator for "Transfusion reaction" at both the hospital and area levels. Transfusion reactions that occur after discharge from a hospitalization would result in a readmission. The area-level indicator includes these cases, while the provider level restricts the number of transfusion reactions to only those that occur during the same hospitalization that exposed the patient to this risk.

All potential indicators were examined empirically by developing and conducting statistical tests for precision, bias, and relatedness of indicators. For each indicator, the project team calculated five different estimates of provider level performance:

1. The raw indicator rate was calculated using the number of adverse events in the numerator divided by the number of discharges in the population at risk by hospital. For the area indicators, the denominator is the population of the Metropolitan Statistical Area (MSA), New England County Metropolitan Area (for the New England States) or county (for non-MSA areas) of the hospital.
2. The raw indicator was adjusted using a logistic regression to account for differences among hospitals (and areas) in demographics (specifically, age and gender). Age was modeled using a set of dummy

variables to represent 10-year categories except for young children, whose age categories are narrower (i.e., less than 1, 1-4, 5-14, 15-24, 25-34, 35-44, 45-54, 55-64, 65-74, 75-84, and 85 or more years), along with a parallel set of age-gender interactions. Because of sparse cells, certain age categories were combined or omitted for selected indicators, such as the obstetric indicators.

3. The raw indicator was adjusted to account for differences among hospitals in age, gender and modified DRG category (as described below).
4. The raw indicator was adjusted to account for differences among hospitals in age, gender, modified DRG, and comorbidities (defined using an adaptation of the AHRQ comorbidity software) of patients.
5. Multivariate signal extraction (MSX) methods were applied to adjust for reliability by estimating the amount of “noise” (i.e., variation due to random error) relative to the amount of “signal” (i.e., systematic variation in hospital performance or the ‘reliability’) for each indicator. This or similar “reliability adjustment” has been used in the literature for similar purposes.<sup>136 137</sup> Multivariate methods (taking into account correlations among indicators to extract additional signal) were applied to most of the accepted indicators. The exceptions were Death in Low Mortality DRGs and Failure to Rescue. Only univariate signal extraction methods (smoothing) were applied to these two indicators and to the experimental indicators, because these indicators possibly cover broader clinical concepts. Correlations between these indicators and other indicators may not reflect correlations due to quality of care, and thus inclusion of these indicators may adversely affect the MSX approximations.

For additional details on the empirical methods, refer to the companion EPC HCUP Quality Indicator Report, published by AHRQ (<http://www.qualityindicators.ahrq.gov/downloads.htm>). Additional details on the modifications made to the DRG and comorbidity categories are described below.

*Hospital Fixed Effects.* In the risk-adjustment models, hospital fixed effects were calculated using the standard method with logistic models of first estimating the predicted value for each discharge, then subtracting the actual outcome from the predicted, and averaging the difference for each hospital to get the hospital fixed effect estimate. In the Quality Indicator Report,<sup>138</sup> linear regression models were used with hospital fixed effects included, arguing that the logistic approach yielded biased estimates due to the omission of a variable (the hospital) correlated with both the dependent (e.g., in-hospital mortality) and the independent (e.g., age, gender, APR-DRG) variables in the model. Given the rare occurrence of many of the PSIs, however, the logistic approach may be more appropriate for this application. Linear methods assume that the error term is normally distributed. This assumption is violated when the outcome is dichotomous.

The QI means were generally an order of magnitude higher than the PSI means, so the assumption was not as problematic. However, the most appropriate method depends on the particular characteristics of each indicator, whether QI or PSI. To the extent that bias is a concern, accounting for the clustering of patients by using a hospital fixed effect is advantageous. To the extent that extreme values are a concern, imposing structure on the error term with logistic methods is advantageous. In the end, the two approaches can be compared in terms of how much difference it makes in the relative assessment of provider performance. This issue warrants further analysis to better understand the trade-offs and limitations of each approach, and under what conditions and for what indicators each approach might best apply.

Specifically, the risk-adjusted “raw” estimate of a hospital’s performance is constructed in two steps. In the first step, if it is denoted whether or not the event associated with a particular indicator  $Y^k$  ( $k=1, \dots, K$ ) was observed for a particular patient  $i$  in year  $t$  ( $t=1, \dots, T$ ), then the regression to construct a

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<sup>136</sup> Hofer TP, Hayward RA, Greenfield S, Wagner EH, Kaplan SH, Manning WG. The unreliability of individual physician “report cards” for assessing the costs and quality of care of a chronic disease JAMA 1999;28(22):2098-105.

<sup>137</sup> Christiansen CL, Morris CN. Improving the statistical approach to health care provider profiling. Ann Intern Med 1997;127(8 Pt 2):764-8).

<sup>138</sup> Davis et al. 2001.

risk-adjusted “raw” estimate of a particular patient’s performance on each indicator can be written as:

$$(1) \quad Y_{it}^k = Z_{it} \Pi_t^k + \xi_{it}^k, \quad \text{where}$$

$Y_{it}^k$  is the  $k^{\text{th}}$  PSI for patient  $i$  in year  $t$  (i.e., whether or not the event associated with the indicator occurred on that discharge).

$Z_{it}$  is a vector of patient covariates for patient  $i$  in year  $t$  (i.e., the patient-level measures used as risk adjusters).

$\Pi_t^k$  is a vector of parameters in each year  $t$ , giving the effect of each patient risk adjuster on indicator  $k$  (i.e., the magnitude of the risk adjustment associated with each patient measure).

$\xi_{it}^k$  is the unexplained residual in this patient-level model.

In the second step, the hospital effect was estimated by subtracting the resulting predictions from this patient-level regression from the actual observed patient-level outcomes, and taking the mean of this difference for each hospital. That is, for each hospital  $j$  ( $j=1, \dots, J$ ),

$$(2) \quad M_{jt}^k = Y_{ijt}^k - (Z_{it} \Pi_t^k + \xi_{it}^k), \quad \text{where}$$

$M_{jt}^k$  is the “raw” adjusted measure for indicator  $k$  for hospital  $j$  in year  $t$  (i.e., the hospital “fixed effect” in the patient-level regression).

$Z_{it}$  is the vector of patient covariates for patient  $i$  in year  $t$  estimated in Step 1.

In addition to age, sex, and age\*sex interactions as adjusters in the model, the project team also included a modified DRG and comorbidity category for the admission.

*Modified DRG Categories.* Two modifications were made to the Centers for Medicare and Medicaid Services (CMS, formerly Health Care Financing Administration) DRGs. First, adjacent DRG categories that were separated by the presence or absence of comorbidities or complications were collapsed. For example, DRGs 076 (Other Resp System Operating Room Procedures w CC) and 077 (Other Resp System Operating Room Procedures w/o CC) were grouped into one category. The purpose was to avoid adjusting for the complication the team was trying to measure. Second, most of the super-MDC DRG categories were excluded from the logistic models. Excluding these categories also avoids adjusting for the complications the team was trying to measure. For example, tracheostomies (DRG 482-483) often result from potentially preventable respiratory complications that require long-term mechanical ventilation. Similarly, operating room procedures unrelated to the principal diagnosis (DRG 468, 477) often result from potentially preventable complications that require surgical repair (i.e., fractures, lacerations).

In the companion technical report on quality indicators, the risk adjustment method implemented All Patient Refined (APR)-DRGs, a refinement of DRGs to capture different levels of complications. However, patient safety indicators, designed to detect potentially preventable complications, require a risk adjustment approach that does not inherently remove the differences between patients based on their complications. The APR-DRGs could be modified to remove applicable complications, on an indicator-by-indicator basis, but implementation of such an approach was beyond the scope of the current project. In this report, APR-DRG risk adjustment was not implemented.

*Modified Comorbidity Software.* To adjust for comorbidities, the project team used an updated adaptation of AHRQ Comorbidity Software (<http://www.hcup-us.ahrq.gov/toolssoftware/comorbidity/comorbidity.jsp>). The ICD-9-CM codes used to define the comorbidity categories were modified to address four main issues.

1. Comorbidity categories were excluded in the current software that include conditions likely to represent potentially preventable complications in certain settings, such as after elective surgery.

Specifically, three DRG categories (cardiac arrhythmia, coagulopathy, and fluid/electrolyte disorders) were removed from the comorbidity adjustment.

2. Most adaptations were designed to capture acute sequelae of chronic comorbidities, where both conditions are represented by a single ICD-9-CM code. For example, the definition of hypertension was broadened to include malignant hypertension, which usually arises in the setting of chronic hypertension. Unless these "acute on chronic" comorbidities are captured, some patients with especially severe comorbidities would be mislabeled as not having conditions of interest.
3. The comorbidity definitions did not include obstetric comorbidity codes, which are relevant for the obstetric indicators. Codes, when available, for these comorbidities in obstetric patients were added.
4. Slight updating was necessary based on recent ICD-9-CM code changes.

*Low Mortality DRGs.* In order to be included in the "Low Mortality DRG" indicator, the DRG had to have an overall in-hospital mortality rate (based on the National SID sample) of less than 0.5%. In addition, if a DRG category was split based on the presence of comorbidities or complications, then the category was included only if both DRGs (with and without comorbidities or complications) met the mortality threshold. Otherwise, the category was not included in the "Low mortality DRG" PSI. The indicator is reported as a single measure and stratified into medical (adult and pediatric), surgical (adult and pediatric), neonatal, obstetric and psychiatric DRGs.

## **Empirical Analysis Statistics**

Using these methods, the project team constructed a set of statistical tests to examine precision, bias, and relatedness of indicators for all accepted hospital-level indicators, and precision and bias for all accepted area-level and experimental indicators. Each of the key statistical test results was summarized and explained in the overview section of the companion HCUP Quality Indicator report.<sup>139</sup> Tables B-1 through B-3 provide a summary of the statistical analyses and their interpretation.

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<sup>139</sup> Davies et al., 2001.

**Table B-1. Precision Tests**

Measure	Statistic/Adjustments	Interpretation
<b>Precision. Is most of the variation in an indicator at the level of the hospital? Do smoothed estimates of quality lead to more precise measures?</b>		
a. Observed variation in indicator	Hospital-Level Standard Deviation Hospital -Level Skew Statistic	Unadjusted Age-gender adjusted Modified DRG adjusted Modified AHRQ comorbidity adjusted
b. MSX methods	Signal Standard Deviation Signal Share Signal Ratio	Reliability adjusted
		Risk adjustment can either increase or decrease observed variation. If increase, then differences in patient characteristics mask provider differences. If decrease, then differences in patient characteristics account for provider differences.
		Estimates what percentage of the observed variation between hospitals reflects systematic differences versus random noise. Signal share is a measure of how much of the total variation (patient and provider) is potentially subject to hospital control.

**Table B-2. Bias Tests**

Measure	Statistic	Interpretation
<b>Bias. Does risk adjustment change our assessment of relative hospital performance, after accounting for reliability? Is the impact greatest among the best or worst performers, or overall? What is the magnitude of the change in performance?</b>		
MSX methods: unadjusted vs. age, sex, modified DRG, comorbidity risk adjustment	Spearman Rank Correlation Coefficient (before and after risk adjustment)	Risk adjustment matters to the extent that it alters the assessment of relative hospital performance. This test determines the impact overall.
	Average absolute value of change relative to mean (after risk adjustment)	This test determines whether the absolute change in performance was large or small relative to the overall mean.
	Percentage of the top 10% of hospitals that remains the same (after risk adjustment)	This test measures the impact at the highest rates (in general, the worse performers).

Measure	Statistic	Interpretation
<b>Bias. Does risk adjustment change our assessment of relative hospital performance, after accounting for reliability? Is the impact greatest among the best or worst performers, or overall? What is the magnitude of the change in performance?</b>		
	Percentage of the bottom 10% of hospitals that remains the same (after risk adjustment)	This test measures the impact at the lowest rates (in general, the better performers).
	Percentage of hospitals that move more than two deciles in rank (up or down) (after risk adjustment)	This test determines the magnitude of the relative changes.

**Table B-3. Relatedness Tests**

Measure	Statistic	Interpretation
<b>Relatedness of indicators. Is the indicator related to other indicators in a way that makes clinical sense? Do methods that remove noise and bias make the relationship clearer?</b>		
a. Correlation of indicator with other indicators	Spearman correlation coefficient	Are indicators correlated with other indicators in the direction one might expect?
b. Factor loadings of indicator	Factor loadings, based on Spearman correlation, Principal Component Analysis	Do indicators load on factors with other indicators that one might expect?

## Appendix C: Operating Room Procedures

50	IMPL CRT PACEMAKER SYS	299	SKULL & BRAIN OP NEC
51	IMPL CRT DEFIBRILLAT SYS	301	REMOVAL FB SPINAL CANAL
52	IMP/REP LEAD LF VEN SYS	302	REOPEN LAMINECTOMY SITE
53	IMP/REP CRT PACEMAKR GEN	309	SPINAL CANAL EXPLOR NEC
54	IMP/REP CRT DEFIB GENAT	31	INTRASPIN NERVE ROOT DIV
112	OPEN CEREB MENINGES BX	321	PERCUTANEOUS CHORDOTOMY
114	OPEN BRAIN BIOPSY	329	OTHER CHORDOTOMY
115	SKULL BIOPSY	332	SPINAL CORD/MENINGES BX
118	OTHER BRAIN DX PROCEDURE	339	OTHER SPINAL DX PROC
119	OTHER SKULL DX PROCEDURE	34	EXCIS SPINAL CORD LESION
121	CRANIAL SINUS I & D	351	SPINE MENINGOCELE REPAIR
122	REMOV INTRACRAN STIMULAT	352	MYELOMENINGOCEL REPAIR
123	REOPEN CRANIOTOMY SITE	353	VERTEBRAL FX REPAIR
124	OTHER CRANIOTOMY	359	SPINAL STRUCT REPAIR NEC
125	OTHER CRANIECTOMY	36	SPINAL CORD ADHESIOLYSIS
131	INCISE CEREBRAL MENINGES	371	SUBARACH-PERITON SHUNT
132	LOBOTOMY & TRACTOTOMY	372	SUBARACH-URETERAL SHUNT
139	OTHER BRAIN INCISION	379	OTH SPINAL THECAL SHUNT
141	THALAMUS OPERATIONS	393	INSERT SPINAL STIMULATOR
142	GLOBUS PALLIDUS OPS	394	REMOVE SPINAL STIMULATOR
151	EX CEREB MENINGEAL LES	397	REVISE SPINE THECA SHUNT
152	HEMISPHERECTOMY	398	REMOVE SPINE THECA SHUNT
153	BRAIN LOBECTOMY	399	SPINE CANAL STRUC OP NEC
159	OTHER BRAIN EXCISION	401	EXCISION ACOUSTC NEUROMA
16	EXCISE SKULL LESION	402	TRIGEMINAL NERV DIVISION
201	LINEAR CRANIECTOMY	403	PERIPH NERVE DIV NEC
202	ELEVATE SKULL FX FRAGMNT	404	PERIPH NERVE INCIS NEC
203	SKULL FLAP FORMATION	405	GASSERIAN GANGLIONECTOMY
204	BONE GRAFT TO SKULL	406	PERIPH GANGLIONECT NEC
205	SKULL PLATE INSERTION	407	PERIPH NERV EXCISION NEC
206	CRANIAL OSTEOPLASTY NEC	412	OPEN PERIPH NERVE BIOPSY
207	SKULL PLATE REMOVAL	419	PERIPH NERVE DX PROC NEC
211	SIMPLE SUTURE OF DURA	43	PERIPHERAL NERVE SUTURE
212	BRAIN MENINGE REPAIR NEC	441	DECOMPRESS TRIGEM ROOT
213	MENINGE VESSEL LIGATION	442	CRAN NERV ROOT DECOM NEC
214	CHOROID PLEXECTOMY	443	CARPAL TUNNEL RELEASE
22	VENTRICULOSTOMY	444	TARSAL TUNNEL RELEASE
231	VENTRICL SHUNT-HEAD/NECK	449	PER NERVE ADHESIOLYS NEC
232	VENTRI SHUNT-CIRCULA SYS	45	PERIPHERAL NERVE GRAFT
233	VENTRICL SHUNT-THORAX	46	PERIPH NERVE TRANSPOSIT
234	VENTRICL SHUNT-ABDOMEN	471	HYPOGLOSS-FACIAL ANASTOM
235	VENTRI SHUNT-UNINARY SYS	472	ACCESSORY-FACIAL ANASTOM
239	OTHER VENTRICULAR SHUNT	473	ACCESS-HYPOGLOSS ANASTOM
242	REPLACE VENTRICLE SHUNT	474	PERIPH NERV ANASTOM NEC
243	REMOVE VENTRICLE SHUNT	475	POSTOP REVIS PER NERV OP
291	LYSIS CORTICAL ADHESION	476	LATE REPAIR PER NERV INJ
292	BRAIN REPAIR	479	OTHER NEUROPLASTY
293	IMPLANT BRAIN STIMULATOR	491	NEURECTASIS
294	INSERT/REPLAC SKULL TONG	492	IMPLANT PERIPH STIMULAT

