Get with the Guidelines Stroke
In-hospital Mortality Report Interpretation Guide

HOW CAN THIS REPORT BE HELPFUL TO MY SITE?

This report can be used in part to understand whether observed death rates at your hospital are consistent with rates that might be expected based upon patient characteristics.

How does this report differ from the Risk Adjusted Mortality Ratio reports that can be run within the PMT (Descriptive measures)?

- This report provides both unadjusted (observed) and risk adjusted mortality rates.
- Both the unadjusted and risk adjusted rates include a lower and upper 95% confidence limit.
- Separate mortality rates are provided for four subsets of patients: acute ischemic stroke, acute ischemic stroke with NIH Stroke Scale recorded, intracerebral hemorrhage, and subarachnoid hemorrhage.

READING THE REPORT

Site: Your Hospital

Region: The region of the United States corresponding to your hospital’s location.

Northeast
ME, NH, VT, MA, CT, RI, NY, PA, NJ

Midwest
OH, MI, IN, WI, IL, MN, IA, MO, ND, SD, NE, KS

South
DE, MD, DC, WV, VA, NC, SC, TN, KY, GA, FL, PR, MS, AL, OK, AR, LA, TX

West
MT, WY, CO, NM, ID, UT, AZ, NV, WA, OR, CA, AK, HI

Nation: All hospitals entering data into Get with the Guidelines – Stroke.

Last 12 months: Records with admission dates within the 12 months prior to the month listed in the header of the report

- A site must have submitted at least 10 records within the last 12 months to receive a report.

Overall: All records submitted by a site at any time.
Number of Cases: Any eligible record submitted during the corresponding timeframe

Number of Risk Model Eligible Cases: Records eligible as per criteria noted in “Risk Adjustment” section below.

- A site must have submitted at least 10 eligible records to have risk-adjusted mortality calculated.

Mortality: Reported as a percentage of eligible cases

- “0%” = no deaths reported by your site
- “-” = no eligible records for the denominator.
  - For example, your hospital might not have submitted any subarachnoid hemorrhage records.

Confidence Limit: Range of certainty around the reported mortality rate

- The narrower the range of values between the lower and upper confidence limits implies more certainty (i.e., less variability) in the reported mortality rate.
- For site specific values, this range will be impacted by the number of records submitted.

Due to the statistical methodology, it is possible for your hospital to have no reported deaths but still have a risk-adjusted mortality rate greater than 0%, because of both the national mortality rate and the number of records submitted by your hospital. Sites with smaller patient populations are more likely to see this apparent discrepancy, because their rates are more profoundly affected by the national average.

REPORT PRESENTATION

<table>
<thead>
<tr>
<th></th>
<th>Site1</th>
<th>Region2</th>
<th>Nation3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Last 12 mo</td>
<td>Overall</td>
<td>Last 12 mo</td>
</tr>
<tr>
<td>Acute Ischemic Stroke</td>
<td>527</td>
<td>3462</td>
<td>83147</td>
</tr>
<tr>
<td>Number of Cases</td>
<td>422</td>
<td>3190</td>
<td>-72525</td>
</tr>
<tr>
<td>Number of Risk Model Eligible Cases</td>
<td>7.3%</td>
<td>6.5%</td>
<td>3.8%</td>
</tr>
<tr>
<td>Observed Mortality Rate</td>
<td>4.8%</td>
<td>6.0%</td>
<td>3.2%</td>
</tr>
<tr>
<td>Upper 95% confidence limit</td>
<td>8.7%</td>
<td>7.8%</td>
<td>4.0%</td>
</tr>
<tr>
<td>Risk-Adjusted Mortality Rate</td>
<td>8.0%</td>
<td>7.1%</td>
<td>4.4%</td>
</tr>
<tr>
<td>Lower 95% confidence limit</td>
<td>5.5%</td>
<td>6.2%</td>
<td>4.3%</td>
</tr>
<tr>
<td>Upper 95% confidence limit</td>
<td>11.1%</td>
<td>8.1%</td>
<td>4.6%</td>
</tr>
</tbody>
</table>

Of all records entered in the last 12 months, 7.3% were deaths (after accounting for inclusion/exclusion criteria).

The 8.0% risk-adjusted mortality rate suggests that this site has fewer deaths than would be expected based upon their case mix (as defined by the variables included in the model).

Among all records submitted, there is a 95% likelihood that the risk-adjusted death rate falls between 6.2% and 8.1%.

The “dot” = mortality rate

The line = confidence limits
The Get with the Guidelines-Stroke In-hospital Mortality Report presents your hospital’s mortality for acute ischemic strokes, acute ischemic strokes with NIHSS reported, intracerebral hemorrhages, and subarachnoid hemorrhages. Mortality is presented in two ways: observed and risk-adjusted.

**Observed mortality** = \# of deaths reported in GWTG-Stroke \\
*total number of records – excluded records*

These observed (also called unadjusted) mortality rates do not reflect differences in patient age, comorbid conditions, and hospital presentation that may vary among hospital types.

Your hospital’s death rate will have natural variation, since the number of stroke deaths at your site will vary from quarter to quarter.

*Note: Both report figures present only observed mortality*

**But what does risk-adjustment mean?**

When risk-adjustment is used, outcomes are analyzed by accounting for patient-specific risk factors that could significantly increase the risk of mortality. Risk-adjustment accounts for such factors and indicates how your site’s mortality compares to that which would be expected. *If your risk-adjusted rate is higher than your observed rate, it means that you have more deaths than would be expected, based upon your hospital’s patient case mix (as defined by the variables in the model (see below)).*

**Modeling using multivariate logistic regression** is the statistical method used to calculate the risk-adjusted mortality in the GWTG-Stroke In-hospital Mortality Report. Simplified, this technique estimates the risk of death after taking into account multiple “predictor” variables. As part of model development, each of these variables is assigned a numeric value that corresponds to its relationship to death. These variables were determined by clinical relevance and the prior literature.

**Variables included in the GWTG-Stroke risk-adjusted mortality model are as follows:**

- Age > 60
- Patient Arrival Mode
  - EMS from Home or Scene
- Atrial Fibrillation/Flutter
- Prior Stroke/TIA
- Prior Myocardial Infarction
- Peripheral Vascular Disease
- Hypertension
- Carotid Stenosis
- Diabetes Mellitus
- Dyslipidemia
- Smoking
- Date/Time Patient Arrival
  - M-F 7am – 6pm
- Stroke Type
  - Ischemic Stroke
  - Intracranial Hemorrhage
  - Subarachnoid Hemorrhage
  - NIHSS score (ischemic stroke only)

**Exclusions: (from both observed mortality and the GWTG-Stroke risk-adjusted mortality model)**

- TIA patients, patients with no stroke-related diagnosis, elective carotid intervention only, or with missing stroke diagnosis
- Patients not admitted
- Exclude patients with IV tPA at outside hospital
- Transferred in patients from another acute care hospital
- Transferred out patients to another acute care hospital
- Missing discharge/death information
- The ischemic stroke with NIHSS recorded model may only be applied to ischemic stroke patients with a valid NIHSS score (0-42 inclusive.)