



# HEALTHGRADES®

## Emergency Medicine Excellence Award™

### Methodology 2012

### (2008-2010 MedPAR Data)

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Millions of Americans are admitted through the emergency department each year. For these patients, timely diagnosis and appropriate initial treatment can mean the difference between surviving the hospitalization or not. Having access to information about a hospital's performance in emergency medicine can help individuals prepare in advance for those emergent situations.

To help consumers evaluate and compare hospital performance in emergency medicine, HealthGrades analyzed mortality data for virtually every hospital in the country and identified the top-performing hospitals for emergency medicine. These hospitals were designated as Emergency Medicine Excellence Award™ recipients. Of the nation's 4,783 short-term acute care hospitals, 263 hospitals had risk-adjusted mortality rates low enough to qualify them as recipients of the HealthGrades Emergency Medicine Excellence Award. A list of award recipients is available at [www.HealthGrades.com](http://www.HealthGrades.com).

The Emergency Medicine Excellence Award was based on HealthGrades risk-adjustment methodology applied to patients admitted to the hospital through the emergency department for the 12 diagnoses described below.

#### Data Acquisition

HealthGrades used Medicare inpatient data from the MedPAR database (purchased from the Centers for Medicare and Medicaid Services) for years 2008 through 2010.

## Emergency Medicine Excellence Award Methodology

HealthGrades analyzed patients admitted through the emergency department for the following 12 diagnoses (cohorts) for each hospital:

- Bowel Obstruction
- Chronic Obstructive Pulmonary Disease
- Diabetic Acidosis and Coma
- Gastrointestinal Bleed
- Heart Attack
- Heart Failure
- Pancreatitis
- Pneumonia
- Pulmonary Embolism
- Respiratory Failure
- Sepsis
- Stroke

Emergency department admissions were identified in the MedPAR data by an Admission Source of 7 or by emergency room charges of \$250 or greater.

To receive a rating (z-score) in a cohort, a hospital must have a minimum of 30 cases over the three years of study and at least five cases in the most recent year of analysis (2010). To be eligible for the Emergency Medicine Excellence Award, a hospital must have a rating in a minimum of nine of the 12 cohorts.

## HealthGrades Risk-adjustment Methodology

HealthGrades risk-adjustment methodology considers important differences in patient demographic and clinical characteristics. This methodology defines risk factors as those clinical and demographic variables that influence patient outcomes in significant and systematic ways. Risk factors may include age, procedures, and comorbid conditions such as hypertension, chronic renal failure, congestive heart failure, and diabetes. These risk factors are incorporated into multivariate logistic regression models to carry out the risk adjustment.

1. For each patient cohort, HealthGrades developed a list of specific diagnoses to be included in the cohort (*Appendix B*). Outcomes were binary, with patients recorded as either alive or expired.
2. A list of potential diagnosis risk factors was then developed.
  - HealthGrades identified all diagnoses occurring in more than 0.5 percent of the patients.
  - Some diagnosis or procedure codes were merged together (e.g., primary and secondary pulmonary hypertension) to minimize the impact of coding differences.
3. HealthGrades used logistic regression to determine, in addition to age and gender, which of these comorbid conditions were actually correlated with mortality and to what extent. A potential risk factor stayed in the model if it had a positive odds ratio (> 1.0) and was also statistically significant in explaining variation. (A list of the top 5 risk factors by cohort and by procedure or diagnosis can be found in *Appendix C*.)

Potential risk factors with odds ratios less than one were removed from the model except in a few cases where there was research to support it.

4. The statistical models were checked for validity and finalized. All of the models were highly significant, with  $p$  values greater than 0.0001. These cohort specific models were then used to estimate the predicted probability of death for each patient in the cohort.

## Determining Emergency Medicine Excellence Award Recipients

Emergency Medicine Excellence Award recipients were determined using the following process:

1. For each hospital and cohort, the observed and predicted numbers of in-hospital deaths were summed for patients admitted through the emergency department, and a z-score was calculated.
2. For each eligible hospital, the straight average of their cohort z-scores was calculated.
3. The eligible hospitals were then rank ordered by their average z-score and 268 had risk-adjusted mortality rates low enough to qualify them as recipients of the HealthGrades Emergency Medicine Excellence Award.

Of the nation's 4,783 short-term, acute-care hospitals considered, 2,191 hospitals were eligible for an award, and 263 had risk-adjusted mortality rates low enough to qualify them as HealthGrades Emergency Medicine Excellence Award recipients.

## Limitations of the Data Models

It must be understood that while these models may be valuable in identifying hospitals that perform better than others, one should not use this information alone to determine the quality of care provided at each hospital. The models are limited by the following factors:

- Cases may have been coded incorrectly or incompletely by the hospital.
- The models can only account for risk factors that are coded into the billing data—if a particular risk factor was not coded into the billing data, such as a patient's socioeconomic status and health behavior, then it was not accounted for with these models.
- Although Health Grades, Inc. has taken steps to carefully compile these data using its methodology, no techniques are infallible, and therefore some information may be missing, outdated or incorrect.

