Vermont Oxford Network risk adjusted estimates use your center's observed number of infants for a given measure and an expected number of cases calculated with logistic regression models. The models include all of the infants submitted by all member centers to calculate coefficients for each predictor. We apply these coefficients to your center's observed number of infants to calculate the number of infants with the particular measure that we would expect your center to have given your center's case mix.

We shrink the risk adjusted estimates using a weighted average of your center's SMR (or O-E) and the mean of all SMRs (or O-E) for the Network. For hospitals with a small number of infants, the Network mean value will receive more weight. For large hospitals, the center's estimate will receive more weight. Shrunken estimates are more stable over time because they filter random variation.

Model Specifications

Mortality, Infants 501 to 1500 grams (with or without birth defects):

- Gestational age in completed weeks and its squared term
- Small for gestational age (SGA, Yes or No), defined as the 10th percentile or less for birth weight, given the infant's gestational age, the maternal race, and the infant's gender based on the United States 2007-2008 natality data
- Multiple gestation (Yes or No)
- APGAR score at 1 minute (0 to 10)
- Infant gender (Male or Female)
- Vaginal delivery (Yes or No)
- Birth location (Inborn or Outborn)
- Birth defect severity (Moderately Severe, Severe, Very Severe, Most Severe), derived empirically from an analysis of mortality risk for birth defects reported to the Network

Mortality, Expanded infants with birth defects:

- Gestational age
- Small for gestational age (SGA, Yes or No)
- Multiple gestation (Yes or No)
- APGAR score at 1 minute (0 to 10)
- Vaginal delivery (Yes or No)
- Birth location (Inborn or Outborn)
- Birth defect severity (Severe, Very Severe, Most Severe)

Mortality, Expanded infants without birth defects:

- Gestational age
- Small for gestational age (SGA, Yes or No)
- Multiple gestation (Yes or No)
- APGAR score at 1 minute (0 to 10)
- Vaginal delivery (Yes or No)
- Birth location (Inborn or Outborn)

Chronic Lung Disease at 36 Weeks and Chronic Lung Disease at 36 Weeks for Infants Less than 33 Weeks Gestational Age, VLBW or Expanded:

- Gestational age in completed weeks and its squared term
- Small for gestational age (SGA, Yes or No)
- Major birth defect (Yes or No)

- Multiple gestation (Yes or No)
- APGAR score at 1 minute (0 to 10)
- Infant gender (Male or Female)
- Vaginal delivery (Yes or No)
- Birth location (Inborn or Outborn)
- Altitude of the center (4000 feet or less, over 4000 feet)

All other outcomes, VLBW or Expanded:

- Gestational age in completed weeks and its squared term
- Small for gestational age (SGA, Yes or No)
- Major birth defect (Yes or No)
- Multiple gestation (Yes or No)
- APGAR score at 1 minute (0 to 10)
- Infant gender (Male or Female)
- Vaginal delivery (Yes or No)
- Birth location (Inborn or Outborn)

Standardized Morbidity or Mortality Ratios (Shrunken) and Control Limits

A standardized morbidity or mortality ratio (SMR) and its upper and lower bounds indicate whether your center has more or fewer infants with the outcome than would be expected, based on your center's case mix and corrected using methods to reduce random variation. It is calculated as observed divided by expected (O/E). It is an estimate, and therefore it has boundaries. The 95% control limit upper bound represents the upper boundary for the SMR. The 95% control limit lower bound represents the lower boundary for the SMR.

If the upper bound of the SMR is less than 1, your center has fewer infants with the outcome than expected. If the lower bound of the SMR is greater than 1, your center has more infants with the outcome than expected. If the lower and upper bounds include 1, then the number of infants with the outcome was not different from the number of infants expected.

Observed Minus Expected Values (Shrunken) and Control Limits

The Observed minus Expected (O-E) value represents the number of observed cases for the outcome at your center minus the number of cases expected for the outcome, based on your center's case mix and corrected using methods to reduce random variation. It is an estimate, and therefore it has boundaries. The 95% control limit upper bound represents the upper boundary for O-E. The 95% control limit lower bound represents the lower boundary for O-E.

If the upper bound of O-E is less than 0, your center has fewer infants with the outcome than expected. If the lower bound of SMR is greater than 0, your center has more infants with the outcome than expected. If the lower and upper bounds include 1, then the number of infants with the outcome was not different from the number of infants expected.

For birth years 2001 to 2010, we interpreted the O-E versus Control Limit in words. We indicated a value of O-E greater than the 95% control limit upper bound by the word "Above" in the column labeled O-E vs. Control Limit, a value of O-E less than the 95% control limit lower bound by the word "Below," and a value of O-E between the lower and upper 95% control limits by the word "Within." Starting in birth year 2011, we provide the actual values instead of the interpretation in words.