Hospital Standardized Mortality Ratio

Methodology Notes

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Table of contents

About HSMR

Calculation

Definition

The ratio of the actual number of acute in-hospital deaths to the expected number of in-hospital deaths, for conditions accounting for about 80% of inpatient mortality.

Method of calculation

HSMR = (Actual number of deaths among diagnosis groups accounting for 80% of inpatient mortality ÷ Expected number of deaths among diagnosis groups accounting for 80% of inpatient mortality) × 100

In other words, the HSMR is the ratio of observed (O) to expected (E) deaths.

The **observed** number of deaths for a hospital is the sum of the actual number of deaths in that hospital. In-hospital death is defined as discharge disposition = 07, 72, 74.

The **expected** number of deaths for a hospital is based on the sum of the probabilities of in-hospital death for cases from that hospital. Coefficients derived from logistic regression models are used to calculate the probability of in-hospital death. For each of the 74 diagnosis groups, a logistic regression model is fitted with the following independent variables: age, sex, length-of-stay group, admission category, comorbidity group, transfers and COVID-19. All of the models are based on data from all acute hospitals in Canada. See Appendix I for more details on how the expected number of deaths is determined.

Logistic models were built using data from 2018–2019 to 2020–2021. To allow for comparisons over time, the coefficients derived from these models are used to determine expected deaths for all reported years.

A **95% HSMR confidence interval** is calculated using Byar's approximation:

Lower confidence limit = $O \div E \times (1 - 1 \div (9 \times O) - 1.96 \div (3 \times \text{sqrt}(O)))^3 \times 100$

Upper confidence limit = $(O + 1) \div E \times (1 - (1 \div (9 \times (O + 1))) + 1.96 \div (3 \times \text{sqrt}(O + 1)))^3 \times 100$

Where O = actual number of deaths and E = expected number of deaths.

Case selection

Inclusion criteria

1. Admission to an acute care institution
2. 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 with palliative care)
3. Age at admission between 29 days and 120 years
4. Sex recorded as male or female
5. Length of stay of up to 365 consecutive days
6. Admission category is elective (L) or emergent/urgent (U)

Exclusion criteria

1. Cadavers, with discharge disposition = 08
2. Stillborns, with discharge disposition = 09
3. Neonates, with age at admission less than or equal to 28 days
4. Records with palliative care
5. Medical assistance in dying (MAID) cases

Palliative care

In all provinces and territories except Quebec, patients are considered palliative when their most responsible diagnosis (MRDx) is Z51.5.

As Quebec uses different coding standards and does not submit to the Discharge Abstract Database, Quebec palliative care patients are defined as either

- Patients with an MRDx of Z51.5; or
- Patients with an MRDx of cancer (MRDx starts with “C”) and palliative care as any diagnosis type in the same record.

The number of palliative care cases in a facility, along with the other descriptive analysis, is available in the private HSMR reports in CIHI’s Your Health System: Insight web tool.

Medical assistance in dying

Medical assistance in dying (MAID) was decriminalized in Canada with the enactment of Bill C-14 in June 2016. Information on MAID performed in acute care hospitals is submitted to the Discharge Abstract Database (DAD). MAID cases are excluded from HSMR calculations for all DAD-submitting provinces and territories. Please note that it is not possible to identify MAID cases in data from Quebec; therefore, MAID cases are not excluded from Quebec results. Findings based on 2016–2017 data indicate that the impact of including or excluding MAID cases is minimal for HSMR results.

For provinces and territories other than Quebec, for 2016–2017 and 2017–2018 data, MAID cases are excluded using the following criteria:

Discharge disposition = 07 (in-hospital death) AND either of the following 2 conditions:

- Prefix = J in any field; OR
- All 3 of the following CCI codes: 1.ZZ.35.HA-P7, 1.ZZ.35.HA-P1, 1.ZZ.35.HA-N3 (all present on the same abstract)

Starting in 2018–2019, MAID cases are excluded using the following criterion:

- Discharge Disposition Code = 73

HSMR diagnosis groups

HSMR diagnosis groups are determined using the first 3 digits of the most responsible diagnosis code (ICD-10-CA) recorded on the discharge. However, for some cases, another diagnosis code was used to assign to an HSMR diagnosis group (see Appendix II for more details).

