# Using Procedure-based Risk Adjustment to Better Predict Outcomes

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When an organization assesses its quality of care, applying benchmarks can be difficult when the population of the organization is different from the benchmarking organizations. How can an organization use benchmarking data that reflects the reality of its population?

"Procedure-based Risk Adjustment for Outcomes Management" offered a different take on this question. Richard Johannes, MD, MS, and Julie Irons, RHIA, of MediQual Systems presented a statistical methodology that "adjusts" data from two groups to allow the comparison as though both had come from the same patient population. The methodology can be derived from administrative data alone (such as age and ICD-9 code) or can include clinical data that must be obtained from health chart abstraction.

Using this methodology helps organizations compare patient populations in a way that truly screens out the higher-risk patients and explains less favorable outcomes. It eliminates the "our patients are sicker than your patients" explanation for more intensive service, the speakers said. It also accurately pinpoints populations whose health needs to be improved via process change while identifying patient factors over which the provider has little control.

## An In-depth Look at Mortality Rates

Looking at mortality rates is a good example, Johannes and Irons said. For example:

Hospital A reported 255 deaths over a total patient population of 2,640 patients, a 9.7 percent mortality rate. Hospital B reported 414 deaths over a total population of 3,630 patients, an 11.4 percent mortality rate. It would appear Hospital A has a more favorable mortality rate than Hospital B and would be a more desirable place to obtain healthcare.

But a more in-depth comparison, adjusting for one factor—age of patient—yields an entirely different result. The adjustment computes the expected mortality of an entire population and then applies it to the sample population. Hospital B has more elderly and higher risk patients in its case mix. When the populations of both are compared with this adjustment, the mortality rate of Hospital B is adjusted to 9.2 percent.

## Models and Tools

The same principle can be applied to procedures as well. Johannes and Irons displayed results from two procedure-based studies: CABG (coronary artery bypass graft) mortality and C section probability.

The CABG model was created by studying the administrative and clinical variables of the CABG procedure. The model was statistically tested and was predictive of several factors contributing to CABG mortality, such as a previous CABG.

This information can be used in a practice setting in a variety of ways. The predictive scores can be used as screening tools. The data can also be used to predict a mortality probability for a patient population and comparing the number of mortalities against the number of predicted mortalities.

For Cesarean sections, the rationale for determining a model is that C section rates have quadrupled over the last half century, Johannes said. The risk factors include reduced parity (more women have fewer children, so a higher percentage of first children are delivered by C sections), older women having children, and breech presentations resulting in C sections. The model included both probability for primary C sections and repeat C sections.

The study covered a large population, using data on 113,000 patients with a delivery from 137 hospitals. The information came from the administrative data set, using age and ICD-9 CM codes.

The model was statistically tested and a number of variables were identified to predict primary and repeat C sections. For instance, a breech presentation has high odds of requiring a C section in both primary and repeat populations. For practical use, as with the CABG mortality study, the predicted scores can be used as screening tools in an aggregate analysis and can create "expected" outcomes in order to compare actual outcomes with what is expected. "Facility C Sections After Risk Adjustment," below, shows actual C sections compared with predicted C sections.

This kind of analysis is helpful in determining the importance of procedure-specific factors. It also accounts for the intensity of care required by underlying disease and age-based factors.

**Facility C Sections After Risk Adjustment**

| Year | Deliveries | Primary C Sections | Repeat C Sections | Total C Sections | Predicted C Sections |
|---|---|---|---|---|---|
| 2001 | 1,334 | 238 | 154 | 392 | 303.2 |

Using procedure-based risk adjustment, the number of predicted C sections for this facility was 303.2, while the actual number was 392. The hospital had 29 percent more C sections than was predicted by the risk factors of its population. This would require further investigation. Studying the types of predictor variables to determine what drives outcomes and treatment would be a good first step.

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