493	REMOVE PERIPH STIMULATOR	742	ADRENAL NERVE DIVISION
499	PERIPHERAL NERVE OPS NEC	743	ADRENAL VESSEL LIGATION
50	SYMPATH NERVE DIVISION	744	ADRENAL REPAIR
511	SYMPATHETIC NERVE BIOPSY	745	ADRENAL REIMPLANTATION
519	SYMPATH NRV DX PROC NEC	749	ADRENAL OPERATION NEC
521	SPHENOPALATIN GANGLIONEC	751	PINEAL FIELD EXPLORATION
522	CERVICAL SYMPATHECTOMY	752	PINEAL GLAND INCISION
523	LUMBAR SYMPATHECTOMY	753	PARTIAL PINEALECTOMY
524	PRESACRAL SYMPATHECTOMY	754	TOTAL PINEALECTOMY
525	PERIART SYMPATHECTOMY	759	PINEAL OPERATION NEC
529	OTHER SYMPATHECTOMY	761	EXC PITUIT LES-TRANSFRON
581	SYMPATHETIC NERVE REPAIR	762	EXC PITUIT LES-TRANSPHEN
589	SYMPATHETIC NERVE OP NEC	763	PART EXCIS PITUITARY NOS
59	OTHER NERVOUS SYSTEM OPS	764	TOT EXC PITUIT-TRANSFRON
602	REOPEN THYROID FIELD WND	765	TOT EXC PITUIT-TRANSPHEN
609	INCIS THYROID FIELD NEC	768	TOTAL EXC PITUITARY NEC
612	OPEN THYROID GLAND BX	769	TOTAL EXC PITUITARY NOS
613	PARATHYROID BIOPSY	771	PITUITARY FOSSA EXPLORAT
619	THYR/PARATHY DX PROC NEC	772	PITUITARY GLAND INCISION
62	UNILAT THYROID LOBECTOMY	779	PITUITARY OPERATION NEC
631	EXCISION THYROID LESION	780	THYMECTOMY NOS
639	PART THYROIDECTOMY NEC	781	PART EXCISION OF THYMUS
64	COMPLETE THYROIDECTOMY	782	TOTAL EXCISION OF THYMUS
650	SUBSTERN THYROIDECT NOS	791	THYMUS FIELD EXPLORATION
651	PART SUBSTERN THYROIDECT	792	INCISION OF THYMUS
652	TOT SUBSTERN THYROIDECT	793	REPAIR OF THYMUS
66	LINGUAL THYROID EXCISION	794	THYMUS TRANSPLANTATION
67	THYROGLOSS DUCT EXCISION	799	THYMUS OPERATION NEC
681	TOTAL PARATHYROIDECTOMY	811	EYELID BIOPSY
689	OTHER PARATHYROIDECTOMY	820	REMOVE EYELID LESION NOS
691	THYROID ISTHMUS DIVISION	821	CHALAZION EXCISION
692	THYROID VESSEL LIGATION	822	EXCISE MINOR LES LID NEC
693	THYROID SUTURE	823	EXC MAJ LES LID PRT-THIC
694	THYROID REIMPLANTATION	824	EXC MAJ LES LID FUL-THIC
695	PARATHYROID REIMPLANT	825	DESTRUCTION LID LESION
698	OTHER THYROID OPERATIONS	831	PTOSIS REP-FRONT MUS SUT
699	OTHER PARATHYROID OPS	832	PTOSIS REP-FRON MUS SLNG
700	ADRENAL EXPLORATION NOS	833	PTOSIS REP-LEVAT MUS ADV
701	UNILAT ADRENAL EXPLORAT	834	PTOSIS REP-LEVAT MUS NEC
702	BILAT ADRENAL EXPLORAT	835	PTOS REP-TARSAL TECHNIQ
712	OPEN ADRENAL GLAND BX	836	BLEPHAROPTOS REPAIR NEC
713	TRANSFRONT PITUITARY BX	837	REDUC OVERCORRECT PTOSIS
714	TRANSPHEN PITUITARY BX	838	CORRECT LID RETRACTION
715	PITUITARY BIOPSY NOS	841	THERMOCAUT/ENTROPION REP
716	THYMUS BIOPSY	842	SUTURE ENTROPION REPAIR
717	PINEAL BIOPSY	843	WEDG RESEC ENTROPION REP
719	ENDOCRINE DX PROC NEC	844	LID RECONS ENTROPION REP
721	ADRENAL LESION EXCISION	849	ENTROPION/ECTROP REP NEC
722	UNILATERAL ADRENALECTOMY	851	CANTHOTOMY
729	PART ADRENALECTOMY NEC	852	BLEPHARORRHAPHY
73	BILATERAL ADRENALECTOMY	859	ADJUST LID POSITION NEC
741	ADRENAL INCISION	861	LID RECONST W SKIN GRAFT

862	LID RECONST W MUC GRAFT	105	CONJUNC/LID ADHESIOLYSIS
863	LID RECONST W HAIR GRAFT	106	REPAIR CONJUNCT LACERAT
864	LID RECON-TARSOCONJ FLAP	1091	SUBCONJUNCTIVAL INJECT
869	LID RECONSTR W GRAFT NEC	1099	CONJUNCTIVAL OP NEC
870	LID RECONSTRUCTION NOS	110	MAGNET REMOVAL CORNEA FB
871	LID MARG RECON-PART THIC	111	CORNEAL INCISION
872	LID RECONS-PART THIC NEC	1121	CORNEAL SCRAPE FOR SMEAR
873	LID MARG RECONS FUL THIC	1122	CORNEAL BIOPSY
874	LID RECONST-FUL THIC NEC	1129	CORNEAL DX PROC NEC
891	ELECTROSURG LID EPILAT	1131	PTERYGIUM TRANSPOSITION
892	CRYOSURG LID EPILATION	1132	PTERYG EXC W CORNEA GRFT
893	EYELID EPILATION NEC	1139	PTERYGIUM EXCISION NEC
899	EYELID OPERATION NEC	1141	MECH REMOV CORNEA EPITH
90	LACRIMAL GLAND INCISION	1142	THERMOCAUT CORNEA LESION
911	LACRIMAL GLAND BIOPSY	1143	CRYOTHERAP CORNEA LESION
912	LACRIMAL SAC BIOPSY	1149	DESTRUCT CORNEA LES NEC
919	LACRIMAL SYS DX PROC NEC	1151	SUTURE CORNEA LACERATION
920	EXC LACRIMAL GLAND NOS	1152	REP CORNEA POSTOP DEHISC
921	EXCIS LES LACRIMAL GLAND	1153	RX CORNEA LAC W CONJ FLP
922	PART DACRYOADENECT NEC	1159	CORNEAL REPAIR NEC
923	TOTAL DACRYOADENECTOMY	1160	CORNEAL TRANSPLANT NOS
93	OTHER LACRIMAL GLAND OPS	1161	LAM KERATPLAST W AUTGRFT
941	LACRIMAL PUNCTUM PROBE	1162	LAMELLAR KERATOPLAST NEC
942	LAC CANALICULI PROBE	1163	PERF KERATOPL W AUTOGRFT
943	NASOLACRIMAL DUCT PROBE	1164	PERFORAT KERATOPLAST NEC
944	NASOLAC DUCT INTUBAT	1169	CORNEAL TRANSPLANT NEC
949	LAC PASSAGE MANIP NEC	1171	KERATOMILEUSIS
951	LAC PUNCTUM INCISION	1172	KERATOPHAKIA
952	LAC CANALICULI INCISION	1173	KERATOPROSTHESIS
953	LACRIMAL SAC INCISION	1174	THERMOKERATOPLASTY
959	LACRIM PASSAGE INCIS NEC	1175	RADIAL KERATOTOMY
96	LACRIM SAC/PASSAGE EXCIS	1176	EPIKERATOPHAKIA
971	CORRECT EVERTED PUNCTUM	1179	CORNEA RECONSTRUCT NEC
972	PUNCTUM REPAIR NEC	1191	CORNEAL TATTOOING
973	CANALICULUS REPAIR	1192	REMOVE CORNEAL IMPLANT
981	DACRYOCYSTORHINOSTOMY	1199	CORNEAL OPERATION NEC
982	CONJUNCTIVOCYSTORHINOST	1200	REMOV ANT SEGMENT FB NOS
983	CONJUNCTIVORHINOS W TUBE	1201	MAGNET REMOV ANT SEG FB
991	LAC PUNCTUM OBLITERATION	1202	NONMAG REMOV ANT SEG FB
999	LACRIMAL SYSTEM OP NEC	1211	IRIDOTOMY W TRANSFIXION
100	INCISE/REMOV CONJUNCT FB	1212	IRIDOTOMY NEC
101	CONJUNCTIVA INCISION NEC	1213	PROLAPSED IRIS EXCISION
1021	CONJUNCTIVAL BIOPSY	1214	IRIDECTOMY NEC
1029	CONJUNCTIVA DX PROC NEC	1221	DX ASPIRAT-ANT CHAMBER
1031	EXCISE CONJUNCTIV LESION	1222	IRIS BIOPSY
1032	DESTRUCT CONJUNC LES NEC	1229	ANT SEGMENT DX PROC NEC
1033	OTH CONJUNC DESTRUC PROC	1231	GONIOSYNECHIAE LYSIS
1041	SYMBLEPH REP W FREE GRFT	1232	ANT SYNECHIA LYSIS NEC
1042	GRAFT CONJUNC CUL-DE-SAC	1233	POST SYNECHIAE LYSIS
1043	CONJUN CUL-DE-SAC RX NEC	1234	CORNEOVITREAL ADHESIOLYS
1044	CONJUNC FREE GRAFT NEC	1235	COREOPLASTY
1049	CONJUNCTIVOPLASTY NEC	1239	IRIDOPLASTY NEC

1240	REMOV ANT SEGMNT LES NOS	1363	EXTRACAP LENS EXTRAC NEC
1241	NONEXC DESTRUC IRIS LES	1364	AFTER-CATAR DISCISSION
1242	EXCISION OF IRIS LESION	1365	AFTER-CATARACT EXCISION
1243	NONEXC DESTR CIL BOD LES	1366	AFTER CATAR FRAGMNTATION
1244	EXCISE CILIARY BODY LES	1369	CATARACT EXTRACTION NEC
1251	GONIOPUNCTURE	1370	INSERT PSEUDOPHAKOS NOS
1252	GONIOTOMY	1371	INSERT LENS AT CATAR EXT
1253	GONIOTOMY W GONIOPUNCTUR	1372	SECONDARY INSERT LENS
1254	TRABECULOTOMY AB EXTERNO	138	IMPLANTED LENS REMOVAL
1255	CYCLODIALYSIS	139	OTHER OPERATIONS ON LENS
1259	FACILIT INTRAOC CIRC NEC	1400	REMOV POST SEGMNT FB NOS
1261	TREPHIN SCLERA W IRIDECT	1401	MAGNET REMOV POST SEG FB
1262	THERMCAUT SCLER W IRIDEC	1402	NONMAG REMOV POST SEG FB
1263	IRIDENCELEISIS/IRIDOTASIS	1411	DIAGNOST VITREOUS ASPIR
1264	TRABECULECTOM AB EXTERNO	1419	DX PROC POST SEG NEC
1265	SCLER FISTULIZ W IRIDECT	1421	CHORIORET LES DIATHERMY
1266	POSTOP REVIS SCL FISTUL	1422	CHORIORETIN LES CRYOTHER
1269	SCLER FISTULIZING OP NEC	1426	CHORIORET LES RADIOTHER
1271	CYCLODIATHERMY	1427	CHORIORET LES RAD IMPLAN
1272	CYCLOCRYOTHERAPY	1429	CHORIORET LES DESTR NEC
1273	CYCLOPHOTOCOAGULATION	1431	RETINAL TEAR DIATHERMY
1274	CIL BODY DIMINUTION NOS	1432	RETINAL TEAR CRYOTHERAPY
1279	GLAUCOMA PROCEDURE NEC	1439	RETINAL TEAR REPAIR NEC
1281	SUTURE SCLERAL LACER	1441	SCLERAL BUCKLE W IMPLANT
1282	SCLERAL FISTULA REPAIR	1449	SCLERAL BUCKLING NEC
1283	REVIS ANT SEG OP WND NEC	1451	DETACH RETINA-DIATHERMY
1284	DESTRUCT SCLERAL LESION	1452	DETACH RETINA-CRYOTHERAP
1285	REPAIR STAPHYLOM W GRAFT	1453	DETACH RETINA XENON COAG
1286	REP SCLER STAPHYLOMA NEC	1454	DETACH RETINA LASER COAG
1287	GRAFT REINFORCE SCLERA	1455	DETACH RET PHOTOCOAG NOS
1288	SCLERA REINFORCEMENT NEC	1459	REPAIR RETINA DETACH NEC
1289	SCLERAL OPERATION NEC	146	REMOV PROS MAT POST SEG
1291	THERAPEUT EVAC ANT CHAMB	1471	ANTERIOR REMOV VITREOUS
1292	ANTERIOR CHAMBER INJECT	1472	VITREOUS REMOVAL NEC
1293	REMOV EPITHEL DOWNGROWTH	1473	ANTERIOR MECHAN VITRECT
1297	IRIS OPERATION NEC	1474	MECH VITRECTOMY NEC
1298	CILIARY BODY OP NEC	1475	VITREOUS SUBSTITUT INJEC
1299	ANTERIOR CHAMBER OP NEC	1479	VITREOUS OPERATION NEC
1300	REMOVE FB LENS NOS	149	OTHER POST SEGMENT OPS
1301	MAGNET REMOVE FB LENS	1501	EXTRAOC MUSC-TEND BIOPSY
1302	NONMAGNET REMOVE FB LENS	1509	EXTRAOC MUSC DX PROC NEC
1311	TEMP-INF INTRCAP LENS EX	1511	ONE EXTRAOC MUS RECESS
1319	INTRACAPSUL LENS EXT NEC	1512	1 EXTRAOC MUSCL ADVANCE
132	LINEAR EXTRACAP LENS EXT	1513	1 EXTRAOC MUSCL RESECT
133	SIMPL ASPIR LENS EXTRACT	1519	XTRAOC MUS OP/DETACH NEC
1341	CATARAC PHACOEMULS/ASPIR	1521	LENGTHEN 1 EXTRAOC MUSC
1342	POST CATARAC FRAG/ASPIR	1522	SHORTEN 1 EXTRAOC MUSC
1343	CATARACT FRAG/ASPIR NEC	1529	OP ON 1 EXTRAOC MUSC NEC
1351	TEMP-INF XTRACAP LENS EX	153	TEMP DETACH >1 XTROC MUS
1359	EXTRACAP LENS EXTRAC NEC	154	OTH OP ON >L EXTRAOC MUS
1361	EXTRACAP LENS EXTRAC NEC	155	EXTRAOCUL MUS TRANSPOSIT
1362	EXTRACAP LENS EXTRAC NEC	156	REVIS EXTRAOC MUSC SURG