Please note that a high ranking for a particular hospital is not a recommendation or endorsement by Health Grades, Inc. of a particular hospital; it means that the data associated with a particular hospital has met the foregoing qualifications. Only individual patients can decide whether a particular hospital is suited for their unique needs.

Also note that if more than one hospital reported to CMS under a single provider ID, HealthGrades analyzed patient outcomes data for those hospitals as a single unit. Throughout this document, therefore, "hospital" refers to one hospital or a group of hospitals reporting under a single provider ID.

## Appendix A. Patient Cohort Definitions

Excluded from each cohort were patients who have had any organ transplant or a complication thereof.

### Cardiac Service Line

Cohort	Inclusions	Exclusions
Heart Attack Principal Diagnosis	<ul style="list-style-type: none"> <li>• Anterior, inferior, posterior, lateral, RV infarcts                             <ul style="list-style-type: none"> <li>• ST elevation</li> <li>• Non ST elevation</li> <li>• Not otherwise specified</li> </ul> </li> <li>• Includes patients who receive thrombolytics, PCI, CABG, or medical management only</li> </ul>	<ul style="list-style-type: none"> <li>• Metastatic cancers</li> <li>• Palliative care patients (V66.7)</li> <li>• Respirator dependent status (V46.11)</li> <li>• Left ventricular assist device (V43.21)</li> <li>• Discharge to hospice</li> </ul>
Heart Failure Principal Diagnosis	<ul style="list-style-type: none"> <li>• Systolic or diastolic, combined, left, valvular, acute or chronic, decompensated or compensated</li> </ul>	<ul style="list-style-type: none"> <li>• Dialysis in this stay (39.95)</li> <li>• Metastatic cancers</li> <li>• Palliative care patients (V66.7)</li> <li>• Respirator dependent status (V46.11)</li> <li>• Left ventricular assist device (V43.21)</li> <li>• Discharge to hospice</li> </ul>

**Critical Care Service Line**

Excluded from each cohort were patients who have had any organ transplant or a complication thereof.

Cohort	Inclusions	Exclusions
<b>Diabetic Acidosis and Coma</b> Principal Diagnosis	<ul style="list-style-type: none"> <li>• With coma</li> <li>• Hypoglycemic shock</li> </ul>	<ul style="list-style-type: none"> <li>• Metastatic cancers</li> <li>• Palliative care patients (V66.7)</li> <li>• Left ventricular assist device (V43.21)</li> <li>• Respirator dependent status (V46.11)</li> <li>• Patients discharged alive with a length of stay &lt; 1 day</li> </ul>
<b>Pulmonary Embolism</b> Principal Diagnosis	<ul style="list-style-type: none"> <li>• Pulmonary embolism and infarction</li> <li>• Iatrogenic</li> </ul>	<ul style="list-style-type: none"> <li>• Metastatic cancers</li> <li>• Palliative care patients (V66.7)</li> <li>• Left ventricular assist device (V43.21)</li> <li>• Patients discharged alive with a length of stay &lt; 1 day</li> <li>• Discharge to hospice</li> <li>•</li> </ul>
<b>Respiratory Failure</b> Principal Diagnosis	<ul style="list-style-type: none"> <li>• Acute respiratory failure</li> <li>• Acute on chronic respiratory failure</li> </ul>	<ul style="list-style-type: none"> <li>• Metastatic cancers</li> <li>• Palliative care patients (V66.7)</li> <li>• Left ventricular assist device (V43.21)</li> <li>• Discharge to hospice</li> </ul>
<b>Sepsis</b> Principal Diagnosis	<ul style="list-style-type: none"> <li>• Salmonella septicemia</li> <li>• Listeriosis</li> <li>• Meningococemia</li> <li>• Streptococcal septicemia</li> <li>• Staphylococcal septicemia</li> <li>• Staphylococcus aureus</li> <li>• Pneumococcal septicemia</li> <li>• Septicemia due to anaerobes</li> <li>• Gram-negative organisms</li> <li>• Hemophilus influenzae</li> <li>• Escherichia coli</li> <li>• Pseudomonas</li> <li>• Serratia</li> <li>• Unspecified organism</li> <li>• Herpetic septicemia</li> <li>• Septic shock</li> <li>• SIRS</li> </ul>	<ul style="list-style-type: none"> <li>• Metastatic cancers</li> <li>• Palliative care patients (V66.7)</li> <li>• Left ventricular assist device (V43.21)</li> <li>• Patients discharged alive with a length of stay &lt; 1 day</li> <li>• Discharge to hospice</li> </ul>

### Gastrointestinal Service Line

Excluded from each cohort were patients who have had any organ transplant or a complication thereof.

