

# Adjusted Ranking Metric

---

## Description

The adjusted ranking metric (ARM) is a summary measure that achieves a reliability adjustment beyond the basic standardized infection ratio (SIR), and thus, has also been called the reliability-adjusted SIR. The ARM accounts for differences in the amount of exposure volume (i.e. patient months, patient days or device days) or opportunity for healthcare-associated infection among a group of patients in a given facility as well as unmeasured variation across facilities. Use of the ARM will result in adjusting a facilities' performance towards the mean. Thus, facilities with low exposure volume are adjusted more than facilities with high exposure volume. Furthermore, the direction of adjustment depends on the location of a facilities' SIR and the mean to which it will be adjusted.

## Methods

To produce ARM values among a group of facilities, there needs to be a combination of indirect standardization and a Bayesian random effects hierarchical model. The indirect standardization (i.e. SIR) accounts for risk factors associated with a specific HAI and the Bayesian random effects hierarchical model using Markov Chain Monte Carlo sampling to construct a Bayesian posterior distribution resulting in a reliability-adjusted SIR.

## Example

### *Bloodstream Infection in Hemodialysis Outpatients*

The primary risk factor associated with differences in rates of BSI in dialysis patients is vascular access type. Vascular access type can be used to stratify these BSI rates. One can produce ARM values using indirect standardization combined with a Bayesian model comprised of vascular access type and a random facility-level intercept. The reliability adjustment is based on the volume of exposure in terms of patient-months such that a facility score will be adjusted more if there are fewer patient-months in the denominator, and less if there are many patient-months in the denominator.

This reliability adjustment, in addition to the risk factor adjustment, enables the ARM metric better measure discrimination between facilities, because it not only accounts for variation in patient risk by vascular access type, but also accounts for variation in the number of patients a facility treats in a given month. Therefore this measure leads to a more reliable representation and enables improved comparisons of performance among facilities.

## Helpful Resources

### **NHSN Dialysis Event Surveillance**

<http://www.cdc.gov/nhsn/dialysis/dialysis-event.html>