The diagnosis groups accounting for about 80% of in-hospital deaths were determined based on 3-year data from 2018–2019 to 2020–2021 in the Discharge Abstract Database and Hospital Morbidity Database. Excluding patients identified as having received palliative care during their stay (see above for the definition of palliative care), the diagnosis groups that represented the top 80% of in-hospital deaths were considered in the analysis. A list of the diagnosis groups is given in Appendix III.

HSMR diagnosis categories

HSMR diagnosis categories are defined as a roll-up of HSMR diagnosis groups that are in the same ICD-10-CA chapter. Diagnosis categories include only HSMR diagnosis groups, not all the groups in the chapter. They are used to make drill-down analyses more meaningful for smaller hospitals. See Appendix IV for the list of HSMR diagnosis categories.

Independent variables

The independent variables are derived as follows:

Age

Based on age in years at time of admission.

Sex

Based on sex recorded on the discharge.

Length-of-Stay Group

Based on the patient's total length of stay (LOS). Derived from the discharge date and the admission date (i.e., LOS = discharge date − admission date). When admission date and discharge date are the same, 1 is added to the LOS (i.e., LOS = 1). 6 LOS groups are used: 1 day, 2 days, 3 to 9 days, 10 to 15 days, 16 to 21 days and 22 to 365 days.

Admission Category

Based on admission category recorded on the discharge.

Comorbidity Group

The Charlson Index score is calculated for each hospitalization stay using pre-admit comorbidities recorded on the discharge (i.e., diagnosis types 1, W, X and Y, but not also type 2). Outside Quebec, 3 comorbidity groups are derived based on the Charlson Index score as follows: 0, 1 or 2, and 3 or more.

Due to differences in data collection, it is not possible to distinguish comorbidities from secondary diagnoses in Quebec. Therefore, Charlson score groups for Quebec patients are assigned differently in order to achieve comparability across the country: patients with a score of 0 or 1 are put in group 0, patients with a score of 2, 3 or 4 are put in group 1 and patients with a score of 5 or more are put in group 2.

See Appendix V for more information about the Charlson Index and how it is calculated.

Transfers

Assignment of cases to a "transfer in" group is based on whether the patient was transferred from an acute care institution and is determined using "institution from type" and "institution from number" variables. Transfers are assumed to be discrete admissions.

COVID-19

As of August 2022, COVID-19 is included in the HSMR case selection as 1 of the 74 diagnosis groups contributing to 80% of in-hospital deaths. The COVID-19 diagnosis group is identified using the first 3 digits of the most responsible diagnosis code (ICD-10-CA: U07) recorded on the discharge abstract.

COVID-19 was also added as a risk factor to the risk-adjustment models for all other 73 diagnosis groups. COVID-19 as a risk factor is determined as diagnosis code U07.1 or U07.2 with diagnosis type M, 1, C, 2, W, X or Y recorded on the discharge abstract.

HSMR peer groups

Teaching hospitals are identified as those with confirmed Teaching status from the provincial ministry or as Teaching in the provincial ministry's submission to the Canadian MIS Database. Non-teaching hospitals were assigned to a Large, Medium or Small Community hospital peer group based on their volumes and patient complexities, as described in Appendix VI.

Peer information provided in Your Health System: Insight includes the HSMR result, the minimum and maximum HSMRs for a hospital site's peer group, as well as the HSMR value representing the 25th, 50th and 75th percentiles.

For a list of hospitals in your peer group, please send an email to hsp@cihi.ca.

HSMR subgroups

In addition to the above, HSMR subgroup analyses are provided to help identify more specific areas of improvement. All the HSMR subgroups are based on the risk-adjusted model for the All Cases HSMR.

Medical and surgical HSMRs

Medical and surgical cases are identified using a case mix major clinical category (MCC) partition code. Patients with an MCC partition code "I — intervention" are assigned to a surgical group; patients with an MCC partition code "D — diagnosis" are assigned to a medical group.