157	EXTRAOC MUSC INJ REPAIR	1955	TYPE 5 TYMPANOPLASTY
159	OTH EXTRAOC MUS-TEND OP	196	TYMPANOPLASTY REVISION
1601	ORBITOTOMY W BONE FLAP	199	MIDDLE EAR REPAIR NEC
1602	ORBITOTOMY W IMPLANT	2001	MYRINGOTOMY W INTUBATION
1609	ORBITOTOMY NEC	2021	MASTOID INCISION
161	REMOVE PENETRAT FB EYE	2022	PETRUS PYRAM AIR CEL INC
1622	DIAGNOSTIC ASP OF ORBIT	2023	MIDDLE EAR INCISION
1623	EYEBALL & ORBIT BIOPSY	2032	MID & INNER EAR BIOPSY
1629	EYEBAL/ORBIT DX PROC NEC	2039	MID/IN EAR DX PROC NEC
1631	EYE EVISC W SYNCH IMPLAN	2041	SIMPLE MASTOIDECTOMY
1639	EYEBALL EVISCERATION NEC	2042	RADICAL MASTOIDECTOMY
1641	EYE ENUC/IMPLAN/MUSC ATT	2049	MASTOIDECTOMY NEC
1642	EYE ENUC W IMPLANT NEC	2051	EXCISE MIDDLE EAR LESION
1649	EYEBALL ENUCLEATION NEC	2059	MIDDLE EAR EXCISION NEC
1651	RADICAL ORBITOMAXILLECT	2061	INNER EAR FENESTRATION
1652	ORBIT EXENT W BONE REMOV	2062	REVIS INNER EAR FENESTRA
1659	ORBITAL EXENTERATION NEC	2071	ENDOLYMPHATIC SHUNT
1661	2NDRY OCULAR IMP INSERT	2072	INNER EAR INJECTION
1662	REVIS/REINSERT OCUL IMP	2079	INC/EXC/DESTR IN EAR NEC
1663	REVIS ENUC SOCKET W GRFT	2091	TYMPANOSYMPATHECTOMY
1664	ENUC SOCKET REVIS NEC	2092	MASTOIDECTOMY REVISION
1665	2NDRY EXENT CAVITY GRAFT	2093	REPAIR OVAL/ROUND WINDOW
1666	REVIS EXENTER CAVITY NEC	2095	ELECMAG HEAR DEV IMPLANT
1669	2ND OP POST EYE REM NEC	2096	IMPLT COCHLEAR PROST NOS
1671	REMOVE OCULAR IMPLANT	2097	IMP/REP SCHAN COCH PROS
1672	REMOVE ORBITAL IMPLANT	2098	IMP/REP MCHAN COCHL PROS
1681	REPAIR OF ORBITAL WOUND	2099	MID-INNER EAR OPS NEC
1682	REPAIR EYEBALL RUPTURE	2104	ETHMOID ART LIGAT-EPIST
1689	EYE/ORBIT INJ REPAIR NEC	2105	MAX ART LIG FOR EPISTAX
1692	EXCISION ORBITAL LESION	2106	EXT CAROT ART LIG-EPIST
1693	EXCISION EYE LESION NOS	2107	NASAL SEPT GRFT-EPISTAX
1698	OPERATION ON ORBIT NEC	2109	EPISTAXIS CONTROL NEC
1699	OPERATION ON EYEBALL NEC	214	RESECTION OF NOSE
1821	PREAURICULAR SINUS EXCIS	215	SUBMUC NASAL SEPT RESECT
1831	RAD EXCIS EXT EAR LES	2161	DIATHER/CRYO TURBINECTOM
1839	EXCIS EXTERNAL EAR NEC	2162	TURBINATE FRACTURE
185	CORRECTION PROMINENT EAR	2169	TURBINECTOMY NEC
186	EXT AUDIT CANAL RECONSTR	2172	OPEN REDUCTION NASAL FX
1871	CONSTRUCTION EAR AURICLE	2182	NASAL FISTULA CLOSURE
1872	REATTACH AMPUTATED EAR	2183	TOT NASAL RECONSTRUCTION
1879	PLASTIC REP EXT EAR NEC	2184	REVISION RHINOPLASTY
189	OTHER EXT EAR OPERATIONS	2185	AUGMENTATION RHINOPLASTY
190	STAPES MOBILIZATION	2186	LIMITED RHINOPLASTY
1911	STAPEDECT W REPLAC INCUS	2187	RHINOPLASTY NEC
1919	STAPEDECTOMY NEC	2188	SEPTOPLASTY NEC
1921	REV STAPDEC W INCUS REPL	2189	NASAL REPAIR NEC
1929	STAPEDECTOMY REVIS NEC	2199	NASAL OPERATION NEC
193	OSSICULAR CHAIN OP NEC	2212	OPEN BIOPSY NASAL SINUS
194	MYRINGOPLASTY	2231	RADICAL MAXILLARY ANTROT
1952	TYPE 2 TYMPANOPLASTY	2239	EXT MAXILLARY ANTROT NEC
1953	TYPE 3 TYMPANOPLASTY	2241	FRONTAL SINUSOTOMY
1954	TYPE 4 TYMPANOPLASTY	2242	FRONTAL SINUSECTOMY

2250	SINUSOTOMY NOS	2771	INCISION OF UVULA
2251	ETHMOIDOTOMY	2772	EXCISION OF UVULA
2252	SPHENOIDOTOMY	2773	REPAIR OF UVULA
2253	MULTIPLE SINUS INCISION	2779	OTHER UVULA OPERATIONS
2260	SINUSECTOMY NOS	2792	MOUTH INCISION NOS
2261	C-LUC EXC MAX SINUS LES	2799	ORAL CAVITY OPS NEC
2262	EXC MAX SINUS LESION NEC	280	PERITONSILLAR I & D
2263	ETHMOIDECTOMY	2811	TONSIL&ADENOID BIOPSY
2264	SPHENOIDECTOMY	2819	TONSIL&ADENOID DX OP NEC
2271	NASAL SINUS FISTULA CLOS	282	TONSILLECTOMY
2279	NASAL SINUS REPAIR NEC	283	TONSILLECTOMY/ADENOIDE
229	OTHER NASAL SINUS OPS	284	EXCISION OF TONSIL TAG
242	GINGIVOPLASTY	285	EXCISION LINGUAL TONSIL
244	EXC OF DENTAL LES OF JAW	286	ADENOIDECTOMY
245	ALVEOLOPLASTY	287	HEMORR CONTRL POST T & A
2502	OPEN BIOPSY OF TONGUE	2891	INCIS TO REMOV TONSIL FB
251	DESTRUCTION TONGUE LES	2892	EXCIS TONSIL/ADENOID LES
252	PARTIAL GLOSSECTOMY	2899	TONSIL/ADENOID OPS NEC
253	COMPLETE GLOSSECTOMY	290	PHARYNGOTOMY
254	RADICAL GLOSSECTOMY	292	EXC BRANCHIAL CLEFT CYST
2559	REPAIR OF TONGUE NEC	293	EXC BRANCHIAL CLEFT CYST
2594	OTHER GLOSSOTOMY	2931	CRICOPHARYNGEAL MYOTOMY
2599	TONGUE OPERATION NEC	2932	PHARYNGEAL DIVERTICULEC
2612	OPEN BX SALIV GLAND/DUCT	2933	PHARYNGECTOMY
2621	SALIVARY CYST MARSUPIAL	2939	EXCIS/DESTR LES PHAR NEC
2629	SALIV LESION EXCIS NEC	294	PLASTIC OP ON PHARYNX
2630	SIALOADENECTOMY NOS	2951	SUTURE OF PHARYNGEAL LAC
2631	PARTIAL SIALOADENECTOMY	2952	CLOS BRANCH CLEFT FISTUL
2632	COMPLETE SIALOADENECTOMY	2953	CLOS PHARYNX FISTULA NEC
2641	SUTURE OF SALIV GLND LAC	2954	LYSIS PHARYNGEAL ADHES
2642	SALIVARY FISTULA CLOSURE	2959	PHARYNGEAL REPAIR NEC
2649	SALIVARY REPAIR NEC	2992	DIVIS GLOSSOPHARYNG NERV
2699	SALIVARY OPERATION NEC	2999	PHARYNGEAL OPERATION NEC
270	DRAIN FACE & MOUTH FLOOR	3001	LARYNX CYST MARSUPIALIZ
271	INCISION OF PALATE	3009	DESTRUCT LARYNX LES NEC
2721	BONY PALATE BIOPSY	301	HEMILARYNGECTOMY
2722	UVULA AND SOFT PALATE BX	3021	EPIGLOTTIDECTOMY
2731	LOC EXC BONY PALATE LES	3022	VOCAL CORDECTOMY
2732	WIDE EXC BONY PALATE LES	3029	OTHER PART LARYNGECTOMY
2742	WIDE EXCISION OF LIP LES	303	COMPLETE LARYNGECTOMY
2743	EXCISION OF LIP LES NEC	304	RADICAL LARYNGECTOMY
2749	EXCISION OF MOUTH NEC	3121	MEDIASTINAL TRACHEOSTOMY
2753	CLOSURE OF MOUTH FISTULA	3129	OTHER PERM TRACHEOSTOMY
2754	REPAIR OF CLEFT LIP	313	INCIS LARYNX TRACHEA NEC
2755	FULL-THICK GRFT TO MOUTH	3145	OPN BX LARYNX OR TRACHEA
2756	SKIN GRAFT TO MOUTH NEC	315	LOCAL DESTRUC TRACH LES
2757	PEDICLE ATTACH TO MOUTH	3161	SUTURE OF LARYNGEAL LAC
2759	MOUTH REPAIR NEC	3162	LARYNGEAL FISTULA CLOS
2761	SUTURE OF PALATE LACERAT	3163	LARYNGOSTOMY REVISION
2762	CLEFT PALATE CORRECTION	3164	LARYNGEAL FX REPAIR
2763	REVIS CLEFT PALAT REPAIR	3169	OTHER LARYNGEAL REPAIR
2769	OTH PLASTIC REPAIR PALAT	3171	SUTURE OF TRACHEAL LACER

3172	CLOSURE OF TRACHEOSTOMY	344	DESTRUCT CHEST WALL LES
3173	TRACHEA FISTULA CLOS NEC	3451	DECORTICATION OF LUNG
3174	REVISION OF TRACHEOSTOMY	3459	OTHER PLEURAL EXCISION
3175	TRACHEAL RECONSTRUCTION	346	SCARIFICATION OF PLEURA
3179	OTHER TRACHEAL REPAIR	3473	CLOS THORACIC FISTUL NEC
3191	LARYNGEAL NERV DIVISION	3474	PECTUS DEFORMITY REPAIR
3192	LYSIS TRACH/LARYNX ADHES	3479	OTHER CHEST WALL REPAIR
3198	OTH LARYNGEAL OPERATION	3481	EXCISE DIAPHRAGM LESION
3199	OTHER TRACHEAL OPERATION	3482	SUTURE DIAPHRAGM LACERAT
320	OTHER TRACHEAL OPERATION	3483	CLOSE DIAPHRAGM FISTULA
3209	OTHER DESTRUC BRONC LES	3484	OTHER DIAPHRAGM REPAIR
321	OTHER BRONCHIAL EXCISION	3485	IMPLANT DIAPHRA PACEMAKE
3221	EMPHYSEMA BLEB PPLICATION	3489	DIAPHRAGM OPERATION NEC
3222	LUNG VOL REDUCTION SURG	3493	REPAIR OF PLEURA
3229	DESTROY LOC LUNG LES NEC	3499	THORACIC OPERATION NEC
323	SEGMENTAL LUNG RESECTION	3500	CLOSED VALVOTOMY NOS
324	LOBECTOMY OF LUNG	3501	CLOSED AORTIC VALVOTOMY
325	COMPLETE PNEUMONECTOMY	3502	CLOSED MITRAL VALVOTOMY
326	RAD DISSEC THORAC STRUCT	3503	CLOSED PULMON VALVOTOMY
329	OTHER EXCISION OF LUNG	3504	CLOSED TRICUSP VALVOTOMY
330	INCISION OF BRONCHUS	3510	OPEN VALVULOPLASTY NOS
331	INCISION OF LUNG	3511	OPN AORTIC VALVULOPLASTY
3325	OPEN BRONCHIAL BIOPSY	3512	OPN MITRAL VALVULOPLASTY
3327	CLOS ENDOSCOPIC LUNG BX	3513	OPN PULMON VALVULOPLASTY
3328	OPEN LUNG BIOPSY	3514	OPN TRICUS VALVULOPLASTY
3329	BRONCH/LUNG DX PROC NEC	3520	REPLACE HEART VALVE NOS
3334	THORACOPLASTY	3521	REPLACE AORT VALV-TISSUE
3339	SURG COLLAPS OF LUNG NEC	3522	REPLACE AORTIC VALVE NEC
3341	BRONCHIAL LACERAT SUTURE	3523	REPLACE MITR VALV-TISSUE
3342	BRONCHIAL FISTULA CLOS	3524	REPLACE MITRAL VALVE NEC
3343	LUNG LACERATION CLOSURE	3525	REPLACE PULM VALV-TISSUE
3348	BRONCHIAL REPAIR NEC	3526	REPLACE PULMON VALVE NEC
3349	LUNG REPAIR NEC	3527	REPLACE TRIC VALV-TISSUE
335	LUNG REPAIR NEC	3528	REPLACE TRICUSP VALV NEC
3350	LUNG TRANSPLANT NOS	3531	PAPILLARY MUSCLE OPS
3351	UNILAT LUNG TRANSPLANT	3532	CHORDAE TENDINEAE OPS
3352	BILAT LUNG TRANSPLANT	3533	ANNULOPLASTY
336	COMB HEART/LUNG TRANSPLA	3534	INFUNDIBULECTOMY
3392	BRONCHIAL LIGATION	3535	TRABECUL CARNEAE CORD OP
3393	PUNCTURE OF LUNG	3539	TISS ADJ TO VALV OPS NEC
3398	BRONCHIAL OPERATION NEC	3542	CREATE SEPTAL DEFECT
3399	LUNG OPERATION NEC	3550	PROSTH REP HRT SEPTA NOS
3402	EXPLORATORY THORACOTOMY	3551	PROS REP ATRIAL DEF-OPN
3403	REOPEN THORACOTOMY SITE	3552	PROS REPAIR ATRIA DEF-CL
341	INCISION OF MEDIASTINUM	3553	PROST REPAIR VENTRIC DEF
3421	TRANSPLEURA THORACOSCOPY	3554	PROS REP ENDOCAR CUSHION
3422	MEDIASTINOSCOPY	3560	GRFT REPAIR HRT SEPT NOS
3426	OPEN MEDIASTINAL BIOPSY	3561	GRAFT REPAIR ATRIAL DEF
3427	BIOPSY OF DIAPHRAGM	3562	GRAFT REPAIR VENTRIC DEF
3428	DX PROCEDURE THORAX NEC	3563	GRFT REP ENDOCAR CUSHION
3429	DX PROC MEDIASTINUM NEC	3570	HEART SEPTA REPAIR NOS
343	DESTRUCT MEDIASTIN LES	3571	ATRIA SEPTA DEF REP NEC

3572	VENTR SEPTA DEF REP NEC	3762	IMPLANT HRT ASST SYS NEC
3573	ENDOCAR CUSHION REP NEC	3763	REPLACE HRT ASSIST SYST
3581	TOT REPAIR TETRAL FALLOT	3764	REMOVE HEART ASSIST SYS
3582	TOTAL REPAIR OF TAPVC	3765	IMP EXT PUL HRT ASST SYS
3583	TOT REP TRUNCUS ARTERIOS	3766	IMP IMP PUL HRT ASST SYS
3584	TOT COR TRANSPOS GRT VES	3767	IMP CARDIOMYOSTIMUL SYS
3591	INTERAT VEN RETRAN TRANSP	3774	INT OR REPL LEAD EPICAR
3592	CONDUIT RT VENT-PUL ART	3775	REVISION OF LEAD
3593	CONDUIT LEFT VENTR-AORTA	3776	REPL TV ATRI-VENT LEAD
3594	CONDUIT ARTIUM-PULM ART	3777	REMOVAL OF LEAD W/O REPL
3595	HEART REPAIR REVISION	3779	REVIS OR RELOCATE POCKET
3596	PERC HEART VALVULOPLASTY	3780	INT OR REPL PERM PACEMKR
3598	OTHER HEART SEPTA OPS	3785	REPL PACEM W 1-CHAM, NON
3599	OTHER HEART VALVE OPS	3786	REPL PACEM 1-CHAM, RATE
3600	OTHER HEART VALVE OPS	3787	REPL PACEM W DUAL-CHAM
3601	PTCA-1 VES/ATH W/O AGENT	3789	REVISE OR REMOVE PACEMAK
3602	PTCA-1 VES/ATH W AGENT	3791	OPN CHEST CARDIAC MASSAG
3603	OPEN CORONRY ANGIOPLASTY	3794	IMPLT/REPL CARDDEFIB TOT
3605	PTCA-MULTIPLE VESSEL/ATH	3795	IMPLT CARDIODEFIB LEADS
3609	REM OF COR ART OBSTR NEC	3796	IMPLT CARDIODEFIB GENATR
3610	AORTOCORONARY BYPASS NOS	3797	REPL CARDIODEFIB LEADS
3611	AORTOCOR BYPAS-1 COR ART	3798	REPL CARDIODEFIB GENRATR
3612	AORTOCOR BYPAS-2 COR ART	3799	OTHER HEART/PERICARD OPS
3613	AORTOCOR BYPAS-3 COR ART	3800	INCISION OF VESSEL NOS
3614	AORTCOR BYPAS-4+ COR ART	3801	INTRACRAN VESSEL INCIS
3615	1 INT MAM-COR ART BYPASS	3802	HEAD/NECK VES INCIS NEC
3616	2 INT MAM-COR ART BYPASS	3803	UPPER LIMB VESSEL INCIS
3617	ABD-CORON ARTERY BYPASS	3804	INCISION OF AORTA
3619	HRT REVAS BYPS ANAS NEC	3805	THORACIC VESSEL INC NEC
362	ARTERIAL IMPLANT REVASC	3806	ABDOMEN ARTERY INCISION
363	ARTERIAL IMPLANT REVASC	3807	ABDOMINAL VEIN INCISION
3631	OPEN CHEST TRANS REVASC	3808	LOWER LIMB ARTERY INCIS
3632	OTH TRANSMYO REVASCULAR	3809	LOWER LIMB VEIN INCISION
3639	OTH HEART REVASCULAR	3810	ENDARTERECTOMY NOS
3691	CORON VESS ANEURYSM REP	3811	INTRACRAN ENDARTERECTOMY
3699	HEART VESSEL OP NEC	3812	HEAD & NECK ENDARTER NEC
3710	INCISION OF HEART NOS	3813	UPPER LIMB ENDARTERECTOM
3711	CARDIOTOMY	3814	ENDARTERECTOMY OF AORTA
3712	PERICARDIOTOMY	3815	THORACIC ENDARTERECTOMY
3724	PERICARDIAL BIOPSY	3816	ABDOMINAL ENDARTERECTOMY
3731	PERICARDIECTOMY	3818	LOWER LIMB ENDARTERECT
3732	HEART ANEURYSM EXCISION	3821	BLOOD VESSEL BIOPSY
3733	EXC/DEST HRT LESION OPEN	3829	BLOOD VESSEL DX PROC NEC
3734	EXC/DEST HRT LES OTHER	3830	VESSEL RESECT/ANAST NOS
3735	PARTIAL VENTRICULECTOMY	3831	INTRACRAN VES RESEC-ANAS
374	HEART & PERICARD REPAIR	3832	HEAD/NECK VES RESEC-ANAS
375	HEART & PERICARD REPAIR	3833	ARM VESSEL RESECT/ANAST
3751	HEART TRANSPLANTATION (Oct 03)	3834	AORTA RESECTION & ANAST
3752	IMPLANT TOT REP HRT SYS	3835	THOR VESSEL RESECT/ANAST
3753	REPL/REP THORAC UNIT HRT	3836	ABD VESSEL RESECT/ANAST
3754	REPL/REP OTH TOT HRT SYS	3837	ABD VEIN RESECT & ANAST
3761	PULSATION BALLOON IMPLAN	3838	LEG ARTERY RESECT/ANAST