Cohort	Inclusions	Exclusions
<b>Bowel Obstruction</b> Principal Diagnosis	<ul style="list-style-type: none"> <li>• Duodenal ulcer with obstruction</li> <li>• Gastrojejunal ulcer with obstruction</li> <li>• Pyloric stenosis</li> <li>• Other obstruction of duodenum</li> <li>• Hernia with obstruction</li> <li>• Intestinal obstruction without hernia</li> <li>• Gallstone ileus</li> <li>• Intussusception</li> </ul>	<ul style="list-style-type: none"> <li>• Metastatic cancers</li> <li>• Palliative care patients (V66.7)</li> <li>• Left ventricular assist device (V43.21)</li> <li>• Discharge to hospice</li> <li>• Patients deceased with a length of stay &lt; 1 day</li> </ul>
<b>Gastrointestinal Bleed</b> Principal Diagnosis	<ul style="list-style-type: none"> <li>• Bleeding/hemorrhage in any of the following areas: <ul style="list-style-type: none"> <li>• Esophageal varices</li> <li>• Ulcer of esophagus</li> <li>• Gastric ulcer</li> <li>• Duodenal ulcer</li> <li>• Peptic ulcer</li> <li>• Gastrojejunal</li> <li>• Gastritis or duodenitis</li> <li>• Angiodysplasia of stomach and duodenum</li> <li>• Diverticulosis</li> <li>• Rectum or anus</li> <li>• Dieulafoy lesion of intestine</li> </ul> </li> <li>• Hematemesis</li> <li>• Melena</li> <li>• Hemorrhage of GI tract, unspecified</li> </ul>	<ul style="list-style-type: none"> <li>• Metastatic cancers</li> <li>• Palliative care patients (V66.7)</li> <li>• Left ventricular assist device (V43.21)</li> <li>• Respirator dependent status (V46.11)</li> <li>• Discharge to hospice</li> <li>• Patients deceased with a length of stay &lt; 1 day</li> </ul>
<b>Pancreatitis</b> Principal Diagnosis	<ul style="list-style-type: none"> <li>• Acute</li> <li>• Chronic</li> </ul>	<ul style="list-style-type: none"> <li>• Metastatic cancers</li> <li>• Palliative care patients (V66.7)</li> <li>• Left ventricular assist device (V43.21)</li> <li>• Respirator dependent status (V46.11)</li> <li>• Discharge to hospice</li> </ul>

### Pulmonary Service Line

Excluded from each cohort were patients who have had any organ transplant or a complication thereof.

Cohort	Inclusions	Exclusions
<b>Chronic Obstructive Pulmonary Disease</b> Principal Diagnosis	<ul style="list-style-type: none"> <li>• Chronic bronchitis</li> <li>• Simple and obstructive bronchitis with and without exacerbation</li> <li>• Other emphysema</li> <li>• Chronic obstructive asthma</li> <li>• Bronchiectasis</li> <li>• Chronic airway obstruction, not elsewhere classified</li> </ul>	<ul style="list-style-type: none"> <li>• Metastatic cancers</li> <li>• Palliative care patients (V66.7)</li> <li>• Left ventricular assist device (V43.21)</li> <li>• Respirator dependent status (V46.11)</li> <li>• Discharge to hospice</li> </ul>
<b>Pneumonia</b> Principal Diagnosis	<ul style="list-style-type: none"> <li>• Streptococcal – Group A and Group B</li> <li>• Staph pneumonia including methicillin resistant</li> <li>• Gram negative</li> <li>• Hemophilus influenzae</li> <li>• Mycoplasma</li> <li>• Chlamydia</li> <li>• Bronchopneumonia</li> <li>• Influenza w/ pneumonia</li> <li>• Legionnaire's</li> <li>• Organism not specified</li> </ul>	<ul style="list-style-type: none"> <li>• SARS-related</li> <li>• Metastatic cancers</li> <li>• Palliative care patients (V66.7)</li> <li>• Left ventricular assist device (V43.21)</li> <li>• Discharge to hospice</li> </ul>

### Stroke Service Line

Excluded from each cohort were patients who have had any organ transplant or a complication thereof.

Cohort	Inclusions	Exclusions
<b>Stroke</b> Principal Diagnosis	<ul style="list-style-type: none"> <li>• Subarachnoid hemorrhage</li> <li>• Intracerebral hemorrhage</li> <li>• Unspecified intracranial hemorrhage</li> <li>• Occlusion and stenosis of basilar, carotid, and vertebral artery</li> <li>• Cerebral thrombosis, embolism, or occlusion</li> <li>• Acute but ill-defined cerebrovascular disease</li> </ul>	<ul style="list-style-type: none"> <li>• Metastatic cancers</li> <li>• Hospitals transferring more than 10% of their population</li> <li>• Subdural bleeds</li> <li>• Extradural bleeds</li> <li>• Palliative care patients (V66.7)</li> <li>• Left ventricular assist device (V43.21)</li> <li>• Respirator dependent status (V46.11)</li> <li>• Patients deceased with a length of stay &lt; 1 day</li> <li>• Patients discharged alive with a length of stay &lt; 1 day</li> <li>• Discharge to hospice</li> </ul>