HSMR for ICU-related cases

Patients admitted to a special care unit at any time during their hospital stay are considered intensive care unit (ICU)–related cases. ICU-related cases are identified by any special care unit number equal to 10, 20, 25, 30, 35, 40, 45, 50, 51, 52, 53, 60, 70 or 80. Note that all deaths of ICU-related cases are included in this calculation, not only deaths that occur in the ICU.

HSMR excluding transfers

For this calculation, all patients transferred to or from an acute care institution are excluded.

Provincial-, peer group–, regional- or organization-level HSMRs

Provincial-, peer group–, regional- or organization-level HSMRs are calculated as the sum ofobserved deaths for all acute care sites divided by the sum of expected deaths for all acute care sites, multiplied by 100.

HSMRs are not calculated for specialty facilities. A specialty facility is defined as a hospital that provides care for a specific group of patients or specific illnesses and that tailors its care to fit the chosen condition, patient or procedure. Examples of specialty hospitals include children's hospitals, women's hospitals and cancer centres. HSMR cases from specialty sites are included in provincial-, peer group–, regional- and multi-site hospital-level HSMRs.

HSMRs are not calculated for non-acute facilities such as rehabilitation and day surgery facilities. Cases from non-acute facilities are not included in provincial-, regional- or organization-level HSMRs.

Other information

Interpretation

The statistical test of significance is based on comparing HSMR results with the peer group averages (for hospital-level results) or with the Canada average (for provincial-/territorial- and regional-level results). The Canada and hospital peer group **blended rates** are used for statistical testing, comparisons and reporting. An HSMR above the peer group/national average indicates that the hospital's/region's mortality rate is higher than the average rate. An HSMR below the peer group/national average indicates that the hospital's/region's mortality rate is lower than the average rate.

The confidence intervals describe the precision of the HSMR estimate. Smaller hospitals with fewer HSMR cases have less-precise HSMR estimates with wider confidence intervals. Results based on small numbers of cases should be interpreted with caution. Please note that the counts in the open-year reports may differ until database closure.

Data sources

Hospital Morbidity Database, CIHI.

Discharge Abstract Database, CIHI.

Availability

Most recent 5 years.

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Appendices

Appendix I: Calculating expected deaths

Calculate the probability of in-hospital death for each record (discharge) using data from your hospital and CIHI coefficient files. A coefficient (weight) is derived for each category of the adjustment variables by running a logistic regression model (e.g., there is a different risk of in-hospital death for each value of a given variable). For more details on coefficient values, see Appendix VII.

The probability of dying for each record and the total expected deaths for a hospital are calculated as follows:

Step 1. Determine the patient group for which you wish to calculate expected deaths and subset your data as appropriate. There are 5 patient groups for which you can calculate probabilities: HSMR All Cases and the 4 specialty HSMRs (medical, surgical program, ICU-related and excluding transfers). Select the patient group you are interested in.

Step 2.

For *All Cases HSMR*:

For each record, sum the appropriate coefficient values for each adjustment variable and intercept (total sum = S). Note that each *diagnosis group* has its own intercept and set of coefficients.

S = intercept + (age in years × age coefficient) + (sex coefficient) + (LOS coefficient) + (admission category coefficient) + (comorbidity coefficient) + (transfer coefficient) + (COVID-19 coefficient)

For example, if the patient has diagnosis group I21, select the coefficients for the I21 model and add them to the formula. If the patient has diagnosis group I25, select coefficients for the I25 model instead. If the patient is male, add the weight for sex M. If the patient is female, sex has no contribution (i.e., it equals 0).

For *HSMR subgroups*:

Select appropriate records (e.g., Medical cases for Medical HSMR) and use the same coefficient as for All Cases HSMR.

Step 3. Calculate the probability of dying for each record:

$p = e^S \div (1 + e^S)$

Where e^S is the exponent of S.

On a calculator, exponents are often represented by the key $\mathbf{e^x}$. In Excel, p is calculated by the following formula: **= exp(S) ÷ (1 + (exp(S)))**.

Step 4. Calculate the expected deaths for each hospital. Note that expected deaths is a statistical, and not clinical, concept:

The expected number of deaths is the sum of p in Step 3 for all records from that hospital.