3839	LEG VEIN RESECT/ANASTOM	3932	SUTURE OF VEIN
3840	VESSEL RESECT/REPLAC NOS	3941	POSTOP VASC OP HEM CONTR
3841	INTRACRAN VES RESEC-REPL	3942	REVIS REN DIALYSIS SHUNT
3842	HEAD/NECK VES RESEC-REPL	3943	REMOV REN DIALYSIS SHUNT
3843	ARM VES RESECT W REPLACE	3949	VASC PROC REVISION NEC
3844	RESECT ABDM AORTA W REPL	3950	ANGIO/ATH NON-CORO VES
3845	RESECT THORAC VES W REPL	3951	CLIPPING OF ANEURYSM
3846	ABD ARTERY RESEC W REPLA	3952	ANEURYSM REPAIR NEC
3847	ABD VEIN RESECT W REPLAC	3953	ARTERIOVEN FISTULA REP
3848	LEG ARTERY RESEC W REPLA	3954	RE-ENTRY OPERATION
3849	LEG VEIN RESECT W REPLAC	3955	REIMPLAN ABERR RENAL VES
3850	VARICOSE V LIG-STRIP NOS	3956	REPAIR VESS W TIS PATCH
3851	INTCRAN VAR V LIG-STRIP	3957	REP VESS W SYNTH PATCH
3852	HEAD/NECK VAR V LIG-STR	3958	REPAIR VESS W PATCH NOS
3853	ARM VARICOSE V LIG-STRIP	3959	REPAIR OF VESSEL NEC
3855	THORAC VAR V LIG-STRIP	397	PER CARDIOPULMON BYPASS
3857	ABD VARICOS V LIGA-STRIP	3971	ENDO IMPL GRFT ABD AORTA
3859	LEG VARICOS V LIGA-STRIP	3972	ENDOVASC REPAIR HEAD VES
3860	EXCISION OF VESSEL NOS	3979	ENDO REPAIR OTHER VESSEL
3861	INTRACRAN VESSEL EXCIS	398	VASCULAR BODY OPERATIONS
3862	HEAD/NECK VESSEL EXCIS	3991	FREEING OF VESSEL
3863	ARM VESSEL EXCISION	3992	VEIN INJECT-SCLEROS AGNT
3864	EXCISION OF AORTA	3993	INSERT VES-TO-VES CANNUL
3865	THORACIC VESSEL EXCISION	3994	REPLAC VES-TO-VES CANNUL
3866	ABDOMINAL ARTERY EXCIS	3998	HEMORRHAGE CONTROL NOS
3867	ABDOMINAL VEIN EXCISION	3999	VESSEL OPERATION NEC
3868	LEG ARTERY EXCISION	400	INCIS LYMPHATIC STRUCTUR
3869	LEG VEIN EXCISION	4011	LYMPHATIC STRUCT BIOPSY
387	INTERRUPTION VENA CAVA	4019	LYMPHATIC DIAG PROC NEC
3880	SURG VESSEL OCCLUS NEC	4021	EXCIS DEEP CERVICAL NODE
3881	OCCLUS INTRACRAN VES NEC	4022	EXCISE INT MAMMARY NODE
3882	OCCLUS HEAD/NECK VES NEC	4023	EXCISE AXILLARY NODE
3883	OCCLUDE ARM VESSEL NEC	4024	EXCISE INGUINAL NODE
3884	OCCLUDE AORTA NEC	4029	SIMP EXC LYMPH STRUC NEC
3885	OCCLUDE THORACIC VES NEC	403	REGIONAL LYMPH NODE EXC
3886	OCCLUDE ABD ARTERY NEC	4040	RAD NECK DISSECTION NOS
3887	OCCLUDE ABD VEIN NEC	4041	UNILAT RAD NECK DISSECT
3888	OCCLUDE LEG ARTERY NEC	4042	BILAT RAD NECK DISSECT
3889	OCCLUDE LEG VEIN NEC	4050	RAD NODE DISSECTION NOS
390	SYSTEMIC-PULM ART SHUNT	4051	RAD DISSEC AXILLARY NODE
391	INTRA-ABD VENOUS SHUNT	4052	RAD DISSEC PERIAORT NODE
3921	CAVAL-PULMON ART ANASTOM	4053	RAD DISSECT ILIAC NODES
3922	AORTA-SUBCLV-CAROT BYPAS	4054	RADICAL GROIN DISSECTION
3923	INTRATHORACIC SHUNT NEC	4059	RAD NODE DISSECTION NEC
3924	AORTA-RENAL BYPASS	4061	THORAC DUCT CANNULATION
3925	AORTA-ILIAC-FEMOR BYPASS	4062	THORACIC DUCT FISTULIZAT
3926	INTRA-ABDOMIN SHUNT NEC	4063	CLOSE THORACIC DUCT FIST
3927	DIALYSIS ARTERIOVENOSTOM	4064	LIGATE THORACIC DUCT
3928	EXTRACRAN-INTRACR BYPASS	4069	THORACIC DUCT OP NEC
3929	VASC SHUNT & BYPASS NEC	409	LYMPH STRUCTURE OP NEC
3930	SUTURE OF VESSEL NOS	410	LYMPH STRUCTURE OP NEC
3931	SUTURE OF ARTERY	4100	BONE MARROW TRNSPLNT NOS

4101	AUTO BONE MT W/O PURG	4284	ESOPH FISTULA REPAIR NEC
4102	ALO BONE MARROW TRNSPLNT	4285	ESOPHAG STRICTURE REPAIR
4103	ALLOGRFT BONE MARROW NOS	4286	PROD SUBQ TUNNEL NO ANAS
4104	AUTO HEM STEM CT W/O PUR	4287	ESOPHAGEAL GRAFT NEC
4105	ALLO HEM STEM CT W/O PUR	4289	ESOPHAGEAL REPAIR NEC
4106	CORD BLD STEM CELL TRANS	4291	LIGATION ESOPH VARIX
4107	AUTO HEM STEM CT W PURG	430	GASTROTOMY
4108	ALLO HEM STEM CT W PURG	431	GASTROTOMY
4109	AUTO BONE MT W PURGING	432	OTHER GASTROSTOMY
412	SPLENOTOMY	433	PYLOROMYOTOMY
4133	OPEN SPLEEN BIOPSY	4342	LOCAL GASTR EXCISION NEC
4141	SPLENIC CYST MARSUPIAL	4349	LOCAL GASTR DESTRUCT NEC
4142	EXC SPLENIC LESION/TISS	435	PROXIMAL GASTRECTOMY
4143	PARTIAL SPLENECTOMY	436	DISTAL GASTRECTOMY
415	TOTAL SPLENECTOMY	437	PART GASTREC W JEJ ANAST
4193	EXC OF ACCESSORY SPLEEN	4381	PART GAST W JEJ TRANSPOS
4194	SPLEEN TRANSPLANTATION	4389	PARTIAL GASTRECTOMY NEC
4195	REPAIR OF SPLEEN	4391	TOT GAST W INTES INTERPO
4199	SPLEEN OPERATION NEC	4399	TOTAL GASTRECTOMY NEC
4201	ESOPHAGEAL WEB INCISION	4400	VAGOTOMY NOS
4209	ESOPHAGEAL INCISION NEC	4401	TRUNCAL VAGOTOMY
4210	ESOPHAGOSTOMY NOS	4402	HIGHLY SELECT VAGOTOMY
4211	CERVICAL ESOPHAGOSTOMY	4403	SELECTIVE VAGOTOMY NEC
4212	ESOPH POUCH EXTERIORIZAT	4411	TRANSABDOMIN GASTROSCOPY
4219	EXT FISTULIZAT ESOPH NEC	4415	OPEN GASTRIC BIOPSY
4221	ESOPHAGOSCOPY BY INCIS	442	GASTRIC DIAGNOS PROC NEC
4225	OPEN BIOPSY OF ESOPHAGUS	4421	DILATE PYLORUS, INCISION
4231	LOC EXCIS ESOPH DIVERTIC	4429	OTHER PYLOROPLASTY
4232	LOCAL EXCIS ESOPHAG NEC	4431	HIGH GASTRIC BYPASS
4239	DESTRUCT ESOPHAG LES NEC	4432	PERCU GASTROJEJUNOSTOMY
4240	ESOPHAGECTOMY NOS	4439	GASTROENTEROSTOMY NEC
4241	PARTIAL ESOPHAGECTOMY	4440	SUTURE PEPTIC ULCER NOS
4242	TOTAL ESOPHAGECTOMY	4441	SUT GASTRIC ULCER SITE
4251	THORAC ESOPHAGUESOPHAGOS	4442	SUTURE DUODEN ULCER SITE
4252	THORAC ESOPHAGOGASTROST	445	REVISION GASTRIC ANASTOM
4253	THORAC SM BOWEL INTERPOS	4461	SUTURE GASTRIC LACERAT
4254	THORAC ESOPHAGOENTER NEC	4463	CLOSE GASTRIC FISTUL NEC
4255	THORAC LG BOWEL INTERPOS	4464	GASTROPEXY
4256	THORAC ESOPHAGOCOLOS NEC	4465	ESOPHAGOGASTROPLASTY
4258	THORAC INTERPOSITION NEC	4466	CREAT ESOPHAGASTR SPHINC
4259	THORAC ESOPHAG ANAST NEC	4469	GASTRIC REPAIR NEC
4261	STERN ESOPHAGUESOPHAGOST	4491	LIGATE GASTRIC VARICES
4262	STERN ESOPHAGOGASTROSTOM	4492	INTRAOP GASTRIC MANIPUL
4263	STERN SM BOWEL INTERPOS	4499	GASTRIC OPERATION NEC
4264	STERN ESOPHAGOENTER NEC	4500	INTESTINAL INCISION NOS
4265	STERN LG BOWEL INTERPOS	4501	DUODENAL INCISION
4266	STERN ESOPHAGOCOLOS NEC	4502	SMALL BOWEL INCISION NEC
4268	STERN INTERPOSITION NEC	4503	LARGE BOWEL INCISION
4269	STERN ESOPHAG ANAST NEC	4511	TRANSAB SM BOWEL ENDOSC
427	ESOPHAGOMYOTOMY	4515	OPEN SMALL BOWEL BIOPSY
4282	SUTURE ESOPHAGEAL LACER	4521	TRANSAB LG BOWEL ENDOSC
4283	ESOPHAGOSTOMY CLOSURE	4526	OPEN LARGE BOWEL BIOPSY

4531	OTH EXCISE DUODENUM LES	4673	SMALL BOWEL SUTURE NEC
4532	DESTRUCT DUODEN LES NEC	4674	CLOSE SM BOWEL FIST NEC
4533	LOCAL EXCIS SM BOWEL NEC	4675	SUTURE LG BOWEL LACERAT
4534	DESTR SM BOWEL LES NEC	4676	CLOSE LG BOWEL FISTULA
4541	EXCISE LG INTESTINE LES	4679	REPAIR OF INTESTINE NEC
4549	DESTRUC LG BOWEL LES NEC	4680	INTRA-AB BOWEL MANIP NOS
4550	INTEST SEG ISOLAT NOS	4681	INTRA-ABD SM BOWEL MANIP
4551	SM BOWEL SEGMENT ISOLAT	4682	INTRA-ABD LG BOWEL MANIP
4552	LG BOWEL SEGMENT ISOLAT	4691	MYOTOMY OF SIGMOID COLON
4561	MULT SEG SM BOWEL EXCIS	4692	MYOTOMY OF COLON NEC
4562	PART SM BOWEL RESECT NEC	4693	REVISE SM BOWEL ANASTOM
4563	TOTAL REMOVAL SM BOWEL	4694	REVISE LG BOWEL ANASTOM
4571	MULT SEG LG BOWEL EXCIS	4697	TRANSPLANT OF INTESTINE
4572	CECECTOMY	4699	INTESTINAL OP NEC
4573	RIGHT HEMICOLECTOMY	470	INTESTINAL OP NEC
4574	TRANSVERSE COLON RESECT	4701	LAP APPENDECTOMY
4575	LEFT HEMICOLECTOMY	4709	OTHER APPENDECTOMY
4576	SIGMOIDECTOMY	471	OTHER APPENDECTOMY
4579	PART LG BOWEL EXCIS NEC	4711	LAP INCID APPENDECTOMY
458	TOT INTRA-ABD COLECTOMY	4719	OTHER INCID APPENDECTOMY
4590	INTESTINAL ANASTOM NOS	472	DRAIN APPENDICEAL ABSC
4591	SM-TO-SM BOWEL ANASTOM	4791	APPENDICOSTOMY
4592	SM BOWEL-RECT STUMP ANAS	4792	CLOSE APPENDICEAL FISTUL
4593	SMALL-TO-LARGE BOWEL NEC	4799	APPENDICEAL OPS NEC
4594	LG-TO-LG BOWEL ANASTOM	480	PROCTOTOMY
4595	ANAL ANASTOMOSIS	481	PROCTOSTOMY
4601	SM BOWEL EXTERIORIZATION	4821	TRANSAB PROCTOSIGMOIDOSC
4602	RESECT EXT SEG SM BOWEL	4825	OPEN RECTAL BIOPSY
4603	LG BOWEL EXTERIORIZATION	4835	LOCAL EXCIS RECTAL LES
4604	RESECT EXT SEG LG BOWEL	4841	SOAVE SUBMUC RECT RESECT
4610	COLOSTOMY NOS	4849	PULL-THRU RECT RESEC NEC
4611	TEMPORARY COLOSTOMY	485	ABD-PERINEAL RECT RESECT
4612	TEMPORARY COLOSTOMY	4861	TRANS SAC RECTOSIGMOIDECT
4613	PERMANENT COLOSTOMY	4862	ANT RECT RESECT W COLOST
4620	ILEOSTOMY NOS	4863	ANTERIOR RECT RESECT NEC
4621	TEMPORARY ILEOSTOMY	4864	POSTERIOR RECT RESECTION
4622	CONTINENT ILEOSTOMY	4865	DUHAMEL RECTAL RESECTION
4623	PERMANENT ILEOSTOMY NEC	4866	DUHAMEL RECTAL RESECTION
4640	INTEST STOMA REVIS NOS	4869	RECTAL RESECTION NEC
4641	SM BOWEL STOMA REVISION	4871	SUTURE OF RECTAL LACER
4642	PERICOLOST HERNIA REPAIR	4872	CLOSURE OF PROCTOSTOMY
4643	LG BOWEL STOMA REVIS NEC	4873	CLOSE RECTAL FIST NEC
4650	INTEST STOMA CLOSURE NOS	4874	RECTORECTOSTOMY
4651	SM BOWEL STOMA CLOSURE	4875	ABDOMINAL PROCTOPEXY
4652	LG BOWEL STOMA CLOSURE	4876	PROCTOPEXY NEC
4660	INTESTINAL FIXATION NOS	4879	REPAIR OF RECTUM NEC
4661	SM BOWEL-ABD WALL FIXAT	4881	PERIRECTAL INCISION
4662	SMALL BOWEL FIXATION NEC	4882	PERIRECTAL EXCISION
4663	LG BOWEL-ABD WALL FIXAT	4891	INCIS RECTAL STRICTURE
4664	LARGE BOWEL FIXATION NEC	4892	ANORECTAL MYOMECTOMY
4671	DUODENAL LACERAT SUTURE	4893	REPAIR PERIRECT FISTULA
4672	DUODENAL FISTULA CLOSURE	4899	RECTAL PERIRECT OP NEC