## Appendix B. Patient Cohorts and Related ICD-9-CM Codes

### Bowel Obstruction

#### Inclusions

Principal Diagnosis: 532.01, 532.11, 532.21, 532.31, 532.41, 532.51, 532.61, 532.71, 532.91, 534.01, 534.11, 534.21, 534.31, 534.41, 534.51, 534.61, 534.71, 534.91, 537.2, 537.3, 550.10, 550.11, 550.12, 550.13, 552.00, 552.01, 552.02, 552.03, 552.1, 552.20, 552.21, 552.29, 552.8, 552.9, 560.0, 560.1, 560.2, 560.31, 560.39, 560.81, 560.89, 560.9

#### Exclusions

Diagnoses (Primary or Secondary): 196.0, 196.1, 196.2, 196.3, 196.5, 196.6, 196.8, 196.9, 197.0, 197.1, 197.2, 197.3, 197.4, 197.5, 197.6, 197.7, 197.8, 198.0, 198.1, 198.2, 198.3, 198.4, 198.5, 198.6, 198.7, 198.81, 198.82, 198.89, 203.02, 203.12, 203.82, 204.02, 204.12, 204.22, 204.82, 204.92, 205.02, 205.12, 205.22, 205.82, 205.92, 206.02, 206.12, 206.22, 206.82, 206.92, 207.02, 207.12, 207.22, 207.82, 208.02, 208.12, 208.22, 208.82, 208.92, 996.80, 996.81, 996.82, 996.83, 996.84, 996.85, 996.86, 996.87, 996.89, V42.0, V42.1, V42.4, V42.6, V42.7, V42.81, V42.82, V42.83, V42.84, V42.89, V42.9, V43.21, V66.7  
Procedures (Primary or Secondary): 37.51, 37.52, 37.53, 37.54, 37.62, 37.63, 50.59

### Chronic Obstructive Pulmonary Disease (COPD)

#### Inclusions

Principal Diagnosis: 91.1, 491.20, 491.21, 491.22, 491.8, 491.9, 492.0, 492.8, 493.20, 493.21, 493.22, 494.0, 494.1, 496

#### Exclusions

Diagnoses (Primary or Secondary): 196.0, 196.1, 196.2, 196.3, 196.5, 196.6, 196.8, 196.9, 197.0, 197.1, 197.2, 197.3, 197.4, 197.5, 197.6, 197.7, 197.8, 198.0, 198.1, 198.2, 198.3, 198.4, 198.5, 198.6, 198.7, 198.81, 198.82, 198.89, 203.02, 203.12, 203.82, 204.02, 204.12, 204.22, 204.82, 204.92, 205.02, 205.12, 205.22, 205.82, 205.92, 206.02, 206.12, 206.22, 206.82, 206.92, 207.02, 207.12, 207.22, 207.82, 208.02, 208.12, 208.22, 208.82, 208.92, 480.3, 480.8, 996.80, 996.81, 996.82, 996.83, 996.84, 996.85, 996.86, 996.87, 996.89, V42.0, V42.1, V42.4, V42.6, V42.7, V42.81, V42.82, V42.83, V42.84, V42.89, V42.9, V43.21, V46.11, V66.7  
Procedures (Primary or Secondary): 33.51, 33.52, 37.51, 37.52, 37.53, 37.54, 37.62, 37.63

### Diabetic Acidosis and Coma

#### Inclusions

Principal Diagnosis: 250.10, 250.11, 250.12, 250.13, 250.20, 250.21, 250.22, 250.23, 250.30, 250.31, 250.32, 250.33, 250.80, 250.81, 250.82, 250.83

#### Exclusions

Diagnoses (Primary or Secondary): 196.0, 196.1, 196.2, 196.3, 196.5, 196.6, 196.8, 196.9, 197.0, 197.1, 197.2, 197.3, 197.4, 197.5, 197.6, 197.7, 197.8, 198.0, 198.1, 198.2, 198.3, 198.4, 198.5, 198.6, 198.7, 198.81, 198.82, 198.89, 203.02, 203.12, 203.82, 204.02, 204.12, 204.22, 204.82, 204.92, 205.02, 205.12, 205.22, 205.82, 205.92, 206.02, 206.12, 206.22, 206.82, 206.92, 207.02, 207.12, 207.22, 207.82, 208.02, 208.12, 208.22, 208.82, 208.92, 996.80, 996.81, 996.82, 996.83, 996.84, 996.85, 996.86, 996.87, 996.89, V42.0, V42.1, V42.4, V42.6, V42.7, V42.81, V42.82, V42.83, V42.84, V42.89, V42.9, V43.21, V46.11, V66.7  
Procedures (Primary or Secondary): 37.51, 37.52, 37.53, 37.54, 37.62, 37.63



