## 30-Day Stroke In-Hospital Mortality

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### Indicator Description and Calculation

**Description:**

The risk-adjusted rate of all-cause in-hospital death occurring within 30 days of first admission to an acute care hospital with a diagnosis of stroke.

**Calculation:**

The risk-adjusted mortality rate (RAMR) is calculated by dividing the observed number of in-hospital deaths by the expected number of in-hospital deaths and multiplying by the Canadian average in-hospital death rate.

**Unit of Analysis for Denominator Cases:**

Single admission

**Place of residence or service:**

National, Province/Territory

**Rate - per 100**

**Method of Adjustment:**

Logistic regression

**Applied Adjustment:**

The following covariates are used in risk adjustment:

For a detailed list of covariates used in the model, please refer to the Model Specification document.
**Denominator**

**Description:**
Total number of first stroke discharges in an 11-month period

**Inclusions:**
1. Stroke (per codes specified below) is coded as most responsible diagnosis (MRDx) but not also as a diagnosis type (2); or
   a. Where another diagnosis is coded as MRDx and also a diagnosis type (2), and a diagnosis of stroke is coded as a type (1) [type (C) for Quebec data] or type (W), (X) or (Y) but not also as type (2); or
   b. Where rehabilitation or convalescence (ICD-10-CA: Z50.1, Z50.5–Z50.9, Z54.8, Z54.9) is coded as MRDx and stroke as a type (1) [type (C) for Quebec data] or type (W), (X) or (Y) but not also as type (2)

**Stroke diagnosis codes:**
- Subarachnoid haemorrhage (ICD-10-CA: I60)
- Intracerebral haemorrhage (ICD-10-CA: I61, I62.9 [for data years prior to 2015-2016*])
- Ischemic stroke (ICD-10-CA: I63.0-I63.5, I63.8, I63.9, H34.1)
- Stroke, not specified as haemorrhage or infarction (ICD-10-CA: I64)
- Venous sinus/cortical vein thrombosis (ICD-10-CA: I63.6, I67.6, G08)

*I62.9 was used for coding of hemorrhagic stroke not otherwise specified in fiscal years prior to 2015–2016. As of 2015–2016 data, this condition is coded to I61.9 (Intracerebral haemorrhage, unspecified).

Note: Transient ischemic attacks are not included in this indicator.

2. Admission between April 1 and March 1 of the following year (period of case selection ends March 1 to allow for 30 days of follow-up)
3. Age at admission 20 years and older
4. Sex recorded as male or female
5. Admission to an acute care institution (Facility Type Code = 1)
6. Admission category recorded as urgent/emergent (Admission Category Code = U)

**Exclusions:**
1. Records with an invalid health card number
2. Records with an invalid code for province issuing health card number
3. Records with an invalid admission date
4. Records with admission category of cadaveric donor or stillbirth (Admission Category Code = R or S)
5. Previous stroke: Records with a stroke inpatient admission (stroke diagnosis codes as specified above) coded as diagnosis type (M), (1), (C) [for Quebec data only], (2), (W), (X) or (Y), and Facility Type Code = 1, within one year prior to the admission date of the index discharge

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**Numerator**

**Description:**
Number of deaths from all causes occurring in hospital within 30 days of admission for stroke

**Inclusions:**
1. Discharge as death (Discharge Disposition Code = 07)
2. Admission to an acute care institution (Facility Type Code = 1)
3. (Discharge date on death record) – (Admission date on stroke record) less than or equal to 30 days

**Exclusions:**
1. Records with an invalid discharge date

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**Background, Interpretation and Benchmarks**

**Rationale**
Stroke is a leading cause of death and long-term disability. Adjusted mortality rates following stroke may reflect the underlying effectiveness of treatment and quality of care.

Furthermore, variations in stroke mortality rates may be due to jurisdictional and institutional differences in care practices, as well as to other factors that are not included in the adjustment. Lower rates are desirable.

**HSP Framework Dimension**
Health System Outputs: Appropriate and effective

**Areas of Need**
Getting Better

**Targets/Benchmarks**
Not applicable
References


Availability of Data Sources and Results

Data Sources

- DAD, HMDB

Type of Year:

- Fiscal

First Available Year:

- 1998

Last Available Year:

- 2016

Geographic Coverage

- All provinces/territories

Result Updates

- Every year

Web Tool: Health Indicators e-Publication

URL: [http://yourhealthsystem.cihi.ca/epub/?language=en](http://yourhealthsystem.cihi.ca/epub/?language=en)

Updates

Beginning with rates based on 2003–2004 to 2005–2006 data, case selection criteria for stroke were revised to include patients transferred to rehabilitation during their index admission. In this case, stroke may not be coded as the most responsible diagnosis; these cases were previously excluded from the indicator.

Beginning with rates based on 2015–2016 data, ICD-10-CA codes used to identify stroke cases have been updated as a result of consultation and close collaboration with the Heart and Stroke Foundation and the Public Health Agency of Canada. Specifically, ICD-10-CA code I62 was excluded from stroke case selection, and H34.1, I67.6 and G08 were added under their respective subcategories. These changes have no substantial impact on comparisons with previously reported results.

Quality Statement

Caveats and Limitations

- Not applicable

Trending Issues

Beginning with 2004 rates, stroke case selection criteria were revised; therefore, comparison of rates from 2004 onward with those of previous years should be made with caution.

Indicator results by place of residence are based on three years of pooled data. The reference year reflects the mid-point of a three-year period.

Comments

Indicator results by place of service, based on one year of data, are also available at [https://www.cihi.ca/sites/default/files/document/additional-facility-indicators-results-en.xlsx](https://www.cihi.ca/sites/default/files/document/additional-facility-indicators-results-en.xlsx).