4901	INCIS PERIANAL ABSCESS	5134	GB-TO-STOMACH ANASTOMOS
4902	PERIANAL INCISION NEC	5135	GALLBLADDER ANASTOM NEC
4904	PERIANAL EXCISION NEC	5136	CHOLEDOCHOENTEROSTOMY
4911	ANAL FISTULOTOMY	5137	HEPATIC DUCT-GI ANASTOM
4912	ANAL FISTULECTOMY	5139	BILE DUCT ANASTOMOS NEC
493	ANAL/PERIAN DX PROC NEC	5141	CDE FOR CALCULUS REMOV
4939	OTHER DESTRUC ANUS LES	5142	CDE FOR OBSTRUCTION NEC
4944	HEMORRHOID CRYOTHERAPY	5143	CHOLEDOCHOHEPAT INTUBAT
4945	HEMORRHOID LIGATION	5149	INCIS OBSTR BILE DUC NEC
4946	HEMORRHOIDECTOMY	5151	COMMON DUCT EXPLORATION
4949	HEMORRHOID PROCEDURE NEC	5159	BILE DUCT INCISION NEC
4951	LEFT LAT SPHINCTEROTOMY	5161	EXCIS CYST DUCT REMNANT
4952	POST SPHINCTEROTOMY	5162	EXCIS AMPULLA OF VATER
4959	ANAL SPHINCTEROTOMY NEC	5163	COMMON DUCT EXCIS NEC
496	EXCISION OF ANUS	5169	BILE DUCT EXCISION NEC
4971	SUTURE ANAL LACERATION	5171	SIMPLE SUT-COMMON DUCT
4972	ANAL CERCLAGE	5172	CHOLEDOCHOPLASTY
4973	CLOSURE OF ANAL FISTULA	5179	BILE DUCT REPAIR NEC
4974	GRACILIS MUSC TRANSPLAN	5181	SPHINCTER OF ODDI DILAT
4975	IMPL OR REV ART ANAL SPH	5182	PANCREAT SPHINCTEROTOM
4976	REMOV ART ANAL SPHINCTER	5183	PANCREAT SPHINCTEROPLAS
4979	ANAL SPHINCT REPAIR NEC	5189	SPHINCT OF ODDI OP NEC
4991	INCISION OF ANAL SEPTUM	5191	REPAIR GB LACERATION
4992	INSERT SUBQ ANAL STIMUL	5192	CLOSURE CHOLECYSTOSTOMY
4993	ANAL INCISION NEC	5193	CLOS BILIARY FISTUL NEC
4994	REDUCTION ANAL PROLAPSE	5194	REVIS BILE TRACT ANASTOM
4995	CONTROL ANAL HEMORRHAGE	5195	REMOVE BILE DUCT PROSTH
4999	ANAL OPERATION NEC	5199	BILIARY TRACT OP NEC
500	HEPATOTOMY	5201	CATH DRAIN-PANCREAT CYST
5012	OPEN LIVER BIOPSY	5209	PANCREATOTOMY NEC
5019	HEPATIC DX PROC NEC	5212	OPEN PANCREATIC BIOPSY
5021	MARSUPIALIZAT LIVER LES	5219	PANCREATIC DX PROC NEC
5022	PARTIAL HEPATECTOMY	522	PANCREATIC DX PROC NEC
5029	DESTRUC HEPATIC LES NEC	5222	OTHER DESTRU PANCREA LES
503	HEPATIC LOBECTOMY	523	PANCREAT CYST MARSUPIALI
504	TOTAL HEPATECTOMY	524	INT DRAIN PANCREAT CYST
5051	AUXILIARY LIVER TRANSPL	5251	PROXIMAL PANCREATECTOMY
5059	LIVER TRANSPLANT NEC	5252	DISTAL PANCREATECTOMY
5061	CLOSURE LIVER LACERAT	5253	RAD SUBTOT PANCREATECTOM
5069	LIVER REPAIR NEC	5259	PARTIAL PANCREATECT NEC
5102	TROCAR CHOLECYSTOSTOMY	526	TOTAL PANCREATECTOMY
5103	CHOLECYSTOSTOMY NEC	527	RAD PANCREATICODUODENECT
5104	CHOLECYSTOTOMY NEC	5280	PANCREAT TRANSPLANT NOS
5113	OPEN BILIARY TRACT BX	5281	REIMPLANT PANCREATIC TIS
5119	BILIARY TR DX PROC NEC	5282	PANCREATIC HOMOTRANSPLAN
5121	OTH PART CHOLECYSTECTOMY	5283	PANCREATIC HETEROTRANSPL
5122	CHOLECYSTECTOMY	5291	TRNSPLNT ISLETS LANG NOS
5123	LAPAROSCOPIC CHOLECYSTEC	5292	CANNULATION PANCREA DUC
5124	LAP PART CHOLECYSTECTOMY	5295	PANCREATIC REPAIR NEC
5131	GB-TO-HEPAT DUCT ANAST	5296	PANCREATIC ANASTOMOSIS
5132	GB-TO-INTESTINE ANASTOM	5299	PANCREATIC OPERATION NEC
5133	GB-TO-PANCREAS ANASTOM	5300	UNILAT ING HERN REP NOS

5301	REPAIR DIRECT ING HERNIA	5494	CREAT PERITONEOVAS SHUNT
5302	REPAIR INDIR ING HERNIA	5495	PERITONEAL INCISION
5303	DIR ING HERNIA REP-GRAFT	5501	NEPHROTOMY
5304	IND ING HERNIA REP-GRAFT	5502	NEPHROSTOMY
5305	ING HERNIA REP-GRAFT NOS	5503	PERCU NEPHROSTM W/O FRAG
5310	BILAT ING HERNIA REP NOS	5504	PERCU NEPHROSTMY W FRAG
5311	BILAT DIR ING HERN REP	5511	PYELOTOMY
5312	BILAT IND ING HERN REP	5512	PYELOSTOMY
5313	BIL DIR/IND ING HRN REP	5524	OPEN RENAL BIOPSY
5314	BIL DIR ING HRN REP-GRFT	5529	RENAL DIAGNOST PROC NEC
5315	BIL IND ING HRN REP-GRFT	5531	RENAL LES MARSUPIALIZAT
5316	BIL DIR/IND ING HERN-PRO	5539	LOC DESTR RENAL LES NEC
5317	BIL ING HRN REP-GRFT NOS	554	PARTIAL NEPHRECTOMY
5321	UNIL FEMOR HRN REP-GRFT	5551	NEPHROURETERECTOMY
5329	UNIL FEMOR HERN REP NEC	5552	SOLITARY KIDNEY NEPHRECT
5331	BIL FEM HERN REPAIR-GRFT	5553	REJECTED KIDNEY NEPHRECT
5339	BIL FEM HERN REPAIR NEC	5554	BILATERAL NEPHRECTOMY
5341	UMBIL HERNIA REPAIR-GRFT	5561	RENAL AUTOTRANSPLANT
5349	UMBIL HERNIA REPAIR NEC	5569	KIDNEY TRANSPLANT NEC
5351	INCISIONAL HERNIA REPAIR	557	NEPHROPEXY
5359	ABD WALL HERN REPAIR NEC	5581	SUTURE KIDNEY LACERATION
5361	INCIS HERNIA REPAIR-GRFT	5582	CLOSE NEPHROST & PYELOST
5369	ABD HERN REPAIR-GRFT NEC	5583	CLOSE RENAL FISTULA NEC
537	ABD REPAIR-DIAPHR HERNIA	5584	REDUCE RENAL PEDICL TORS
5380	THOR REP-DIAPH HERN NOS	5585	SYMPHYSIOTOMY
5381	DIAPHRAGMATIC PPLICATION	5586	RENAL ANASTOMOSIS
5382	PARASTERN HERNIA REPAIR	5587	CORRECT URETEROPELV JUNC
539	OTHER HERNIA REPAIR	5589	RENAL REPAIR NEC
540	ABDOMINAL WALL INCISION	5591	RENAL DECAPSULATION
5411	EXPLORATORY LAPAROTOMY	5597	IMPLANT MECHANIC KIDNEY
5412	REOPEN RECENT LAP SITE	5598	REMOV MECHANICAL KIDNEY
5419	LAPAROTOMY NEC	5599	RENAL OPERATION NEC
5421	LAPAROSCOPY	560	TU REMOV URETER OBSTRUCT
5422	ABDOMINAL WALL BIOPSY	561	URETERAL MEATOTOMY
5423	PERITONEAL BIOPSY	562	URETEROTOMY
5429	ABD REGION DX PROC NEC	5634	OPEN URETERAL BIOPSY
543	DESTRUCT ABD WALL LESION	5639	URETERAL DX PROCEDUR NEC
544	DESTRUCT PERITONEAL TISS	5640	URETERECTOMY NOS
545	DESTRUCT PERITONEAL TISS	5641	PARTIAL URETERECTOMY
5451	LAP PERITON ADHESIOLYSIS	5642	TOTAL URETERECTOMY
5459	OTH PERITON ADHESIOLYSIS	5651	FORM CUTAN ILEOURETEROST
5461	RECLOSE POST OP DISRUPT	5652	REVIS CUTAN ILEOURETEROS
5462	DELAYED CLOS ABD WOUND	5661	FORM CUTAN URETEROSTOMY
5463	ABD WALL SUTURE NEC	5662	REVIS CUTAN URETEROS NEC
5464	PERITONEAL SUTURE	5671	URIN DIVERSION TO BOWEL
5471	REPAIR OF GASTROSCHISIS	5672	REVIS URETEROENTEROSTOMY
5472	ABDOMEN WALL REPAIR NEC	5673	NEPHROCYSTANASTOMOSI NOS
5473	PERITONEAL REPAIR NEC	5674	URETERONEOCYSTOSTOMY
5474	OMENTAL REPAIR NEC	5675	TRANSURETEROURETEROSTOMY
5475	MESENTERIC REPAIR NEC	5679	URETERAL ANASTOMOSIS NEC
5492	REMOVE FB FROM PERITON	5681	INTRALUM URETE ADHESIOLY
5493	CREATE CUTANPERITON FIST	5682	SUTURE URETERAL LACERAT

5683	URETEROSTOMY CLOSURE	5892	PERIURETHRAL EXCISION
5684	CLOSE URETER FISTULA NEC	5893	IMPLT ARTF URIN SPHINCT
5685	URETEROPEXY	5899	URETH/PERIURETH OP NEC
5686	REMOVE URETERAL LIGATURE	5900	RETROPERIT DISSECT NOS
5689	REPAIR OF URETER NEC	5901	RETROPERIT DISSECT NOS
5692	IMPLANT URETERAL STIMUL	5902	PERIREN ADHESIO LYS NEC
5693	REPLACE URETERAL STIMUL	5903	LAP LYS PERIREN/URET ADH
5694	REMOVE URETERAL STIMULAT	5909	PERIREN/URETER INCIS NEC
5695	LIGATION OF URETER	5911	OTH LYS PERIVES ADHESIO
5699	URETERAL OPERATION NEC	5912	LAP LYS PERIVESURETH ADH
5712	CYSTOTOMY & ADHESIO LYSIS	5919	PERIVESICAL INCISION NEC
5718	OTHER SUPRAPU CYSTOSTOMY	5921	PERIREN/URETERAL BIOPSY
5719	CYSTOTOMY NEC	5929	PERIREN/URET DX PROC NEC
5721	VESICOSTOMY	593	URETHROVES JUNCT P LICAT
5722	REVISE CLO VESICOSTOMY	594	SUPRAPUBIC SLING OP
5733	CLOS TRANSURETH BLADD BX	595	RETROPUBIC URETH SUSPENS
5734	OPEN BLADDER BIOPSY	596	PARAURETHRAL SUSPENSION
5739	BLADDER DIAGNOS PROC NEC	5971	LEVATOR MUSC SUSPENSION
5741	TU ADHESIO LYSIS BLADDER	5979	URIN INCONTIN REPAIR NEC
5749	TU DESTRUC BLADD LES NEC	5991	PERIREN/VESICLE EXCISION
5751	EXCISION OF URACHUS	5992	PERIREN/VESICLE OP NEC
5759	BLADDER LES DESTRUCT NEC	600	INCISION OF PROSTATE
576	PARTIAL CYSTECTOMY	6012	OPEN PROSTATIC BIOPSY
5771	RADICAL CYSTECTOMY	6014	OPEN SEMINAL VESICLES BX
5779	TOTAL CYSTECTOMY NEC	6015	PERIPROSTATIC BIOPSY
5781	SUTURE BLADDER LACERAT	6018	PROSTATIC DX PROCED NEC
5782	CYSTOSTOMY CLOSURE	6019	SEMIN VES DX PROCED NEC
5783	ENTEROVESICO FIST REPAIR	602	SEMIN VES DX PROCED NEC
5784	VESIC FISTULA REPAIR NEC	6021	TRANSURETH PROSTATECTOMY
5785	CYSTOURETHROPLASTY	6029	OTH TRANSURETH PROSTATEC
5786	BLADDER EXSTROPHY REPAIR	603	SUPRAPUBIC PROSTATECTOMY
5787	BLADDER RECONSTRUCTION	604	RETROPUBIC PROSTATECTOMY
5788	BLADDER ANASTOMOSIS NEC	605	RADICAL PROSTATECTOMY
5789	BLADDER REPAIR NEC	6061	LOS EXCIS PROSTATIC LES
5791	BLADDER SPHINCTEROTOMY	6062	PERINEAL PROSTATECTOMY
5793	CONTROL BLADD HEMORRHAGE	6069	PROSTATECTOMY NEC
5796	IMPLANT BLADDER STIMULAT	6072	SEMINAL VESICLE INCISION
5797	REPLACE BLADDER STIMULAT	6073	SEMINAL VESICLE EXCISION
5798	REMOVE BLADDER STIMULAT	6079	SEMINAL VESICLE OP NEC
5799	BLADDER OPERATION NEC	6081	PERIPROSTATIC INCISION
580	URETHROTOMY	6082	PERIPROSTATIC EXCISION
581	URETHRAL MEATOTOMY	6093	REPAIR OF PROSTATE
5841	SUTURE URETHRAL LACERAT	6094	CONTROL PROSTATE HEMORR
5842	URETHROSTOMY CLOSURE	6095	TRANS BAL DIL PROS URETH
5843	CLOSE URETH FISTULA NEC	6096	TU DESTR PROSTATE BY MT
5844	URETHRAL REANASTOMOSIS	6097	OTH TU DESTR PROS - RT
5845	HYP0-EPISPADIUS REPAIR	6099	PROSTATIC OPERATION NEC
5846	URETH RECONSTRUCTION NEC	612	EXCISION OF HYDROCELE
5847	URETHRAL MEATOPLASTY	6142	SCROTAL FISTULA REPAIR
5849	URETHRAL REPAIR NEC	6149	SCROTUM/TUNIC REPAIR NEC
585	URETH STRICTURE RELEASE	6192	EXCISION TUNICA LES NEC
5891	PERIURETHRAL INCISION	6199	SCROTUM & TUNICA OP NEC

620	INCISION OF TESTES	6512	OVARIAN BIOPSY NEC
6212	OPEN TESTICULAR BIOPSY	6513	LAP BIOPSY OF OVARY
6219	TESTES DX PROCEDURE NEC	6514	OTH LAP DX PROC OVARIES
622	TESTICULAR LES DESTRUCT	6519	OVARIAN DX PROCEDURE NEC
623	UNILATERAL ORCHIECTOMY	6521	OVARIAN CYST MARSUPIALIZ
6241	REMOVE BOTH TESTES	6522	OVARIAN WEDGE RESECTION
6242	REMOVE SOLITARY TESTIS	6523	LAP MARSUP OVARIAN CYST
625	ORCHIOPEXY	6524	LAP WEDGE RESECT OVARY
6261	SUTURE TESTICULAR LACER	6525	OTH LAP LOC EXC DEST OVA
6269	TESTICULAR REPAIR NEC	6529	LOCAL DESTR OVA LES NEC
627	INSERT TESTICULAR PROSTH	653	LOCAL DESTR OVA LES NEC
6299	TESTICULAR OPERATION NEC	6531	LAP UNILAT OOPHORECTOMY
6309	SPERMAT CORD/VAS DX NEC	6539	OTH UNILAT OOPHORECTOMY
631	EXC SPERMATIC VARICOCELE	654	OTH UNILAT OOPHORECTOMY
632	EXCISE EPIDIDYMIS CYST	6541	LAP UNI SALPINGO-OOPHOR
633	EXCISE CORD/EPID LES NEC	6549	OTH UNI SALPINGO-OOPHOR
634	EPIDIDYMECTOMY	6551	OTH REMOVE BOTH OVARIES
6351	SUTURE CORD & EPID LACER	6552	OTH REMOVE REMAIN OVARY
6353	TRANSPLANT SPERMAT CORD	6553	LAP REMOVE BOTH OVARIES
6359	CORD & EPIDID REPAIR NEC	6554	LAP REMOVE REMAIN OVARY
6381	SUTURE VAS & EPIDID LAC	6561	OTH REMOVE OVARIES/TUBES
6382	POSTOP VAS RECONSTRUCT	6562	OTH REMOVE REM OVA/TUBE
6383	EPIDIDYMOVASOSTOMY	6563	LAP REMOVE OVARIES/TUBES
6385	REMOV VAS DEFERENS VALVE	6564	LAP REMOVE REM OVA/TUBE
6389	VAS & EPIDIDY REPAIR NEC	6571	OTH SIMPLE SUTURE OVARY
6392	EPIDIDYMYOTOMY	6572	OTH REIMPLANT OF OVARY
6393	SPERMATIC CORD INCISION	6573	OTH SALPINGO-OOPHOROPLAS
6394	SPERM CORD ADHESIOLYSIS	6574	LAP SIMPLE SUTURE OVARY
6395	INSERT VALVE IN VAS DEF	6575	LAP REIMPLANT OF OVARY
6399	CORD/EPID/VAS OPS NEC	6576	LAP SALPINGO-OOPHOROPLAS
640	CIRCUMCISION	6579	REPAIR OF OVARY NEC
6411	PENILE BIOPSY	658	REPAIR OF OVARY NEC
642	LOCAL EXCIS PENILE LES	6581	LAP ADHESIOLYS OVA/TUBE
643	AMPUTATION OF PENIS	6589	ADHESIOLYSIS OVARY/TUBE
6441	SUTURE PENILE LACERATION	6591	ASPIRATION OF OVARY
6442	RELEASE OF CHORDEE	6592	TRANSPLANTATION OF OVARY
6443	CONSTRUCTION OF PENIS	6593	MANUAL RUPT OVARIAN CYST
6444	RECONSTRUCTION OF PENIS	6594	OVARIAN DENERVATION
6445	REPLANTATION OF PENIS	6595	OVARIAN TORSION RELEASE
6449	PENILE REPAIR NEC	6599	OVARIAN OPERATION NEC
645	SEX TRANSFORMAT OP NEC	660	OVARIAN OPERATION NEC
6492	INCISION OF PENIS	6601	SALPINGOTOMY
6493	DIVISION OF PENILE ADHES	6602	SALPINGOSTOMY
6495	INS NONINFL PENIS PROSTH	6611	FALLOPIAN TUBE BIOPSY
6496	REMOVE INT PENILE PROSTH	6619	FALLOP TUBE DX PROC NEC
6497	INS INFLATE PENIS PROSTH	6621	BILAT ENDOSC CRUSH TUBE
6498	PENILE OPERATION NEC	6622	BILAT ENDOSC DIVIS TUBE
6499	MALE GENITAL OP NEC	6629	BILAT ENDOS OCC TUBE NEC
650	MALE GENITAL OP NEC	6631	BILAT TUBAL CRUSHING NEC
6501	LAPAROSCOPIC OOPHOROTOMY	6632	BILAT TUBAL DIVISION NEC
6509	OTHER OOPHOROTOMY	6639	BILAT TUBAL DESTRUCT NEC
6511	OVARIAN ASPIRAT BIOPSY	664	TOTAL UNILAT SALPINGECT