### Gastrointestinal Bleed

#### Inclusions

Principal Diagnosis: 456.0, 456.20, 530.20, 530.21, 530.7, 530.82, 531.00, 531.01, 531.20, 531.21, 531.40, 531.41, 531.60, 531.61, 532.00, 532.01, 532.20, 532.21, 532.40, 532.41, 532.60, 532.61, 533.00, 533.01, 533.20, 533.21, 533.40, 533.41, 533.60, 533.61, 534.00, 534.01, 534.20, 534.21, 534.40, 534.41, 534.60, 534.61, 535.01, 535.11, 535.21, 535.31, 535.41, 535.51, 535.61, 537.83, 537.84, 562.02, 562.03, 562.12, 562.13, 569.3, 569.82, 569.85, 569.86, 578.0, 578.1, 578.9

#### Exclusions

Diagnoses (Primary or Secondary): 196.0, 196.1, 196.2, 196.3, 196.5, 196.6, 196.8, 196.9, 197.0, 197.1, 197.2, 197.3, 197.4, 197.5, 197.6, 197.7, 197.8, 198.0, 198.1, 198.2, 198.3, 198.4, 198.5, 198.6, 198.7, 198.81, 198.82, 198.89, 203.02, 203.12, 203.82, 204.02, 204.12, 204.22, 204.82, 204.92, 205.02, 205.12, 205.22, 205.82, 205.92, 206.02, 206.12, 206.22, 206.82, 206.92, 207.02, 207.12, 207.22, 207.82, 208.02, 208.12, 208.22, 208.82, 208.92, 996.80, 996.81, 996.82, 996.83, 996.84, 996.85, 996.86, 996.87, 996.89, V42.0, V42.1, V42.4, V42.6, V42.7, V42.81, V42.82, V42.83, V42.84, V42.89, V42.9, V43.21, V46.11, V66.7  
Procedures (Primary or Secondary): 37.51, 37.52, 37.53, 37.54, 37.62, 37.63

### Heart Attack

#### Inclusions

Principal Diagnosis: 410.01, 410.11, 410.21, 410.31, 410.41, 410.51, 410.61, 410.71, 410.81, 410.91

#### Exclusions

Diagnoses (Primary or Secondary): 196.0, 196.1, 196.2, 196.3, 196.5, 196.6, 196.8, 196.9, 197.0, 197.1, 197.2, 197.3, 197.4, 197.5, 197.6, 197.7, 197.8, 198.0, 198.1, 198.2, 198.3, 198.4, 198.5, 198.6, 198.7, 198.81, 198.82, 198.89, 203.02, 203.12, 203.82, 204.02, 204.12, 204.22, 204.82, 204.92, 205.02, 205.12, 205.22, 205.82, 205.92, 206.02, 206.12, 206.22, 206.82, 206.92, 207.02, 207.12, 207.22, 207.82, 208.02, 208.12, 208.22, 208.82, 208.92, 414.06, 414.07, 996.80, 996.81, 996.82, 996.83, 996.84, 996.85, 996.86, 996.87, 996.89, V42.0, V42.1, V42.4, V42.6, V42.7, V42.81, V42.82, V42.83, V42.84, V42.89, V42.9, V43.21, V46.11, V66.7  
Procedures (Primary or Secondary): 37.51, 37.52, 37.53, 37.54, 37.62, 37.63

### Heart Failure

#### Inclusions

Principal Diagnosis: 398.91, 402.01, 402.11, 402.91, 404.01, 404.03, 404.11, 404.13, 404.91, 404.93, 428.0, 428.1, 428.20, 428.21, 428.22, 428.23, 428.30, 428.31, 428.32, 428.33, 428.40, 428.41, 428.42, 428.43, 428.9

#### Exclusions

Diagnoses (Primary or Secondary): 196.0, 196.1, 196.2, 196.3, 196.5, 196.6, 196.8, 196.9, 197.0, 197.1, 197.2, 197.3, 197.4, 197.5, 197.6, 197.7, 197.8, 198.0, 198.1, 198.2, 198.3, 198.4, 198.5, 198.6, 198.7, 198.81, 198.82, 198.89, 203.02, 203.12, 203.82, 204.02, 204.12, 204.22, 204.82, 204.92, 205.02, 205.12, 205.22, 205.82, 205.92, 206.02, 206.12, 206.22, 206.82, 206.92, 207.02, 207.12, 207.22, 207.82, 208.02, 208.12, 208.22, 208.82, 208.92, 414.06, 414.07, 996.80, 996.81, 996.82, 996.83, 996.84, 996.85, 996.86, 996.87, 996.89, V42.0, V42.1, V42.4, V42.6, V42.7, V42.81, V42.82, V42.83, V42.84, V42.89, V42.9, V43.21, V46.11, V66.7  
Procedures (Primary or Secondary): 37.51, 37.52, 37.53, 37.54, 37.62, 37.63, 39.95, 55.69