Appendix II: Special notes for diagnosis groups

To account for coding standards related to certain conditions and to ensure that diagnosis groups truly reflect the main reason for a patient's stay in the hospital, the following steps were taken:

1. According to World Health Organization (WHO) guidelines for dagger/asterisk codes, the etiology is coded as the most responsible diagnosis (MRDx) while the manifestation is coded as type 6. For patients with a type 6 coded on their discharge, the first 3 digits of the type 6 diagnosis determined the patient's diagnosis group.
2. If a patient was admitted with an MRDx of coronary artery disease (I25.0, I25.1, I25.8 or I25.9) but also had an acute myocardial infarction (I21 or I22) as diagnosis type 1, W, X or Y and a revascularization procedure (1.IJ.76, 1.IJ.50, 1.IJ.57.GQ or 1.IJ.54. GQ-AZ), the patient's diagnosis group was considered to be the acute myocardial infarction (i.e., I21 group if the preadmission diagnosis starts with I21, or I22 group if the preadmission diagnosis starts with I22). Please note that I22 is not one of the 74 diagnosis groups in the top 80% list.
3. If a patient was admitted with an MRDx of care involving rehabilitation (Z50.1, Z50.5, Z50.6, Z50.7, Z50.8, Z50.9, Z54.8, Z54.9) and also had a cerebrovascular disease (CVD) (I60 to I64) as diagnosis type 1, W, X or Y, the patient's diagnosis group was considered to be the CVD. If a patient had more than one CVD, the CVD with the highest mortality is assigned, in the following order: I61, I60, I62, I64, I63.
4. If an acute lower respiratory tract infection (J10.0, J11.0, J12 to J16, J18 or J20 to J22) was coded as the MRDx and a patient also had chronic obstructive pulmonary disease (COPD) (J44), the patient's diagnosis group was considered to be COPD.
5. All patients with pneumonia (J12 to J17) as the MRDx or type 6 (where the COPD rule mentioned above was not applied) were combined with the unspecified pneumonia (J18) diagnosis group to provide a more complete case selection of pneumonia patients, as specificity might not be available and/or accessible at the time of coding.

6. All patients with an MRDx of sepsis (A42.7, A22.7, A26.7, A28.2, A32.7, A39.2, A39.3, A40, A39.4, A21.7, B00.7, B37.7, A03.9, A02.1, A20.7, A23.9, A24.1, A28.0), who did not have type 6 diagnosis, were combined with the other sepsis (A41) diagnosis group to provide a more complete case selection of sepsis patients. Variations in coding of sepsis exist across the country, and specificity might not be available and/or accessible at the time of coding. Patients with a type 6 diagnosis and sepsis were assigned to the diagnosis group according to their type 6 diagnosis.
7. All patients with an MRDx of concussion (S06.0) were removed from the intracranial injury (S06) diagnosis group. Within this group, concussion accounts for a large number of cases but very few deaths. The remaining cases represent more severe brain traumas and are largely responsible for the high mortality within this diagnosis group.

Appendix III: Diagnosis groups

Diagnosis groups that account for about 80% of acute care in-hospital deaths

Diagnosis group	Description
A04	Other bacterial intestinal infections
A41*	Sepsis
A49	Bacterial infection of unspecified site
C15	Malignant neoplasm of oesophagus
C16	Malignant neoplasm of stomach
C18	Malignant neoplasm of colon
C22	Malignant neoplasm of liver and intrahepatic bile ducts
C25	Malignant neoplasm of pancreas
C34	Malignant neoplasm of bronchus and lung
C50	Malignant neoplasm of breast
C61	Malignant neoplasm of prostate
C67	Malignant neoplasm of bladder
C71	Malignant neoplasm of brain
C78	Secondary malignant neoplasm of respiratory and digestive organs
C79	Secondary malignant neoplasm of other and unspecified sites
C83	Non-follicular lymphoma
C90	Multiple myeloma and malignant plasma cell neoplasms
C92	Myeloid leukemia
E11	Diabetes mellitus type 2
E87	Other disorders of fluid, electrolyte and acid-base balance
F03	Unspecified dementia
F05	Delirium, not induced by alcohol and other psychoactive substances
G30	Alzheimer’s disease
G93	Other disorders of brain
I21*	Acute myocardial infarction (AMI)
I25*	Chronic ischemic heart disease
I26	Pulmonary embolism
I33	Acute and subacute endocarditis
I35	Nonrheumatic aortic valve disorders
I46	Cardiac arrest
I48	Atrial fibrillation and flutter
I50	Heart failure