6651	REMOVE BOTH FALLOP TUBES	688	PELVIC EVISCERATION
6652	REMOVE SOLITARY FAL TUBE	689	HYSTERECTOMY NEC/NOS
6661	DESTROY FALLOP TUBE LES	6901	D & C FOR PREG TERMINAT
6662	REMOV TUBE & ECTOP PREG	6902	D & C POST DELIVERY
6663	BILAT PART SALPINGEC NOS	6909	D & C NEC
6669	PARTIAL SALPINGECTOM NEC	6911	D & C NEC
6671	SIMPL SUTURE FALLOP TUBE	6919	DESTRUC UTER SUPPORT NEC
6672	SALPINGO-OOPHOROSTOMY	6921	INTERPOSIT OP UTERIN LIG
6673	SALPINGO-SALPINGOSTOMY	6922	UTERINE SUSPENSION NEC
6674	SALPINGO-UTEROSTOMY	6923	VAG REPAIR INVERS UTERUS
6679	FALLOP TUBE REPAIR NEC	6929	UTERUS/ADNEXA REPAIR NEC
6692	UNILAT FALLOP TUBE DESTR	693	PARACERV UTERINE DENERV
6693	IMPL FALLOP TUBE PROSTH	6941	SUTURE UTERINE LACERAT
6694	REMOV FALLOP TUBE PROSTH	6942	CLOSURE UTERINE FISTULA
6695	BLOW THERAPEUT INTO TUBE	6949	UTERINE REPAIR NEC
6696	FALLOPIAN TUBE DILATION	6951	ASPIRAT CURET-PREG TERMI
6697	BURY FIMBRIAE IN UTERUS	6952	ASPIRAT CURET-POST DELIV
6699	FALLOPIAN TUBE OP NEC	6995	INCISION OF CERVIX
6711	ENDOCERVICAL BIOPSY	6997	REMOVE PENETRAT CERV FB
6712	CERVICAL BIOPSY NEC	6998	UTERINE SUPPORT OP NEC
6719	CERVICAL DX PROCEDUR NEC	6999	UTERINE OPERATION NEC
672	CONIZATION OF CERVIX	7012	CULDOTOMY
6731	CERVICAL CYST MARSUPIAL	7013	INTRALUM VAG ADHESIOLYS
6732	CERVICAL LES CAUTERIZAT	7014	VAGINOTOMY NEC
6733	CERVICAL LES CRYOTHERAPY	7023	CUL-DE-SAC BIOPSY
6739	CERVICAL LES DESTRUC NEC	7024	VAGINAL BIOPSY
674	AMPUTATION OF CERVIX	7029	VAGIN/CUL-DE-SAC DX NEC
675	AMPUTATION OF CERVIX	7031	HYMENECTOMY
6751	TRANSAB CERCLAGE CERVIX	7032	EXCIS CUL-DE-SAC LESION
6759	OTH REP INT CERVICAL OS	7033	EXCISION VAGINAL LESION
6761	SUTURE CERVICAL LACERAT	704	VAGINAL OBLITERATION
6762	CERVICAL FISTULA REPAIR	7050	CYSTOCEL/RECTOCEL REPAIR
6769	CERVICAL REPAIR NEC	7051	CYSTOCELE REPAIR
680	HYSTEROTOMY	7052	RECTOCELE REPAIR
6813	OPEN UTERINE BIOPSY	7061	VAGINAL CONSTRUCTION
6814	OPEN UTERINE LIGAMENT BX	7062	VAGINAL RECONSTRUCTION
6815	CLOS UTERINE LIGAMENT BX	7071	SUTURE VAGINA LACERATION
6816	CLOSED UTERINE BIOPSY	7072	REPAIR COLOVAGIN FISTULA
6819	UTERUS/ADNEX DX PROC NEC	7073	REPAIR RECTOVAG FISTULA
6821	ENDOMET SYNECHIAE DIVIS	7074	REP VAGINOENT FISTUL NEC
6822	INCISION UTERINE SEPTUM	7075	REPAIR VAG FISTULA NEC
6823	ENDOMETRIAL ABLATION	7076	HYMENORRHAPHY
6829	UTERINE LES DESTRUCT NEC	7077	VAGINAL SUSPENS & FIXAT
683	UTERINE LES DESTRUCT NEC	7079	VAGINAL REPAIR NEC
6831	LAP SCERVIC HYSTERECTOMY	708	VAGINAL VAULT OBLITERAT
6839	OTH SUBTOT ABD HYSTERECT (Oct 03)	7091	VAGINAL OPERATION NEC
684	TOTAL ABD HYSTERECTOMY	7092	CUL-DE-SAC OPERATION NEC
685	TOTAL ABD HYSTERECTOMY	7101	VULVAR ADHESIOLYSIS
6851	LAP AST VAG HYSTERECTOMY	7109	INCIS VULVA/PERINEUM NEC
6859	OTHER VAG HYSTERECTOMY	7111	VULVAR BIOPSY
686	RADICAL ABD HYSTERECTOMY	7119	VULVAR DIAGNOS PROC NEC
687	RADICAL VAG HYSTERECTOMY	7122	INCISE BARTHOLIN"S GLAND

7123	BARTHOLIN GLAND MARSUP	7670	REDUCTION FACIAL FX NOS
7124	DESTRUC BARTHOLIN GLAND	7672	OPN REDUCT MALAR/ZYGO FX
7129	BARTHOLIN'S GLAND OP NEC	7674	OPEN REDUCT MAXILLARY FX
713	LOCAL VULVAR EXCIS NEC	7676	OPEN REDUCT MANDIBLE FX
714	OPERATIONS ON CLITORIS	7677	OPEN REDUCT ALVEOLAR FX
715	RADICAL VULVECTOMY	7679	OPEN REDUCT FACE FX NEC
7161	UNILATERAL VULVECTOMY	7691	BONE GRAFT TO FACE BONE
7162	BILATERAL VULVECTOMY	7692	SYN IMPLANT TO FACE BONE
7171	SUTURE VULVAR LACERATION	7694	OPEN REDUCT TM DISLOCAT
7172	REPAIR VULVAR FISTULA	7697	REMOVE INT FIX FACE BONE
7179	VULVAR/PERIN REPAIR NEC	7699	FACIAL BONE/JNT OP NEC
718	OTHER VULVAR OPERATIONS	7700	SEQUESTRECTOMY NOS
719	OTHER FEMALE GENITAL OPS	7701	CHEST CAGE SEQUESTREC
7394	PUBIOTOMY TO ASSIST DEL	7702	HUMERUS SEQUESTRECTOMY
7399	OPS ASSISTING DELIV NEC	7703	RADIUS & ULNA SEQUESTREC
740	CLASSICAL C-SECTION	7704	METACARP/CARP SEQUESTREC
741	LOW CERVICAL C-SECTION	7705	FEMORAL SEQUESTRECTOMY
742	EXTRAPERITONEAL C-SECT	7706	PATELLAR SEQUESTRECTOMY
743	REM EXTRATUB ECTOP PREG	7707	TIBIA/FIBULA SEQUESTREC
744	CESAREAN SECTION NEC	7708	METATAR/TAR SEQUESTREC
7491	HYSTEROTOMY TO TERMIN PG	7709	SEQUESTRECTOMY NEC
7499	CESAREAN SECTION NOS	7710	OTHER BONE INCISION NOS
7536	CORRECTION FETAL DEFECT	7711	OTHER CHEST CAGE INCIS
7550	REPAIR OB LAC UTERUS NOS	7712	OTHER HUMERUS INCISION
7551	REPAIR OB LACERAT CERVIX	7713	OTHER RADIUS/ULNA INCIS
7552	REPAIR OB LAC CORP UTERI	7714	OTH METACARP/CARP INCIS
7561	REPAIR OB LAC BLAD/URETH	7715	OTHER FEMORAL INCISION
7593	SURG CORR INVERT UTERUS	7716	OTHER PATELLAR INCISION
7599	OBSTETRIC OPERATION NEC	7717	OTHER TIBIA/FIBULA INCIS
7601	FACIAL BONE SEQUESTRECT	7718	OTH METATARS/TARS INCIS
7609	FACIAL BONE INCISION NEC	7719	BONE INCIS W/O DIV NEC
7611	FACIAL BONE BIOPSY	7720	WEDGE OSTEOTOMY NOS
7619	FACIAL BONE DX PROC NEC	7721	CHEST CAGE WEDG OSTEOTOM
762	DESTRUCT FACIAL BONE LES	7722	HUMERUS WEDGE OSTEOTOMY
7631	PARTIAL MANDIBULECTOMY	7723	RADIUS/ULNA WEDG OSTEOTO
7639	PART FACIAL OSTECTOM NEC	7724	METACAR/CAR WEDG OSTEOTO
7641	TOT MANDIBULEC W RECONST	7725	FEMORAL WEDGE OSTEOTOMY
7642	TOTAL MANDIBULECTOMY NEC	7726	PATELLAR WEDGE OSTEOTOMY
7643	MANDIBULAR RECONST NEC	7727	TIBIA/FIBUL WEDG OSTEOT
7644	TOT FACE OSTECT W RECONS	7728	METATAR/TAR WEDG OSTEOT
7645	TOT FACE BONE OSTECT NEC	7729	WEDGE OSTEOTOMY NEC
7646	FACIAL BONE RECONSTR NEC	7730	OTHER BONE DIVISION NOS
765	TEMPOROMAND ARTHROPLASTY	7731	CHEST CAGE BONE DIV NEC
7661	CL OSTEOPLASTY MAND RAMI	7732	HUMERUS DIVISION NEC
7662	OPEN OSTEOPLAS MAND RAMI	7733	RADIUS/ULNA DIVISION NEC
7663	OSTEOPLASTY MANDIBLE BDY	7734	METACAR/CAR DIVISION NEC
7664	MAND ORTHOGNATHIC OP NEC	7735	FEMORAL DIVISION NEC
7665	SEG OSTEOPLASTY MAXILLA	7736	PATELLAR DIVISION NEC
7666	TOT OSTEOPLASTY MAXILLA	7737	TIBIA/FIBULA DIV NEC
7667	REDUCTION GENIOPLASTY	7738	METATAR/TAR DIVISION NEC
7668	AUGMENTATION GENIOPLASTY	7739	BONE DIVISION NEC
7669	FACIAL BONE REPAIR NEC	7740	BONE BIOPSY NOS

7741	CHEST CAGE BONE BIOPSY	7795	TOT OSTECTOMY-FEMUR
7742	HUMERUS BIOPSY	7796	TOTAL PATELLECTOMY
7743	RADIUS & ULNA BIOPSY	7797	TOT OSTECT-TIBIA/FIBULA
7744	METACARPAL/CARPAL BIOPSY	7798	TOT OSTECT-METATARS/TARS
7745	FEMORAL BIOPSY	7799	TOTAL OSTECTOMY NEC
7746	PATELLAR BIOPSY	7800	BONE GRAFT NOS
7747	TIBIA & FIBULA BIOPSY	7801	BONE GRAFT TO CHEST CAGE
7748	METATARSAL/TARSAL BIOPSY	7802	BONE GRAFT TO HUMERUS
7749	BONE BIOPSY NEC	7803	BONE GRAFT-RADIUS/ULNA
7751	BUNIONECT/SFT/OSTEOTOMY	7804	BONE GRFT TO METACAR/CAR
7752	BUNIONECT/SFT/ARTHRODES	7805	BONE GRAFT TO FEMUR
7753	OTH BUNIONECT W SFT CORR	7806	BONE GRAFT TO PATELLA
7754	EXC CORRECT BUNIONETTE	7807	BONE GRAFT-TIBIA/FIBULA
7756	REPAIR OF HAMMER TOE	7808	BONE GRAFT-METATAR/TAR
7757	REPAIR OF CLAW TOE	7809	BONE GRAFT NEC
7758	OTH EXC, FUS, REPAIR TOE	7810	APPLIC EXT FIX DEV NOS
7759	BUNIONECTOMY NEC	7811	APPL EXT FIX-CHEST CAGE
7760	LOC EXC BONE LESION NOS	7812	APPLIC EXT FIX-HUMERUS
7761	EXC CHEST CAGE BONE LES	7813	APPL EXT FIX-RADIUS/ULNA
7762	LOC EXC BONE LES HUMERUS	7814	APPL EXT FIX-METACAR/CAR
7763	LOC EXC LES RADIUS/ULNA	7815	APPLIC EXT FIX DEV-FEMUR
7764	LOC EXC LES METACAR/CAR	7816	APPL EXT FIX DEV-PATELLA
7765	LOC EXC BONE LES FEMUR	7817	APPL EXT FIX-TIB/FIBULA
7766	LOC EXC BONE LES PATELLA	7818	APPL EXT FIX-METATAR/TAR
7767	LOC EXC LES TIBIA/FIBULA	7819	APPLIC EXT FIX DEV NEC
7768	LOC EXC LES METATAR/TAR	7820	LIMB SHORTEN PROC NOS
7769	LOC EXC BONE LESION NEC	7822	LIMB SHORT PROC-HUMERUS
7770	EXCISE BONE FOR GRFT NOS	7823	LIMB SHORTEN-RADIUS/ULNA
7771	EX CHEST CAGE BONE-GFT	7824	LIMB SHORTEN-METACAR/CAR
7772	EXCISE HUMERUS FOR GRAFT	7825	LIMB SHORT PROC-FEMUR
7773	EXCIS RADIUS/ULNA-GRAFT	7827	LIMB SHORTEN-TIB/FIBULA
7774	EXCIS METACAR/CAR-GRAFT	7828	LIMB SHORTEN-METATAR/TAR
7775	EXCISE FEMUR FOR GRAFT	7829	LIMB SHORTEN PROC NEC
7776	EXCISE PATELLA FOR GRAFT	7830	LIMB LENGTHEN PROC NOS
7777	EXCISE TIB/FIB FOR GRAFT	7831	LIMB LENGTHEN PROC NOS
7778	EXCIS METATAR/TAR-GRAFT	7832	LIMB LENGTH PROC-HUMERUS
7779	EXCISE BONE FOR GFT NEC	7833	LIMB LENGTH-RADIUS/ULNA
7780	OTH PART OSTECTOMY NOS	7834	LIMB LENGTH-METACAR/CAR
7781	OTH CHEST CAGE OSTECTOMY	7835	LIMB LENGTH PROC-FEMUR
7782	PARTIAL HUMERECTOMY NEC	7837	LIMB LENGTHEN-TIB/FIBULA
7783	PART OSTECT-RADIUS/ULNA	7838	LIMB LENGTHN-METATAR/TAR
7784	PART OSTECT-METACAR/CAR	7839	LIMB LENGTHEN PROC NEC
7785	PART OSTECTOMY-FEMUR	7840	OTH BONE REPAIR/PLAST OP
7786	PARTIAL PATELLECTOMY	7841	OTH CHEST CAGE REP/PLAST
7787	PART OSTECT-TIBIA/FIBULA	7842	OTH HUMERUS REPAIR/PLAST
7788	PART OSTECT-METATAR/TAR	7843	OTH RAD/ULN REPAIR/PLAST
7789	PARTIAL OSTECTOMY NEC	7844	OTH METAC/CARP REP/PLAST
7790	TOTAL OSTECTOMY NOS	7845	OTH FEMUR REPAIR/PLASTIC
7791	TOT CHEST CAGE OSTECTOMY	7846	OTH PATELLA REPAIR/PLAST
7792	TOTAL OSTECTOMY-HUMERUS	7847	OTH TIB/FIB REPAIR/PLAST
7793	TOT OSTECT-RADIUS/ULNA	7848	OTH META/TAR REPA/PLAST
7794	TOT OSTECT-METACARP/CARP	7849	OTH BONE REPA/PLAST NEC

