
2005 OREGON HOSPITAL INPATIENT QUALITY INDICATORS (IQIs)

TECHNICAL GUIDE

This document outlines key technical issues related to hospital Inpatient Quality Indicators (IQIs), developed by the federal Agency for Healthcare Research and Quality's (AHRQ). It is intended for individuals with some statistical background and want to duplicate the results.

The most complete and up-to-date information and guide about AHRQ IQIs can be found at <http://www.qualityindicators.ahrq.gov>, which provides an overview, free downloads, FAQs, technical guides and specifications (inclusion and exclusion criteria for all AHRQ inpatient quality indicators).

This report uses AHRQ's QI Windows Application Software (Ver 3.0), released in May, 2006.

Indicator Definitions

AHRQ's Inpatient Quality Indicators pertain to selected **medical conditions** and **surgical procedures**, for the most part based on **ICD-9-CM diagnosis and procedure** codes. Specific codes and definitions are provided in AHRQ's Guide to Inpatient Quality Indicators¹.

These definitions are integrated into the AHRQ Inpatient Quality Indicator software, which is then applied to inpatient discharge data

Inpatient Quality Indicators, by **calendar year**, include **volume** and **mortality rates**.

Volume indicators represent the number of discharges that meet the inclusion and exclusion criteria for the given procedure.

- Procedures for which volume is reported have been demonstrated to show a **positive relationship between volume and patient outcomes** in large, representative samples. In general, these procedures are very **specialized** and require a certain degree of experience both by the surgeons and other members of the medical team. Volumes are not reported for conditions.
- The same research literature provides possible **threshold volumes**, at which improved patient outcomes have been observed. These threshold volumes are specific to each procedure and range from as few as 7 and as many as 200 discharges. To assess each hospital's volume indicators, they should be **compared to the corresponding threshold volume**.
- For **Oregon's** report, **volumes are excluded if total cases are less than 5 or all cases were transferred to another hospital**.

Mortality rates represent the percent of patients with the specified condition or procedure who died in the hospital. Deaths after discharge from the hospital are not captured in these measures. Rates are risk-adjusted, and rates based on less than thirty (30) cases are not included in the public report.

- **Denominator** populations include discharges with the specified conditions or procedures, defined in most cases by ICD-9-CM diagnosis and/or procedure code(s). For some indicators, only certain age groups were included. Patients who were transferred to another short-term hospital are excluded. In general, maternal and neonate discharge records (MDC 14 and 15) are excluded.
- **Numerator** values are the number of in-hospital deaths that occurred in the denominator population.

¹ http://www.qualityindicators.ahrq.gov/iqi_download.htm <accessed 10.05.2006>

Inclusion and exclusion criteria for corresponding **volume** indicators are the same as the denominator, except that transfers to other short-term hospitals are included in volume calculations. Volumes less than five (5) are excluded from the public report.

Risk Adjustment & All of Those Rates

Why Risk Adjust? Some patient characteristics such as age, gender, and co-morbidities impact the likelihood of dying in the hospital, and some hospitals treat more high-risk patients than others. Risk adjustment “levels the playing field” among hospitals by adjusting for differences in patients treated at each hospital. These risk-adjusted values are necessary in order to make hospital-to-hospital comparisons. There are a variety of off-the-shelf packages as well as regression modeling techniques used for risk adjustment; the AHRQ software uses APR-DRG for risk adjustment.

All-Patient Refined Diagnosis-Related Groups (APR-DRG) is a 3M product designed to classify administrative discharge records into clinically-cohesive groups. It is similar to the Diagnosis Related Group (DRG) used by the Centers of Medicare and Medicaid Services (CMS), but **more expansive**, particularly for pediatric populations, and **restructured**. It further classifies the discharge record into “severity” scores (ranging from 1 to 4) based on co-morbidities and other factors: **Risk of Mortality** and **Severity of Illness**. Risk of Mortality was used in the risk adjustment by the AHRQ IQI software.

Risk Adjustment Process. The key components of risk adjustment are the observed rate, the expected rate and the US population rate.

Observed Mortality rate. The observed mortality rates, or raw rates, are simply the number of events (deaths) divided by the number of discharges for a given condition or procedure. See AHRQ’s Guide to Inpatient Quality Indicators for details about inclusion and exclusion criteria for each condition and procedure.

Expected Mortality rate. The expected rate is the mortality rate expected if the hospital’s performance is the same as the national average, given the hospital’s case mix for a specified indicator. It is based on 1) average mortality rates for certain patient characteristics (age, gender, APR-DRG, and risk of mortality) in a national sample and 2) the same set of patient characteristics at any given hospital. It is **calculated without regard to the observed rate**.

Risk-Adjusted Mortality rate. Risk-adjusted rates represent the estimated performance if the hospital had an “average” patient mix, given the actual performance. It is the most appropriate rate upon which to compare *across hospitals*.

- The risk adjusted rate is calculated as follow:

$$\text{risk-adjusted rate} = (\text{observed rate}/\text{expected rate}) * \text{population rate}$$

Calculation of Confidence Intervals

Confidence intervals (CI) were chosen as the basis of statistical comparison because they allowed comparison **with an intuitively appealing reference (e.g., the state average)** and they provide information about both the risk-adjusted mortality rate estimate and the reliability of the estimate. This report uses 95% CI from AHRQ’s QI software (ver 3.0), which calculates the CIs as follow:

$$\begin{aligned} \text{DSE} &= \text{SUM}(\text{expected_rate} * (1 - \text{expected_rate})) \\ \text{SE} &= \text{SQRT}(\text{expected_dse}) / \text{observed_denominator} \\ &\quad * \text{pop_rate} / \text{expected_rate} \\ 95\% \text{ CI} &= \text{risk_adjusted_rate} +/- \text{SE} * 1.96 \end{aligned}$$