### Pancreatitis

#### Inclusions

Principal Diagnosis: 577.0, 577.1

#### Exclusions

Diagnoses (Primary or Secondary): 196.0, 196.1, 196.2, 196.3, 196.5, 196.6, 196.8, 196.9, 197.0, 197.1, 197.2, 197.3, 197.4, 197.5, 197.6, 197.7, 197.8, 198.0, 198.1, 198.2, 198.3, 198.4, 198.5, 198.6, 198.7, 198.81, 198.82, 198.89, 203.02, 203.12, 203.82, 204.02, 204.12, 204.22, 204.82, 204.92, 205.02, 205.12, 205.22, 205.82, 205.92, 206.02, 206.12, 206.22, 206.82, 206.92, 207.02, 207.12, 207.22, 207.82, 208.02, 208.12, 208.22, 208.82, 208.92, 996.80, 996.81, 996.82, 996.83, 996.84, 996.85, 996.86, 996.87, 996.89, V42.0, V42.1, V42.4, V42.6, V42.7, V42.81, V42.82, V42.83, V42.84, V42.89, V42.9, V43.21, V46.11, V66.7  
Procedures (Primary or Secondary): 37.51, 37.52, 37.53, 37.54, 37.62, 37.63

### Pneumonia

#### Inclusions

Principal Diagnosis: 481, 482.0, 482.1, 482.2, 482.30, 482.31, 482.32, 482.39, 482.40, 482.41, 482.42, 482.49, 482.81, 482.82, 482.83, 482.84, 482.89, 482.9, 483.0, 483.1, 483.8, 485, 486, 487.0

#### Exclusions

Diagnoses (Primary or Secondary): 196.0, 196.1, 196.2, 196.3, 196.5, 196.6, 196.8, 196.9, 197.0, 197.1, 197.2, 197.3, 197.4, 197.5, 197.6, 197.7, 197.8, 198.0, 198.1, 198.2, 198.3, 198.4, 198.5, 198.6, 198.7, 198.81, 198.82, 198.89, 203.02, 203.12, 203.82, 204.02, 204.12, 204.22, 204.82, 204.92, 205.02, 205.12, 205.22, 205.82, 205.92, 206.02, 206.12, 206.22, 206.82, 206.92, 207.02, 207.12, 207.22, 207.82, 208.02, 208.12, 208.22, 208.82, 208.92, 480.3, 996.80, 996.81, 996.82, 996.83, 996.84, 996.85, 996.86, 996.87, 996.89, V42.0, V42.1, V42.4, V42.6, V42.7, V42.81, V42.82, V42.83, V42.84, V42.89, V42.9, V43.21, V66.7

Procedures (Primary or Secondary): 37.51, 37.52, 37.53, 37.54, 37.62, 37.63

### Pulmonary Embolism

#### Inclusions

Principal Diagnosis: 415.11, 415.19

#### Exclusions

Diagnoses (Primary or Secondary): 196.0, 196.1, 196.2, 196.3, 196.5, 196.6, 196.8, 196.9, 197.0, 197.1, 197.2, 197.3, 197.4, 197.5, 197.6, 197.7, 197.8, 198.0, 198.1, 198.2, 198.3, 198.4, 198.5, 198.6, 198.7, 198.81, 198.82, 198.89, 203.02, 203.12, 203.82, 204.02, 204.12, 204.22, 204.82, 204.92, 205.02, 205.12, 205.22, 205.82, 205.92, 206.02, 206.12, 206.22, 206.82, 206.92, 207.02, 207.12, 207.22, 207.82, 208.02, 208.12, 208.22, 208.82, 208.92, 996.80, 996.81, 996.82, 996.83, 996.84, 996.85, 996.86, 996.87, 996.89, V42.0, V42.1, V42.4, V42.6, V42.7, V42.81, V42.82, V42.83, V42.84, V42.89, V42.9, V43.21, V66.7

Procedures (Primary or Secondary): 37.51, 37.52, 37.53, 37.54, 37.62, 37.63

### Respiratory Failure

#### Inclusions

Principal Diagnosis: 518.81, 518.84

#### Exclusions

Diagnoses (Primary or Secondary): 196.0, 196.1, 196.2, 196.3, 196.5, 196.6, 196.8, 196.9, 197.0, 197.1, 197.2, 197.3, 197.4, 197.5, 197.6, 197.7, 197.8, 198.0, 198.1, 198.2, 198.3, 198.4, 198.5, 198.6, 198.7, 198.81, 198.82, 198.89, 203.02, 203.12, 203.82, 204.02, 204.12, 204.22, 204.82, 204.92, 205.02, 205.12, 205.22, 205.82, 205.92, 206.02, 206.12, 206.22, 206.82, 206.92, 207.02, 207.12, 207.22, 207.82, 208.02, 208.12, 208.22, 208.82, 208.92, 996.80, 996.81, 996.82, 996.83, 996.84, 996.85, 996.86, 996.87, 996.89, V42.0, V42.1, V42.4, V42.6, V42.7, V42.81, V42.82, V42.83, V42.84, V42.89, V42.9, V43.21, V66.7