Diagnosis group	Description
I60*	Subarachnoid haemorrhage
I61*	Intracerebral haemorrhage
I62*	Other nontraumatic intracranial haemorrhage
I63*	Cerebral infarction
I64*	Stroke, not specified as haemorrhage or infarction
I70	Atherosclerosis
I71	Aortic aneurism and dissection
J10	Influenza due to identified seasonal influenza virus
J18*	Pneumonia
J44*	Other chronic obstructive pulmonary disease
J69	Pneumonitis due to solids and liquids
J80	Adult respiratory distress syndrome
J84	Other interstitial pulmonary diseases
J90	Pleural effusion, not elsewhere classified
J96	Respiratory failure, not elsewhere classified
K26	Duodenal ulcer
K55	Vascular disorders of intestine
K56	Paralytic ileus and intestinal obstruction without hernia
K57	Diverticular disease of intestine
K63	Other diseases of intestine
K65	Peritonitis
K70	Alcoholic liver disease
K72	Hepatic failure, not elsewhere classified
K74	Fibrosis and cirrhosis of liver
K83†	Other diseases of biliary tract
K85	Acute pancreatitis
K92	Other diseases of digestive system
L03	Cellulitis
N17	Acute renal failure
N18	Chronic renal failure
N39	Other disorders of urinary system
R41†	Other symptoms and signs involving cognitive functions and awareness
R53	Malaise and fatigue
R57	Shock, not elsewhere classified
R64	Cachexia
S06*	Intracranial injury
S32	Fracture of lumbar spine and pelvis
S72	Fracture of femur

Diagnosis group	Description
T81	Complications of procedures, not elsewhere classified
T82	Complications of cardiac and vascular prosthetic devices, implants and grafts
U07†	COVID-19 and COVID-19–related condition
Z54	Convalescence

Notes

* Indicates diagnosis groups where changes were applied. Refer to Appendix II for more details.

† Indicates diagnosis groups that were added after the methodology change in 2022.

Appendix IV: Diagnosis categories

Diagnosis categories	HSMR diagnosis groups included in categories
Certain infectious and parasitic diseases	A04, A41*, A49
Primary malignant neoplasms of specified site	C15, C16, C18, C22, C25, C34, C50, C61, C67, C71
Malignant neoplasms of ill-defined, secondary and unspecified sites	C78, C79
Malignant neoplasms of lymphoid, haematopoietic and related tissue	C83, C90, C92
Endocrine, nutritional and metabolic diseases	E11, E87
Mental and behavioral disorders and diseases of the nervous system	F03, F05, G30, G93
Ischemic heart diseases	I21*, I25*
Other heart diseases	I26, I33, I35, I46, I48, I50
Cerebrovascular diseases	I60*, I61*, I62*, I63*, I64*
Diseases of arteries, arterioles and capillaries	I70, I71
Diseases of the respiratory system	J10, J18*, J44*, J69, J80, J84, J90, J96, U07
Diseases of the digestive system	K26, K55, K56, K57, K63, K65, K70, K72, K74, K83, K85, K92
Diseases of the genitourinary system	N17, N18, N39
General symptoms and signs	R41, R53, R57, R64
Injuries	S06*, S32, S72
Complications of surgical and medical care, not elsewhere classified	T81, T82
Other	L03, Z54

Note

* Indicates diagnosis groups where changes were applied. Refer to Appendix II for more details.

Appendix V: The Charlson Index

The Charlson Index is an overall comorbidity score that has been shown to be highly associated with mortality and has been widely used in clinical research. Based on Quan's updated methodology (Quan, et al., 2011), the comorbid conditions below are used to calculate the Charlson Index score for each record. Conditions within each group are counted only once (e.g., if I43 and I50 appear on the abstract, the score will be 2). If conditions from different groups are present on the abstract, their weights will be summed (e.g., if I50 and F01 are present on the abstract, the score will be 4).