7850	INT FIX W/O FX REDUC NOS	7912	CL RED-INT FIX RAD/ULNA
7851	INT FIXATION-CHEST CAGE	7913	CL RED-INT FIX METAC/CAR
7852	INT FIXATION-HUMERUS	7914	CLOSE RED-INT FIX FINGER
7853	INT FIXATION-RADIUS/ULNA	7915	CLOSED RED-INT FIX FEMUR
7854	INT FIXATION-METACAR/CAR	7916	CL RED-INT FIX TIB/FIBU
7855	INTERNAL FIXATION-FEMUR	7917	CL RED-INT FIX METAT/TAR
7856	INTERNAL FIX-PATELLA	7918	CLOSE RED-INT FIX TOE FX
7857	INT FIXATION-TIBIA/FIBUL	7919	CL FX REDUC-INT FIX NEC
7858	INT FIXATION-METATAR/TAR	7920	OPEN FX REDUCTION NOS
7859	INT FIX-NO FX REDUCT NEC	7921	OPEN REDUC-HUMERUS FX
7860	REMOVE IMP DEVICE NOS	7922	OPEN REDUC-RADIUS/ULN FX
7861	REMOV IMP DEV-CHEST CAGE	7923	OPEN REDUC-METAC/CAR FX
7862	REMOVE IMPL DEV-HUMERUS	7924	OPEN REDUCTION-FINGER FX
7863	REMOV IMP DEV-RADIUS/ULN	7925	OPEN REDUCTION-FEMUR FX
7864	REMOV IMP DEV-METAC/CARP	7926	OPEN REDUC-TIBIA/FIB FX
7865	REMOVE IMP DEVICE-FEMUR	7927	OPEN REDUC-METAT/TARS FX
7866	REMOV IMP DEVICE-PATELLA	7928	OPEN REDUCTION-TOE FX
7867	REMOV IMP DEV-TIB/FIBULA	7929	OPEN FX REDUCTION NEC
7868	REMOVE IMP DEV-METAT/TAR	7930	OPN FX RED W INT FIX NOS
7869	REMOVE IMPL DEVICE NEC	7931	OPEN RED-INT FIX HUMERUS
7870	OSTEOCLASIS NOS	7932	OP RED-INT FIX RAD/ULNA
7871	OSTEOCLASIS-CHEST CAGE	7933	OP RED-INT FIX METAC/CAR
7872	OSTEOCLASIS-HUMERUS	7934	OPEN RED-INT FIX FINGER
7873	OSTEOCLASIS-RADIUS/ULNA	7935	OPEN REDUC-INT FIX FEMUR
7874	OSTEOCLASIS-METACAR/CAR	7936	OP RED-INT FIX TIB/FIBUL
7875	OSTEOCLASIS-FEMUR	7937	OP RED-INT FIX METAT/TAR
7876	OSTEOCLASIS-PATELLA	7938	OPEN REDUCT-INT FIX TOE
7877	OSTEOCLASIS-TIBIA/FIBULA	7939	OPN FX RED W INT FIX NEC
7878	OSTEOCLASIS-METATAR/TAR	7940	CLS REDUC-SEP EPIPHY NOS
7879	OSTEOCLASIS NEC	7941	CLOSE RED-HUMERUS EPIPHY
7880	OTHER BONE DX PROC NOS	7942	CLS RED-RADIUS/UL EPIPHY
7881	OTH DX PROCED-CHEST CAGE	7945	CLOSE REDUC-FEMUR EPIPHY
7882	OTH DX PROCED-HUMERUS	7946	CLS RED-TIBIA/FIB EPIPHY
7883	OTH DX PROC-RADIUS/ULNA	7949	CLS REDUC-SEP EPIPHY NEC
7884	OTH DX PROC-METACAR/CAR	7950	OPEN RED-SEP EPIPHY NOS
7885	OTH DX PROCED-FEMUR	7951	OPN RED-SEP EPIPHY-HUMER
7886	OTH DX PROCED-PATELLA	7952	OP RED-RADIUS/ULN EPIPHY
7887	OTH DX PROC-TIBIA/FIBULA	7955	OPN RED-SEP EPIPHY-FEMUR
7888	OTH DX PROC-METATAR/TAR	7956	OP RED-TIBIA/FIB EPIPHYS
7889	OTHER BONE DX PROC NEC	7959	OPEN RED-SEP EPIPHY NEC
7890	INSERT BONE STIMUL NOS	7960	OPEN FX SITE DEBRIDE NOS
7891	INSERT BONE STIMUL-CHEST	7961	DEBRID OPEN FX-HUMERUS
7892	INSERT BONE STIM-HUMERUS	7962	DEBRID OPN FX-RADIUS/ULN
7893	INSER BONE STIM-RAD/ULNA	7963	DEBRID OPN FX-METAC/CAR
7894	INSER BONE STIM-META/CAR	7964	DEBRID OPN FX-FINGER
7895	INSERT BONE STIM-FEMUR	7965	DEBRID OPN FX-FEMUR
7896	INSERT BONE STIM-PATELLA	7966	DEBRID OPN FX-TIBIA/FIB
7897	INSER BONE STIM-TIB/FIB	7967	DEBRID OPN FX-METAT/TAR
7898	INSER BONE STIM-META/TAR	7968	DEBRID OPN FX-TOE
7899	INSERT BONE STIMUL NEC	7969	OPEN FX SITE DEBRIDE NEC
7910	CL FX REDUC-INT FIX NOS	7980	OPEN REDUC-DISLOCAT NOS
7911	CLOS RED-INT FIX HUMERUS	7981	OPN REDUC DISLOC-SHOULDR

7982	OPEN REDUC-ELBOW DISLOC	8044	HAND JOINT STRUCT DIVIS
7983	OPEN REDUC-WRIST DISLOC	8045	HIP STRUCTURE DIVISION
7984	OPN REDUC DISLOC-HAND	8046	KNEE STRUCTURE DIVISION
7985	OPEN REDUC-HIP DISLOCAT	8047	ANKLE STRUCTURE DIVISION
7986	OPEN REDUC-KNEE DISLOCAT	8048	FOOT JOINT STRUCT DIVIS
7987	OPEN REDUC-ANKLE DISLOC	8049	JT STRUCTUR DIVISION NEC
7988	OPN REDUC DISLOC-FT/TOE	805	JT STRUCTUR DIVISION NEC
7989	OPEN REDUC-DISLOCAT NEC	8050	EXC/DEST INTVRT DISC NOS
7990	UNSPEC OP BONE INJ NOS	8051	EXCISION INTERVERT DISC
7991	HUMERUS INJURY OP NOS	8059	OTH EXC/DEST INTVRT DISC
7992	RADIUS/ULNA INJ OP NOS	806	EXCIS KNEE SEMILUN CARTL
7993	METACARP/CARP INJ OP NOS	8070	SYNOVECTOMY-SITE NOS
7994	FINGER INJURY OP NOS	8071	SHOULDER SYNOVECTOMY
7995	FEMUR INJURY OP NOS	8072	ELBOW SYNOVECTOMY
7996	TIBIA/FIBULA INJ OP NOS	8073	WRIST SYNOVECTOMY
7997	METATARS/TARS INJ OP NOS	8074	HAND SYNOVECTOMY
7998	TOE INJURY OPERATION NOS	8075	HIP SYNOVECTOMY
7999	UNSPEC OP-BONE INJ NEC	8076	KNEE SYNOVECTOMY
8000	ARTHROT & PROS REMOV NOS	8077	ANKLE SYNOVECTOMY
8001	ARTHROT/PROS REMOV-SHLDR	8078	FOOT SYNOVECTOMY
8002	ARTHROT/PROS REMOV-ELBOW	8079	SYNOVECTOMY-SITE NEC
8003	ARTHROT/PROS REMOV-WRIST	8080	DESTRUCT JOINT LES NOS
8004	ARTHROT/PROS REMOV-HAND	8081	DESTRUC-SHOULDER LES NEC
8005	ARTHROT/PROS REMOV-HIP	8082	DESTRUC-ELBOW LESION NEC
8006	ARTHROT/PROS REMOV-KNEE	8083	DESTRUC-WRIST LESION NEC
8007	ARTHROT/PROS REMOV-ANKLE	8084	DESTRUC-HAND JT LES NEC
8008	ARTHROT/PROS REMOV-FOOT	8085	DESTRUCT-HIP LESION NEC
8009	ARTHROT & PROS REMOV NEC	8086	DESTRUCT-KNEE LESION NEC
8010	OTHER ARTHROTOMY NOS	8087	DESTRUC-ANKLE LESION NEC
8011	OTH ARTHROTOMY-SHOULDER	8088	DESTRUC-FOOT JT LES NEC
8012	OTH ARTHROTOMY-ELBOW	8089	DESTRUCT JOINT LES NEC
8013	OTH ARTHROTOMY-WRIST	8090	EXCISION OF JOINT NOS
8014	OTH ARTHROTOMY-HAND/FNGR	8091	EXCISION OF SHOULDER NEC
8015	OTH ARTHROTOMY-HIP	8092	EXCISION OF ELBOW NEC
8016	OTH ARTHROTOMY-KNEE	8093	EXCISION OF WRIST NEC
8017	OTH ARTHROTOMY-ANKLE	8094	EXCISION HAND JOINT NEC
8018	OTH ARTHROTOMY-FOOT/TOE	8095	EXCISION OF HIP NEC
8019	OTHER ARTHROTOMY NEC	8096	EXCISION OF KNEE NEC
8020	ARTHROSCOPY NOS	8097	EXCISION OF ANKLE NEC
8021	SHOULDER ARTHROSCOPY	8098	EXCISION FOOT JOINT NEC
8022	ELBOW ARTHROSCOPY	8099	EXCISION OF JOINT NEC
8023	WRIST ARTHROSCOPY	8100	SPINAL FUSION NOS
8024	HAND & FINGER ARTHROSCOP	8101	ATLAS-AXIS FUSION
8025	HIP ARTHROSCOPY	8102	OTHER CERVICAL FUS ANT
8026	KNEE ARTHROSCOPY	8103	OTHER CERVICAL FUS POST
8027	ANKLE ARTHROSCOPY	8104	DORSAL/DORSOLUM FUS ANT
8028	FOOT & TOE ARTHROSCOPY	8105	DORSAL/DORSOLUM FUS POST
8029	ARTHROSCOPY NEC	8106	LUMBAR/LUMBOSAC FUS ANT
8040	JT STRUCTUR DIVISION NOS	8107	LUMBAR/LUMBOSAC FUS LAT
8041	SHOULDER STRUCT DIVISION	8108	LUMBAR/LUMBOSAC FUS POST
8042	ELBOW STRUCTURE DIVISION	8109	LUMBAR/LUMBOSAC FUS POST
8043	WRIST STRUCTURE DIVISION	8111	ANKLE FUSION

8112	TRIPLE ARTHRODESIS	8174	ARTHROPLASTY CARPAL WIT
8113	SUBTALAR FUSION	8175	ARTHROPLASTY CARPAL W/O
8114	MIDTARSAL FUSION	8179	OTH REPAIR HAN/FIN/WRIS
8115	TARSOMETATARSAL FUSION	8180	TOTAL SHOULDER REPLACE
8116	METATARSOPHALANGEAL FUS	8181	PARTIAL SHOULDER REPLACE
8117	OTHER FUSION OF FOOT	8182	REP RECUR SHLDER DISLOC
8118	OTHER FUSION OF FOOT	8183	SHOULDER ARTHROPLAST NEC
8120	ARTHRODESIS NOS	8184	TOTAL ELBOW REPLACEMENT
8121	ARTHRODESIS OF HIP	8185	ELBOW ARTHROPLASTY NEC
8122	ARTHRODESIS OF KNEE	8186	ELBOW ARTHROPLASTY NEC
8123	ARTHRODESIS OF SHOULDER	8187	ELBOW ARTHROPLASTY NEC
8124	ARTHRODESIS OF ELBOW	8193	SUTUR CAPSUL/LIGAMEN ARM
8125	CARPORADIAL FUSION	8194	SUTURE CAPSUL/LIG ANK/FT
8126	METACARPOCARPAL FUSION	8195	SUTUR CAPSUL/LIG LEG NEC
8127	METACARPOPHALANGEAL FUS	8196	OTHER REPAIR OF JOINT
8128	INTERPHALANGEAL FUSION	8197	REV JT REPL UPPER EXTREM
8129	ARTHRODESIS NEC	8198	OTHER JOINT DX PROCEDURE
8130	SPINAL REFUSION NOS	8199	JOINT STRUCTURE OP NEC
8131	REFUSION OF ATLAS-AXIS	8201	EXPLOR TEND SHEATH-HAND
8132	REFUSION OF OTH CERV ANT	8202	MYOTOMY OF HAND
8133	REFUS OF OTH CERV POST	8203	BURSOTOMY OF HAND
8134	REFUSION OF DORSAL ANT	8209	INC SOFT TISSUE HAND NEC
8135	REFUSION OF DORSAL POST	8211	TENOTOMY OF HAND
8136	REFUSION OF LUMBAR ANT	8212	FASCIOTOMY OF HAND
8137	REFUSION OF LUMBAR LAT	8219	DIV SOFT TISSUE HAND NEC
8138	REFUSION OF LUMBAR POST	8221	EXC LES TEND SHEATH HAND
8139	REFUSION OF SPINE NEC	8222	EXCISION HAND MUSCLE LES
8140	REPAIR OF HIP, NEC	8229	EXC LES SFT TISS HND NEC
8141	REPAIR OF HIP, NEC	8231	BURSECTOMY OF HAND
8142	FIVE-IN-ONE KNEE REPAIR	8232	EXCIS HAND TEND FOR GRFT
8143	TRIAD KNEE REPAIR	8233	HAND TENONECTOMY NEC
8144	PATELLAR STABILIZATION	8234	EXC HND MUS/FAS FOR GRFT
8145	CRUCIATE LIG REPAIR NEC	8235	HAND FASCIECTOMY NEC
8146	COLLATERL LIG REPAIR NEC	8236	OTHER MYECTOMY OF HAND
8147	OTHER REPAIR OF KNEE	8239	HAND SOFT TISSUE EXC NEC
8148	OTHER REPAIR OF KNEE	8241	SUTURE TENDN SHEATH HAND
8149	OTHER REPAIR OF ANKLE	8242	DELAY SUT FLEX TEND HAND
8151	TOTAL HIP REPLACEMENT	8243	DELAY SUT HAND TEND NEC
8152	PARTIAL HIP REPLACEMENT	8244	SUTUR FLEX TEND HAND NEC
8153	REVISE HIP REPLACEMENT	8245	SUTURE HAND TENDON NEC
8154	TOTAL KNEE REPLACEMENT	8246	SUTURE HAND MUSCLE/FASC
8155	REVISE KNEE REPLACEMENT	8251	HAND TENDON ADVANCEMENT
8156	TOTAL ANKLE REPLACEMENT	8252	HAND TENDON RECESSION
8157	REPL JOINT OF FOOT, TOE	8253	HAND TENDON REATTACHMENT
8159	REV JT REPL LOW EXT NEC	8254	HAND MUSCLE REATTACHMENT
8161	360 SPINAL FUSION	8255	CHNG HND MUS/TEN LNG NEC
8162	FUS/REFUS 2-3 VERTEBRAE	8256	TRANSPLANT HAND TEND NEC
8163	FUS/REFUS 4-8 VERTEBRAE	8257	TRANSPOSIT HAND TEND NEC
8164	FUS/REFUS 9 VERTEBRAE	8258	TRANSPLANT HAND MUSC NEC
8171	ARTHROPLAS METACARP WIT	8259	TRANSPOSIT HAND MUSC NEC
8172	ARTHROPLASTY METACAR W/O	8261	POLLICIZATION OPERATION
8173	TOTAL WRIST REPLACEMENT	8269	THUMB RECONSTRUCTION NEC

