



## Complete Summary

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### TITLE

Complications of anesthesia: rate per 1,000 surgery discharges.

### SOURCE(S)

AHRQ quality indicators. Guide to patient safety indicators [revision 1]. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2003 May 28. 143 p. (AHRQ Pub; no. 03-R203).

## Brief Abstract

### DESCRIPTION

This measure assesses the number of cases of anesthetic overdose, reaction, or endotracheal tube misplacement per 1,000 surgery discharges.

### RATIONALE

Patient safety is an issue of major national interest. Policymakers, providers, and consumers have made the safety of care in United States hospitals a top priority. The need to assess, monitor, track, and improve the safety of inpatient care became apparent with publication of the Institute of Medicine's series of reports describing the problem of medical errors. As our health care system becomes more complex, the possibility of significant unintended adverse effects increases.

Patient Safety Indicators (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 Complications of Anesthesia 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.

### PRIMARY CLINICAL COMPONENT

Anesthesia; complications; anesthetic overdose; anesthetic reaction; endotracheal tube misplacement

### DENOMINATOR DESCRIPTION

All surgical discharges defined by specific Diagnosis-Related Groups (DRGs).

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

#### NUMERATOR DESCRIPTION

Discharges with International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) diagnosis codes for anesthesia complications in any secondary diagnosis field per 1,000 discharges.

### Evidence Supporting the Measure

#### PRIMARY MEASURE DOMAIN

Outcome

#### SECONDARY MEASURE DOMAIN

Not applicable

#### EVIDENCE SUPPORTING THE MEASURE

A formal consensus procedure involving experts in relevant clinical, methodological, and organizational sciences  
One or more research studies published in a National Library of Medicine (NLM) indexed, peer-reviewed journal

### Evidence Supporting Need for the Measure

#### NEED FOR THE MEASURE

Unspecified

### State of Use of the Measure

#### STATE OF USE

Current routine use

#### CURRENT USE

Internal quality improvement  
National health care quality reporting  
Quality of care research

## Application of Measure in its Current Use

### CARE SETTING

Hospitals

### PROFESSIONALS RESPONSIBLE FOR HEALTH CARE

Advanced Practice Nurses  
Physicians

### LOWEST LEVEL OF HEALTH CARE DELIVERY ADDRESSED

Single Health Care Delivery Organizations

### TARGET POPULATION AGE

Unspecified

### TARGET POPULATION GENDER

Either male or female

### STRATIFICATION BY VULNERABLE POPULATIONS

Unspecified

## Characteristics of the Primary Clinical Component

### INCIDENCE/PREVALENCE

Based on the 1997 Healthcare Cost and Utilization Project (HCUP) State Inpatient Database for 19 States, the Complications of Anesthesia rate was 0.55 per 1,000 population at risk.

### EVIDENCE FOR INCIDENCE/PREVALENCE

AHRQ quality indicators. Guide to patient safety indicators [revision 1]. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2003 May 28. 143 p. (AHRQ Pub; no. 03-R203).

### ASSOCIATION WITH VULNERABLE POPULATIONS

Unspecified

### BURDEN OF ILLNESS

Based on the matching analysis of the 2000 Healthcare Cost and Utilization Project (HCUP) Nationwide Inpatient Sample (NIS) data reported by Zhan and

Miller, complications of anesthesia were associated with an excess length of stay of 0.17 days, excess charges of \$1,598, and an excess mortality rate of 0.24%.

#### EVIDENCE FOR BURDEN OF ILLNESS

Zhan C, Miller MR. Excess length of stay, charges, and mortality attributable to medical injuries during hospitalization. JAMA 2003 Oct 8;290(14):1868-74.  
[PubMed](#)

#### UTILIZATION

See "Burden of Illness" field.

#### COSTS

See "Burden of Illness" field.

### Institute of Medicine National Healthcare Quality Report Categories

#### IOM CARE NEED

Getting Better

#### IOM DOMAIN

Safety

### Data Collection for the Measure

#### CASE FINDING

Users of care only

#### DESCRIPTION OF CASE FINDING

All surgical discharges defined by specific Diagnosis-Related Groups (DRGs)

#### DENOMINATOR (INDEX) EVENT

Clinical Condition  
Institutionalization  
Therapeutic Intervention

#### DENOMINATOR INCLUSIONS/EXCLUSIONS

##### Inclusions

All surgical discharges defined by specific Diagnosis-Related Groups (DRGs). Refer to Appendix A of the original measure documentation for DRGs.

Exclusions

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

NUMERATOR INCLUSIONS/EXCLUSIONS

Inclusions

Discharges with International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) diagnosis codes for anesthesia complications in any secondary diagnosis field per 1,000 discharges. Refer to Appendix A of the original measure documentation for a list of specific ICD-9-CM diagnosis codes.