Comorbid condition	ICD-10 codes (first 3 or 4 digits, as specified)	Weight
Congestive heart failure	I099, I255, I420, I425, I426, I427, I428, I429, I43, I50 P290	2
Dementia	F01, F02, F03, F051 G30, G311	2
Chronic pulmonary disease	I278, I279 J40, J41, J42, J43, J44, J45, J47, J60, J61, J62, J63, J64, J65, J66, J67, J684, J701, J703	1
Rheumatologic disease	M05, M06, M315, M32, M33, M34, M351, M353, M360	1
Mild liver disease	B18 K700, K701, K702, K703, K709, K713, K714, K715, K717, K73, K74, K760, K762, K763, K764, K768, K769	2
Diabetes with chronic complications	E102, E103, E104, E105, E107, E112, E113, E114, E115, E117, E132, E133, E134, E135, E137, E142, E143, E144, E145, E147	1
Hemiplegia or paraplegia	G041, G114, G801, G802, G81, G82, G830, G831, G832, G833, G834, G839	2
Renal disease	N032, N033, N034, N035, N036, N037, N052, N053, N054, N055, N056, N057, N18, N19, N250 Z490, Z491, Z492	1
Any malignancy, including lymphoma and leukemia	C00, C01, C02, C03, C04, C05, C06, C07, C08, C09, C10, C11, C12, C13, C14, C15, C16, C17, C18, C19, C20, C21, C22, C23, C24, C25, C26, C30, C31, C32, C33, C34, C37, C38, C39, C40, C41, C43, C45, C46, C47, C48, C49, C50, C51, C52, C53, C54, C55, C56, C57, C58, C60, C61, C62, C63, C64, C65, C66, C67, C68, C69, C70, C71, C72, C73, C74, C75, C76, C81, C82, C83, C84, C85, C88, C90, C91, C92, C93, C94, C95, C96, C97	2
Moderate or severe liver disease	I850, I859, I864 K704, K711, K721, K729, K765, K766, K767	4
Metastatic solid tumour	C77, C78, C79, C80	6
AIDS/HIV	B24 O987	4

Diagnosis types 1, W, X and Y are used to calculate the Charlson score. Type 3 codes for the following conditions are also included where applicable (to account for coding and classification standards):

- Asterisk codes (coded at the secondary position in the abstract): I43, F02, M360
- Diabetes codes in the “Diabetes with chronic complications” group: E102, E103, E104, E105, E107, E112, E113, E114, E115, E117, E132, E133, E134, E135, E137, E142, E143, E144, E145, E147
- All diagnosis codes in the “Any malignancy, including lymphoma and leukemia” and “Metastatic solid tumour” groups

The following exclusions are applied:

- For cases without a type 6 diagnosis code:
  - If a patient had a qualifying Charlson diagnosis code as type 1, W, X, Y or 3 (for selected cases), and this same code also appeared as the MRDx or type 2, then this type 1, W, X, Y or 3 code was not included in the Charlson calculation.
- For cases with a type 6 diagnosis code:
  - The original type 6 code is not included in the Charlson calculation.
  - The original MRDx is included in the Charlson calculation if this diagnosis code is not also a type 2 code.
- If a patient had a qualifying Charlson diagnosis code as type 1, W, X, Y or 3 (for selected cases), and this same code also appeared as type 6 or type 2, then this type 1, W, X, Y or 3 code was not included in the Charlson calculation. For all cases:
  - When the MRDx was not used to determine a diagnosis group (see Appendix II for examples), the diagnosis used to assign the diagnosis group was not counted in the Charlson calculation. For example, if a patient had an MRDx of care involving use of rehabilitation procedures (Z50) and also had an intracerebral hemorrhage (I61) as a preadmission diagnosis, the diagnosis group would be I61 for the HSMR calculation. Accordingly, the I61 diagnosis was not included in the Charlson Index score calculation.