Procedures (Primary or Secondary): 33.51, 37.51, 37.52, 37.53, 37.54, 50.51

### Sepsis

#### Inclusions

Principal Diagnosis: 003.1, 027.0, 036.2, 036.3, 038.0, 038.10, 038.11, 038.12, 038.19, 038.2, 038.3, 038.40, 038.41, 038.42, 038.43, 038.44, 038.49, 038.8, 038.9, 785.52

#### Exclusions

Diagnoses (Primary or Secondary): 196.0, 196.1, 196.2, 196.3, 196.5, 196.6, 196.8, 196.9, 197.0, 197.1, 197.2, 197.3, 197.4, 197.5, 197.6, 197.7, 197.8, 198.0, 198.1, 198.2, 198.3, 198.4, 198.5, 198.6, 198.7, 198.81, 198.82, 198.89, 203.00, 203.02, 203.12, 203.82, 204.02, 204.10, 204.12, 204.22, 204.82, 204.92, 205.02, 205.12, 205.22, 205.82, 205.92, 206.02, 206.12, 206.22, 206.82, 206.92, 207.02, 207.12, 207.22, 207.82, 208.02, 208.12, 208.22, 208.82, 208.92, 996.80, 996.81, 996.82, 996.83, 996.84, 996.85, 996.86, 996.87, 996.89, V42.0, V42.1, V42.4, V42.6, V42.7, V42.81, V42.82, V42.83, V42.84, V42.89, V42.9, V43.21, V66.7

Procedures (Primary or Secondary): 37.51, 37.52, 37.53, 37.54, 37.62, 37.63, 50.59, 50.69

**Stroke**

**Inclusions**

Principal Diagnosis: 430, 431, 432.9, 433.01, 433.11, 433.21, 433.31, 433.81, 433.91, 434.01, 434.11, 434.91

**Exclusions**

Diagnoses (Primary or Secondary): 196.0, 196.1, 196.2, 196.3, 196.5, 196.6, 196.8, 196.9, 197.0, 197.1, 197.2, 197.3, 197.4, 197.5, 197.6, 197.7, 197.8, 198.0, 198.1, 198.2, 198.3, 198.4, 198.5, 198.6, 198.7, 198.81, 198.82, 198.89, 203.02, 203.12, 203.82, 204.02, 204.12, 204.22, 204.82, 204.92, 205.02, 205.12, 205.22, 205.82, 205.92, 206.02, 206.12, 206.22, 206.82, 206.92, 207.02, 207.12, 207.22, 207.82, 208.02, 208.12, 208.22, 208.82, 208.92, 432.1, 996.80, 996.81, 996.82, 996.83, 996.84, 996.85, 996.86, 996.87, 996.89, V42.0, V42.1, V42.4, V42.6, V42.7, V42.81, V42.82, V42.83, V42.84, V42.89, V42.9, V43.21, V46.11, V66.7

