Hospital Deaths (HSMR)

Name	Hospital Deaths (HSMR)
Short/Other Names	Hospital Standardized Mortality Ratio (HSMR)
Description	The ratio of the actual number of in-hospital deaths in a region or hospital to the number that would have been expected, based on the types of patients a region or hospital treats. For further details, please see the General Methodology Notes.
Interpretation	Lower is better. The HSMR is most useful to follow a hospital's performance over time.
HSP Framework Dimension	Health System Outputs: Appropriate and effective
Areas of Need	Getting Better
Geographic Coverage	All provinces
Reporting Level/Disaggregation	National, Province/Territory, Region, Facility
Indicator Results	Accessing Indicator Results on Your Health System: In Depth

Identifying Information
Name   Hospital Deaths (HSMR)
Short/Other Names Hospital Standardized Mortality Ratio (HSMR)
Indicator Description and Calculation

Description	The ratio of the actual number of in-hospital deaths in a region or hospital to the number that would have been expected, based on the types of patients a region or hospital treats. For further details, please see the General Methodology Notes.
Calculation: Description	The ratio of the actual number of in-hospital deaths to the expected number of in-hospital deaths, for conditions accounting for about 80% of inpatient mortality Unit of Analysis: Hospitalization
Calculation: Geographic Assignment	Place of service
Calculation: Type of Measurement	Ratio
Calculation: Adjustment Applied	The following covariates are used in risk adjustment: For each HSMR diagnosis group, the HSMR logistic regression models are fitted with age, sex, length-of-stay (LOS) group, admission category (urgent and elective), comorbidity (Charlson Index Score) group and transfers as independent variables.
Calculation: Method of Adjustment	Logistic regression
Denominator	**Description:** Expected deaths, or number of deaths that would have occurred in a hospital or region had the mortality of these patients been the same as the mortality of similar patients across the country, based on the reference year (2012–2013) **Inclusions:** 1. Discharge between April 1 of a given year and March 31 of the following year 2. Admission to an acute care institution (Facility Type Code = 1) 3. Discharge with diagnosis group of interest (i.e., one of the diagnosis groups that account for about 80% of in-hospital deaths, after excluding patients receiving palliative care) 4. Age at admission between 29 days and 120 years 5. Sex recorded as male or female 6. Length of stay of up to 365 consecutive days 7. Admission category recorded as urgent/emergent or elective (Admission Category Code = U or L) **Exclusions:** 1. Cadavers or stillborns (Discharge Disposition Code = 08 or 09) 2. Self sign-outs or did not return from a pass (Discharge Disposition Code = 06, 12, 61,* 62,* 65,* 66,* 67*)

3. Records with brain death as most responsible diagnosis code (ICD-10-CA: G93.81)

4. Records with most responsible diagnosis (MRDx) of palliative care (ICD-10-CA: Z51.5). For Quebec data: records where Z51.5 coded as MRDx, or cancer (C00–C97) coded as MRDx and Z51.5 coded in any secondary diagnosis field

5. Medical assistance in dying (MAID):
• 2016–2017 to 2017–2018 data only:
Discharge Disposition Code = 07 (in-hospital death) AND either 1 of the following 2:
– Prefix = J in any field; OR
– 3 CCI codes: 1.ZZ.35.HA-P7, 1.ZZ.35.HA-P1, 1.ZZ.35.HA-N3 (all present on the same abstract)
• 2018–2019 data onward: Discharge Disposition Code = 73

Note
*2018–2019 data onward

Numerator

Description:
Observed deaths, or actual number of in-hospital deaths that occurred in a hospital or region
Inclusions:
Death (Discharge Disposition Code = 07, 72,* 74*)

Note
*2018–2019 data onward

Exclusions:
Same as for the denominator

Background, Interpretation and Benchmarks

The HSMR is a performance indicator that allows hospitals to measure and monitor their progress in quality of care.

Rationale

Ever since the HSMR measure was first developed and disseminated by CIHI, many hospitals and health providers across Canada have been using it as part of their ongoing efforts to improve care.

The HSMR can be used to track the overall change in mortality resulting from a broad range of factors, including changes in the quality and safety of care delivered.

Interpretation

Lower is better. The HSMR is most useful to follow a hospital's performance over time.

HSP Framework Dimension — Health System Outputs: Appropriate and effective

Areas of Need — Getting Better

Targets/Benchmarks — Not applicable

References

Alexandrescu R, Jen MH, Bottle A, Jarman B, Aylin P. Logistic versus hierarchical modeling: an analysis of a statewide inpatient sample. *J Am Coll Surg* 2011;213(3):392-401.

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Jarman B, Gault S, Alves B et al. Explaining differences in English hospital death rates using routinely collected data. *BMJ* 1999;318 (7197):1515-1520.

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Availability of Data Sources and Results

Data Sources	DAD, HMDB
	Type of Year:
	Fiscal
	First Available Year:
Available Data Years	2013
	Last Available Year:
	2017
Geographic Coverage	All provinces
Reporting Level/Disaggregation	National, Province/Territory, Region, Facility
Result Updates	
Update Frequency	Twice a year
	Web Tool:
	Your Health System: In Depth
	URL:
Indicator Results	Accessing Indicator Results on Your Health System: In Depth
	Changes to the HSMR methodology, implemented in February 2015, include the following:
Updates	1. HSMR results are calculated with an updated baseline using 2012–2013 data. The previous baseline was calculated using 2009–2010 data.
	2. The statistical test of significance is based on comparing results with the national average (as opposed to 100).
Quality Statement	
Caveats and Limitations	Medical assistance in dying (MAID) was decriminalized in Canada with the enactment of Bill C-14 in June 2016. MAID cases are excluded from HSMR calculations for all DAD-submitting provinces and territories. It is not possible to exclude MAID cases from Quebec results due to differences in data collection. The impact of the differences of MAID exclusion is not fully known but is estimated to have a small effect on interprovincial comparability.
Trending Issues	Not applicable
	The average experience of Canadian hospitals is set at 100 and is based on data collected in 2012–2013. HSMR results are compared against the current national average. An HSMR above the national average indicates that the hospital's mortality rate is higher than the average HSMR. An HSMR below the national average indicates that the hospital's mortality rate is lower than the average HSMR.
Comments	Further information is available in the Technical Notes and other HSMR resources: https://www.cihi.ca/en/health-system-performance/quality-of-care-and-outcomes/hsmr
	Indicator results are also available in

- Your Health System: In Brief
- Your Health System: Insight, updated monthly starting with 2013-2014 data