Exclusions

Unspecified

DENOMINATOR TIME WINDOW

Time window is a single point in time

NUMERATOR TIME WINDOW

Institutionalization

DATA SOURCE

Administrative data

LEVEL OF DETERMINATION OF QUALITY

Individual Case

OUTCOME TYPE

Adverse Outcome

PRE-EXISTING INSTRUMENT USED

Unspecified

Computation of the Measure

SCORING

Rate

INTERPRETATION OF SCORE

Better quality is associated with a lower score

## ALLOWANCE FOR PATIENT FACTORS

Analysis by high-risk subgroup (stratification on vulnerable populations)  
Analysis by subgroup (stratification on patient factors)  
Risk adjustment method widely or commercially available

## DESCRIPTION OF ALLOWANCE FOR PATIENT FACTORS

Risk adjustment of the data is recommended using age, sex, Diagnosis-Related Group (DRG), and comorbidity categories.

Application of multivariate signal extraction (MSX) to smooth risk adjusted rates is also recommended.

## STANDARD OF COMPARISON

External comparison at a point in time  
External comparison of time trends  
Internal time comparison

## Evaluation of Measure Properties

### EXTENT OF MEASURE TESTING

The Patient Safety Indicators (PSIs) were evaluated by the project team using 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 Healthcare Cost and Utilization Project (HCUP) State Inpatient Database for 19 States for the final empirical analyses.

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 Diagnosis-Related Group (DRG), and comorbidities.
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.

Refer to the original measure documentation for additional details.

### EVIDENCE FOR RELIABILITY/VALIDITY TESTING

AHRQ quality indicators. Guide to patient safety indicators [revision 1]. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2003 May 28. 143 p. (AHRQ Pub; no. 03-R203).

## Identifying Information

### ORIGINAL TITLE

Complications of anesthesia.

### MEASURE COLLECTION

[Agency for Healthcare Research and Quality \(AHRQ\) Quality Indicators](#)

### MEASURE SET NAME

[Agency for Healthcare Research and Quality \(AHRQ\) Patient Safety Indicators](#)

### DEVELOPER

Agency for Healthcare Research and Quality

### INCLUDED IN

National Healthcare Disparities Report (NHDR)  
National Healthcare Quality Report (NHQR)

### ADAPTATION

A subset of this indicator was originally proposed by Iezzoni and colleagues (1994) 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 Patient Safety Indicator (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.

### RELEASE DATE

2003 Mar

### REVISION DATE

2003 May

### MEASURE STATUS

This is the current release of this measure.

#### SOURCE(S)

AHRQ quality indicators. Guide to patient safety indicators [revision 1]. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2003 May 28. 143 p. (AHRQ Pub; no. 03-R203).

#### MEASURE AVAILABILITY

The individual measure, "Complications of Anesthesia," is published in "AHRQ Quality Indicators. Guide to Patient Safety Indicators." This document is available in [Portable Document Format \(PDF\)](#) and a [zipped WordPerfect\(R\) file](#) from the [Quality Indicators](#) page at the Agency for Healthcare Research and Quality (AHRQ) Web site.

For more information, please contact the QI Support Team at [support@qualityindicators.ahrq.gov](mailto:support@qualityindicators.ahrq.gov).

#### COMPANION DOCUMENTS

The following are available:

- "AHRQ Patient Safety Quality Indicators Software (Version 2.1)" (Rockville, [MD]: AHRQ, 2003 Mar 13) and its accompanying documentation can be downloaded from the [Agency for Healthcare Research and Quality \(AHRQ\) Web site](#). (The software is available in both SAS- and SPSS-compatible formats.)
- Guidance for using the AHRQ quality indicators for hospital-level public reporting or payment. Rockville (MD): Agency for Healthcare Research and Quality; 2004 Aug. 24 p. This document is available from the [AHRQ Web site](#).
- "HCUPnet, Healthcare Cost and Utilization Project" [internet]. (Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2004 [Various pagings]). HCUPnet is available from the [AHRQ Web site](#).
- "Refinement of the HCUP Quality Indicators" (Rockville [MD]: AHRQ, 2001 May. Various pagings. [Technical review; no. 4]; AHRQ Publication No. 01-0035). This document was prepared by the UCSF-Stanford Evidence-based Practice Center for AHRQ and can be downloaded from the [AHRQ Web site](#).

#### NQMC STATUS

This NQMC summary was completed by ECRI on October 1, 2003. The information was verified by the measure developer on October 29, 2003.

#### COPYRIGHT STATEMENT

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