Procedures (Primary or Secondary): 37.51, 37.52, 37.53, 37.54, 37.62, 37.63

## Appendix C. Top Five Risk Factors by Procedure or Diagnosis

<b>Bowel Obstruction</b>	
Diag 518.81	ACUTE RESPIRATORY FAILURE
Diag 585.6	END STAGE RENAL DISEASE
Diag 038.0, 038.10, 038.11, 038.19, 038.2, 038.3, 038.40, 038.41, 038.42, 038.43, 038.44, 038.49, 038.8, 038.9	SEPSIS
Diag 995.92	SEVERE SEPSIS
Diag 569.83	PERFORATION OF INTESTINE
<b>Chronic Obstructive Pulmonary Disease (COPD)</b>	
Diag 038.0, 038.10, 038.11, 038.19, 038.2, 038.3, 038.40, 038.41, 038.42, 038.43, 038.44, 038.49, 038.8, 038.9	SEPSIS
Diag 518.81	ACUTE RESPIRATORY FAILURE
Diag 518.84	ACUTE AND CHRONIC RESPIRATORY FAILURE
Diag 507.0	PNEUMONITIS DUE TO INHALATION OF FOOD OR VOMITUS
Diag 410.71	ACUTE MYOCARDIAL INFARCTION, SUBENDOCARDIAL INFARCTION, INITIAL EPISODE OF CARE
<b>Diabetic Acidosis and Coma</b>	
Diag 518.81	ACUTE RESPIRATORY FAILURE
Diag 038.0, 038.10, 038.11, 038.19, 038.2, 038.3, 038.40, 038.41, 038.42, 038.43, 038.44, 038.49, 038.8, 038.9	SEPSIS
Diag 403.11, 403.91	HYPERTENSIVE CHRONIC KIDNEY DISEASE
Diag 250.33	DIABETES WITH OTHER COMA, TYPE I [JUVENILE TYPE], UNCONTROLLED
Diag 250.30	DIABETES WITH OTHER COMA, TYPE II OR UNSPECIFIED TYPE, NOT STATED AS UNCONTROLLED
<b>Gastrointestinal Bleed</b>	
Diag 518.81	ACUTE RESPIRATORY FAILURE
Diag 532.60	CHRONIC OR UNSPECIFIED DUODENAL ULCER WITH HEMORRHAGE AND PERFORATION, WITHOUT MENTION OF OBSTRUCTION
Diag 585.6	END STAGE RENAL DISEASE
Diag 507.0	PNEUMONITIS DUE TO INHALATION OF FOOD OR VOMITUS
Diag 789.59	OTHER ASCITES
<b>Heart Attack</b>	
Diag 427.5	CARDIAC ARREST
Proc 37.61	IMPLANT OF PULSATION BALLOON
Diag 410.01, 410.11, 410.21, 410.51, 410.61, 410.81, 410.91	ANTERIOR/LATERAL WALL AMI
Diag 585.6	END STAGE RENAL DISEASE
Diag 518.81	ACUTE RESPIRATORY FAILURE
<b>Heart Failure</b>	
Diag 410.01, 410.11, 410.21, 410.51, 410.61, 410.81, 410.91	ANTERIOR/LATERAL WALL AMI
Diag 518.81	ACUTE RESPIRATORY FAILURE
Diag 507.0	PNEUMONITIS DUE TO INHALATION OF FOOD OR VOMITUS
Diag 585.6	END STAGE RENAL DISEASE
Diag 518.84	ACUTE AND CHRONIC RESPIRATORY FAILURE

<b>Pancreatitis</b>	
Diag 518.81	ACUTE RESPIRATORY FAILURE
Diag 785.52	SEPTIC SHOCK
Diag 038.0, 038.10, 038.11, 038.19, 038.2, 038.3, 038.40, 038.41, 038.42, 038.43, 038.44, 038.49, 038.8, 038.9	SEPSIS
Diag 585.6	END STAGE RENAL DISEASE
Diag 789.59	OTHER ASCITES
<b>Pneumonia</b>	
Diag 518.81	ACUTE RESPIRATORY FAILURE
Diag 518.82	OTHER PULMONARY INSUFFICIENCY, NOT ELSEWHERE CLASSIFIED
Diag 162.9	MALIGNANT NEOPLASM OF BRONCHUS AND LUNG, UNSPECIFIED
Diag 518.84	ACUTE AND CHRONIC RESPIRATORY FAILURE
Diag 038.0, 038.10, 038.11, 038.19, 038.2, 038.3, 038.40, 038.41, 038.42, 038.43, 038.44, 038.49, 038.8, 038.9	SEPSIS
<b>Pulmonary Embolism</b>	
Diag 518.81	ACUTE RESPIRATORY FAILURE
Diag 276.2	ACIDOSIS
Diag 507.0	PNEUMONITIS DUE TO INHALATION OF FOOD OR VOMITUS
Diag 518.84	ACUTE AND CHRONIC RESPIRATORY FAILURE
Diag 585.6	END STAGE RENAL DISEASE
<b>Respiratory Failure</b>	
Diag 348.1	ANOXIC BRAIN DAMAGE
Diag 780.01	COMA
Diag 427.5	CARDIAC ARREST
Diag 162.9	MALIGNANT NEOPLASM OF BRONCHUS AND LUNG, UNSPECIFIED
Diag 410.01, 410.11, 410.21, 410.51, 410.61, 410.81, 410.91	ANTERIOR/LATERAL WALL AMI
<b>Sepsis</b>	
Diag 427.5	CARDIAC ARREST
Diag 410.01, 410.11, 410.21, 410.51, 410.61, 410.81, 410.91	ANTERIOR/LATERAL WALL AMI
Diag 557.0	ACUTE VASCULAR INSUFFICIENCY OF INTESTINE
Diag 286.6	DEFIBRATION SYNDROME
Diag 348.1	ANOXIC BRAIN DAMAGE
<b>Stroke</b>	
Diag 780.01	COMA
Diag 518.81	ACUTE RESPIRATORY FAILURE
Diag 585.6	END STAGE RENAL DISEASE
Diag 038.0, 038.10, 038.11, 038.19, 038.2, 038.3, 038.40, 038.41, 038.42, 038.43, 038.44, 038.49, 038.8, 038.9	SEPSIS
Diag 430	SUBARACHNOID HEMORRHAGE