8271	HAND TEND PULLEY RECONST	8387	OTHER PLASTIC OPS MUSCLE
8272	PLAST OP HND-MUS/FAS GRF	8388	OTHER PLASTIC OPS TENDON
8279	PLAST OP HAND W GRFT NEC	8389	OTHER PLASTIC OPS FASCIA
8281	TRANSFER OF FINGER	8391	ADHESIOLYSIS MUS/TEN/FAS
8282	REPAIR OF CLEFT HAND	8392	INSERT SKEL MUSC STIMULA
8283	REPAIR OF MACRODACTYLY	8393	REMOV SKEL MUSC STIMULAT
8284	REPAIR OF MALLET FINGER	8399	MUS/TEN/FAS/BUR OP NEC
8285	OTHER TENODESIS OF HAND	8400	UPPER LIMB AMPUTAT NOS
8286	OTHER TENOPLASTY OF HAND	8401	FINGER AMPUTATION
8289	HAND PLASTIC OP NEC	8402	THUMB AMPUTATION
8291	LYSIS OF HAND ADHESIONS	8403	AMPUTATION THROUGH HAND
8299	HAND MUS/TEN/FAS/OPS NEC	8404	DISARTICULATION OF WRIST
8301	TENDON SHEATH EXPLORAT	8405	AMPUTATION THRU FOREARM
8302	MYOTOMY	8406	DISARTICULATION OF ELBOW
8303	BURSOTOMY	8407	AMPUTATION THRU HUMERUS
8309	SOFT TISSUE INCISION NEC	8408	SHOULDER DISARTICULATION
8311	ACHILLOTENOTOMY	8409	FOREQUARTER AMPUTATION
8312	ADDUCTOR TENOTOMY OF HIP	8410	LOWER LIMB AMPUTAT NOS
8313	OTHER TENOTOMY	8411	TOE AMPUTATION
8314	FASCIOTOMY	8412	AMPUTATION THROUGH FOOT
8319	SOFT TISSUE DIVISION NEC	8413	DISARTICULATION OF ANKLE
8321	SOFT TISSUE BIOPSY	8414	AMPUTAT THROUGH MALLEOLI
8329	SOFT TISSUE DX PROC NEC	8415	BELOW KNEE AMPUTAT NEC
8331	EXCIS LES TENDON SHEATH	8416	DISARTICULATION OF KNEE
8332	EXCIS LESION OF MUSCLE	8417	ABOVE KNEE AMPUTATION
8339	EXC LES SOFT TISSUE NEC	8418	DISARTICULATION OF HIP
8341	TENDON EXCISION FOR GRFT	8419	HINDQUARTER AMPUTATION
8342	OTHER TENONECTOMY	8421	THUMB REATTACHMENT
8343	MUSC/FASC EXCIS FOR GRFT	8422	FINGER REATTACHMENT
8344	OTHER FASCIECTOMY	8423	FOREARM/WRIST/HAND REATT
8345	OTHER MYECTOMY	8424	UPPER ARM REATTACHMENT
8349	OTHER SOFT TISSUE EXCIS	8425	TOE REATTACHMENT
835	BURSECTOMY	8426	FOOT REATTACHMENT
8361	TENDON SHEATH SUTURE	8427	LOWER LEG/ANKLE REATTACH
8362	DELAYED TENDON SUTURE	8428	THIGH REATTACHMENT
8363	ROTATOR CUFF REPAIR	8429	REATTACHMENT NEC
8364	OTHER SUTURE OF TENDON	843	AMPUTATION STUMP REVIS
8365	OTHER MUSCLE/FASC SUTURE	8440	IMPLNT/FIT PROS LIMB NOS
8371	TENDON ADVANCEMENT	8444	IMPLANT ARM PROSTHESIS
8372	TENDON RECESSION	8448	IMPLANT LEG PROSTHESIS
8373	TENDON REATTACHMENT	8491	AMPUTATION NOS
8374	MUSCLE REATTACHMENT	8492	SEPARAT EQUAL JOIN TWIN
8375	TENDON TRNSFR/TRANSPLANT	8493	SEPARAT UNEQUL JOIN TWIN
8376	OTHER TENDON TRANSPOSIT	8499	MUSCULOSKELETAL OP NEC
8377	MUSCLE TRNSFR/TRANSPLANT	8512	OPEN BREAST BIOPSY
8379	OTHER MUSCLE TRANSPOSIT	8520	BREAST TISSU DESTRUC NOS
8381	TENDON GRAFT	8521	LOCAL EXCIS BREAST LES
8382	MUSCLE OR FASCIA GRAFT	8522	QUADRANT RESECT BREAST
8383	TENDON PULLEY RECONSTRUC	8523	SUBTOTAL MASTECTOMY
8384	CLUBFOOT RELEASE NEC	8524	EXC ECTOPIC BREAST TISSU
8385	MUSC/TEND LNG CHANGE NEC	8525	EXCISION OF NIPPLE
8386	QUADRICEPSPLASTY	8531	UNILAT REDUCT MAMMOPLAST

8532	BILAT REDUCT MAMMOPLASTY	8621	EXCISION OF PILONID CYST
8533	UNIL SUBQ MAMMECT-IMPLNT	8622	EXC WOUND DEBRIDEMENT
8534	UNILAT SUBQ MAMMECT NEC	8625	DERMABRASION
8535	BIL SUBQ MAMMECT-IMPLANT	864	RADICAL EXCIS SKIN LES
8536	BILAT SUBQ MAMMECTOM NEC	8660	FREE SKIN GRAFT NOS
8541	UNILAT SIMPLE MASTECTOMY	8661	FULL-THICK HAND SKIN GRF
8542	BILAT SIMPLE MASTECTOMY	8662	HAND SKIN GRAFT NEC
8543	UNILAT EXTEN SIMP MASTEC	8663	FULL-THICK SKIN GRFT NEC
8544	BILAT EXTEND SIMP MASTEC	8665	HETEROGRAFT TO SKIN
8545	UNILAT RADICAL MASTECTOM	8666	HOMOGRAFT TO SKIN
8546	BILAT RADICAL MASTECTOMY	8667	DERMAL REGENER GRAFT
8547	UNIL EXT RAD MASTECTOMY	8669	FREE SKIN GRAFT NEC
8548	BIL EXTEN RAD MASTECTOMY	8670	PEDICLE GRAFT/FLAP NOS
8550	AUGMENT MAMMOPLASTY NOS	8671	CUT & PREP PEDICLE GRAFT
8553	UNILAT BREAST IMPLANT	8672	PEDICLE GRAFT ADVANCEMEN
8554	BILATERAL BREAST IMPLANT	8673	ATTACH PEDICLE TO HAND
856	MASTOPEXY	8674	ATTACH PEDICLE GRAFT NEC
857	TOTAL BREAST RECONSTRUCT	8675	REVISION OF PEDICLE GRFT
8582	BREAST SPLIT-THICK GRAFT	8681	REPAIR FACIAL WEAKNESS
8583	BREAST FULL-THICK GRAFT	8682	FACIAL RHYTIDECTOMY
8584	BREAST PEDICLE GRAFT	8683	SIZE REDUCT PLASTIC OP
8585	BREAST MUSCLE FLAP GRAFT	8684	RELAXATION OF SCAR
8586	TRANSPOSITION OF NIPPLE	8685	SYNDACTYLY CORRECTION
8587	NIPPLE REPAIR NEC	8686	ONYCHOPLASTY
8589	MAMMOPLASTY NEC	8689	SKIN REPAIR & PLASTY NEC
8593	BREAST IMPLANT REVISION	8691	SKIN EXCISION FOR GRAFT
8594	BREAST IMPLANT REMOVAL	8693	INSERT TISSUE EXPANDER
8595	INSER BREAST TISSU EXPAN	8753	INTRAOPER CHOLANGIOGRAM
8596	REMOV BREAST TISSU EXPAN	9504	ANESTHETIZED EYE EXAM
8599	BREAST OPERATION NEC		
8606	INSERT INFUSION PUMP		

## Appendix D: Log of Revisions to PSI Documentation and Software Version 2.1, Revision 2

The following table summarizes the revisions made to the PSI software, software documentation and the Guide to Patient Safety Indicators (Guide) document in release version 2.1, revision 2. The table lists the component(s) affected by the change and a short summary of the changes that were made.

Component	Changes
Guide	<ol style="list-style-type: none"> <li>1. Modified documentation to reflect changes in indicators associated with ICD-9-CM coding updates for FY 2004 (effective 10-1-2003). See separate documentation for specific details.<sup>140</sup></li> <li>2. Changed syntax of "hospital-level" to "provider-level" throughout the documentation.</li> <li>3. Added PSI number to each Indicator name.</li> <li>4. Updated empirical results for Table 1, and limited contents to Provider-level PSIs.</li> <li>5. Added Table 2, listing Area-level PSIs.</li> <li>6. Added caption for Table 3, Indicators and Use of External Cause-of-Injury Codes.</li> <li>7. Modified PSI #2 (death in low mortality DRGs). The indicator is reported as a single measure, but also stratified by type of DRG: adult medical, pediatric medical, adult surgical (with OR procedure), adult surgical (without OR procedure), pediatric surgical (with OR procedure), pediatric surgical (without OR procedure), obstetric and psychiatric. A list of low mortality DRGs by type is included PSI Guide.  Impact: Among the low mortality DRGs, about 25% of the discharges and 60% of the deaths are "adult medical" DRGs. Psychiatric DRGs also have a higher share of deaths (10%) than discharges (6%). Death among the other DRG types is very rare (0.1% or less). Few low mortality surgical DRGs do not have an operating room procedure, so the adult or pediatric surgical DRG (without OR procedure) will generally be missing or zero for most hospitals. Modified PSI #2, Death in Low-mortality DRG, to split the adult and pediatric surgical strata into separate strata for cases with operating room procedures and cases without operating room procedures.</li> <li>8. Modified PSI #14, Postoperative Wound Dehiscence, to include only OR procedures in the definition of abdominopelvic surgery.  Impact: Small (less than 1%) decrease in the denominator and resulting small increase in the rate due to exclusion of a low-risk procedure.</li> <li>9. Modified PSI #17, Birth Trauma, to exclude preterm infants with subdural or cerebral hemorrhage or osteogenesis imperfecta infants with injury to skeleton from the numerator only. NOTE: The infants remain in the population at risk for other types of birth trauma.</li> </ol>

<sup>140</sup> Updates to Version 2.1, Revision 2 – ICD-9-CM Coding Updates," [http://www.qualityindicators.ahrq.gov/psi\\_download.htm](http://www.qualityindicators.ahrq.gov/psi_download.htm)

Component	Changes
	<p>Impact: Small (less than 1%) increase in the denominator and resulting small decrease or no impact in the rate (i.e. the risk of other types of birth trauma for these two populations is less than or no different than for other births).</p> <p>10. Added three new Indicators #27-29, to include third-degree lacerations for each of three types of delivery: Vaginal with and without instruments, and Cesarean.</p> <p>Impact: The rate for OB Trauma is generally 5-10% higher when including 3<sup>rd</sup> degree lacerations</p> <p>11. Limited the surgical DRG inclusion criteria to major OR procedures for PSI #1, 8-13, all of which deal with postoperative illness or injury.</p> <p>Impact: Medium (1-4%) decrease in the denominator. The impact on the rate varies by indicator. PSIs 1, 8 and 9 have a medium (1-3%) increase in the rate. PSIs 10 and 12 have a small (less than 1%) decrease in the rate. PSIs 11 and 13 have a medium (3-4%) decrease in the rate.</p> <p>12. Modified PSIs #1, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 15, 16 to exclude discharges with a PSI-defining secondary diagnosis and a different PSI-defining principal diagnosis (but within the same PSI definition).</p> <p>Impact: Small (less than 1%) decrease in the denominator. The impact on the rate varies by indicator. PSIs 1, 3, 6, 7, 8, 10, 11, 13 and 16 have a small (less than 1%) increase in the rate. PSI 9 has a small (less than 1%) decrease in the rate. PSI 15 has a medium (2-3%) decrease in the rate. PSIs 5 and 12 have a large (5-9%) decrease in the rate.</p> <p>13. Modified PSIs #8, 9, 11, 12 to exclude discharges where the only OR procedure is a PSI-related procedure.</p> <p>Impact: Small (less than 1%) decrease in the denominator. The impact on the rate varies by indicator. PSI 11 has a small (less than 1%) decrease in the rate. PSI 9 has a medium (1-2%) decrease in the rate. PSIs 8 and 12 have a large (15-65%) decrease in the rate.</p> <p>14. Modified PSIs #8, 9, 11, 12, 14 to exclude discharges where a PSI-related procedure precedes the denominator-defining OR procedure.</p> <p>Impact: Small (less than 1%) decrease in the denominator. The impact on the rate varies by indicator. PSI 9 has a large (65-70%) increase in the rate. PSIs 11 and 12 have a small (less than 1%) decrease in the rate. PSI 8 has a medium (3-4%) decrease in the rate. PSI 14 has a large (8-9%) decrease in the rate.</p> <p>15. Modified Area level PSI #24, Postoperative Wound Dehiscence, to drop the requirement that the wound reclosure occurs in a discharge with a procedure code of abdominopelvic surgery.</p> <p>Impact: Numerator increases by about 40%.</p> <p>16. Added code 72.79 to the definition of instrument-assisted delivery in PSI #18, 19.</p> <p>Impact: Transfers about 33% of the denominator from PSI 19 to PSI 18. Because the OB Trauma rate for these cases is higher than average for PSI 19 and lower</p>

Component	Changes
	than average for PSI 18, and because the OB Trauma rate for PSI 19 is lower than PSI 18, the rate for both indicators decreases by 3-10%.
Software (SAS and SPSS)	<ol style="list-style-type: none"> <li>1. Implemented syntax changes associated with ICD-9-CM coding updates from FY 2004 (effective 10-1-2003). See separate documentation on ICD-9 coding updates for specific details.</li> <li>2. Implemented all syntax changes required to implement the indicator modifications (noted above under Guide) and incorporated the related documentation in the Software manuals.</li> <li>3. Modified the age, DRG and co morbidity aggregations used in the risk-adjustment to reflect the new rates and to group the DRGs by MDC (including an MDC-specific other category).</li> <li>4. Added the calculation and reporting of the expected rate at the stratification level selected by the user. The SAS (PSSASP3.SAS) and SPSS (PSSPSP3.SPS) software now calculates the risk-adjusted rate, the expected rate and the smoothed rate. The rates are saved in the output file. The user also has the option to print the rates or save the rates in a comma-delimited ASCII file.</li> </ol>
Software (SAS)	<ol style="list-style-type: none"> <li>1. Inserted "PS" in format names for age, sex, DRG and co morbidity aggregations in SAS programs to distinguish these formats from similarly named formats used by other indicator software.</li> </ol>

## Appendix E: ICD-9-CM and DRG Coding Updates in PSI Release Version 2.1, Revision 2

The following changes were implemented in version 2.1, revision 2 of the Patient Safety Indicator PSI software code (both SAS and SPSS) and reflect changes to indicator definitions based on updates to ICD-9-CM and DRG codes for Fiscal Year 2004 (effective 10-1-2003). All changes noted below have been incorporated into the software syntax, software documentation and the Guide to Patient Safety Indicators. With this software update, the PSI software definitions now incorporate ICD-9-CM codes valid from October 1, 1994 through September 30, 2004.

<b>Indicator Name (#)</b>	<b>Component</b>	<b>Change</b>
Failure to Rescue (PSI #4)	Denominator (exclusion, viral pneumonia)	Added new (FY 2004) code 480.3 "Pneumonia due to SARS-associated coronavirus" to the viral pneumonia exclusion criteria (for FTR - pneumonia)  Expected impact on rate: negligible
Failure to Rescue (PSI #4)	Denominator (inclusion, shock or cardiac arrest)	Added new (FY 2004) code 785.52, "Septic shock" to the denominator inclusion criteria (for FTR - shock or cardiac arrest)  Expected impact on rate: negligible
Iatrogenic Pneumothorax (PSI #6)	Denominator (exclusion, cardiac surgery)	Added new (FY 2003) DRG code 525 "Heart assist system implant" to the cardiac surgery exclusion criteria.  Expected impact on rate: negligible
Postoperative Wound Dehiscence (PSI #14)	Denominator (inclusion, abdominopelvic surgery)	Added new (FY 2004) code 68.39 "Other subtotal abdominal hysterectomy, NOS" to denominator inclusion criteria for abdominopelvic surgery.  Expected impact on rate: negligible
Birth Trauma (PSI #17)	Numerator (inclusion, birth trauma)	Added new (FY 2004) code 767.11 "Epicranial subaponeurotic hemorrhage (massive)" to numerator inclusion criteria for birth trauma.  Expected impact on rate: may increase slightly
Birth Trauma (PSI #17)	Denominator (inclusion, liveborn)	Added new (FY 2004) codes 767.11 "Epicranial subaponeurotic hemorrhage (massive)" and 767.19 "Other injuries to scalp" and new categories 766.2x, Disorders relating to long gestation and high birth weight; 770.8x, Other respiratory conditions of fetus and newborn (FY 2003); 771.8x, Infections specific to the perinatal period (FY 2003); 772.1x, Fetal and neonatal hemorrhage (FY 2002); and 779.8x, Other and ill-defined conditions originating in the perinatal period (FY 2003).  Expected impact on rate: negligible
Multiple Indicators	Shock exclusion	Added new (FY 2004) code 785.52, "Septic shock" to the Shock exclusion criteria for the applicable PSIs  Expected impact on rate: negligible

<b>Indicator Name (#)</b>	<b>Component</b>	<b>Change</b>
Multiple Indicators	Trauma exclusion	Added new (FY 2004) codes 850.11 "Concussion-brief coma < 31 minutes" and 850.12 "Concussion - brief coma 31-59 minutes" to the Trauma exclusion criteria for the applicable PSIs  Expected impact on rate: negligible
Multiple Indicators	Immunocompromised state exclusion	Added new (FY 2004) code 37.51, "Heart transplantation" to the immunocompromised state exclusion criteria for the applicable PSIs  Expected impact on rate: negligible
Multiple Indicators	Surgical discharges denominator inclusion	Added new (FY 2004) DRG codes 528-540 to the surgical discharges inclusion criteria for the applicable PSIs.  Expected impact on rate: negligible; may decrease rates on FY04 data from Revision 1
Multiple Indicators	Cancer discharges denominator exclusion	Added new (FY 2004) DRG codes 539-540, Lymphoma & leukemia with major operating room procedure with and without complications, respectively, to the cancer exclusion criteria for the applicable PSIs.  Expected impact on rate: negligible