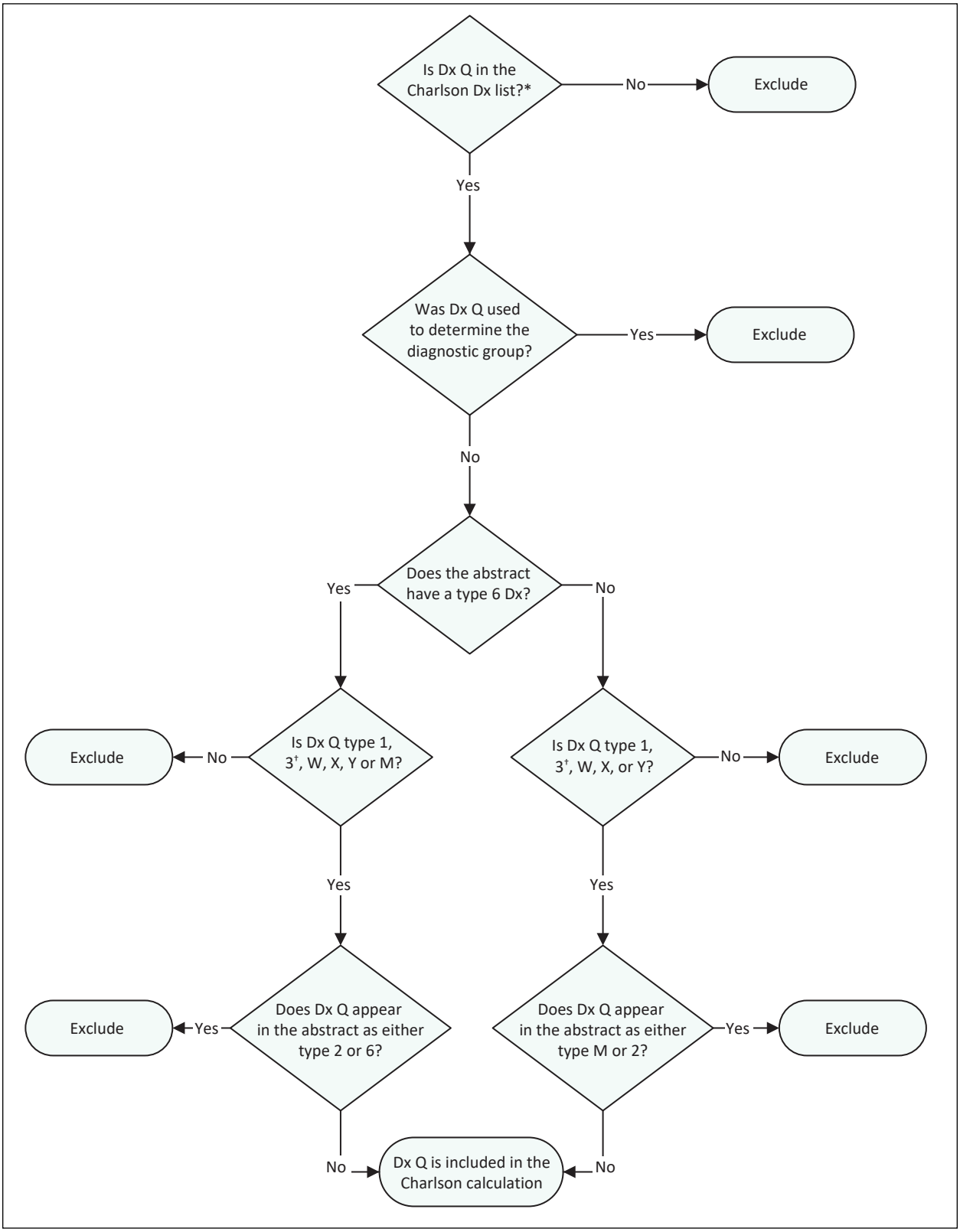
The flowchart on page 21 illustrates how the Charlson score is assigned.

Outside Quebec, if the sum of all Charlson weights is equal to 0, the patient is in Charlson group 0. If the sum of all weights is 1 or 2, then the patient is in Charlson group 1. If the sum of all weights is 3 or more, then the patient is in Charlson group 2.

Due to differences in data collection, it is not possible to distinguish comorbidities from secondary diagnoses in Quebec data. Therefore, Charlson score groups for data submitted by Quebec are assigned differently in order to achieve comparability across the country: patients with a score of 0 or 1 are in group 0, patients with a score of 2, 3 or 4 are in group 1 and patients with a score of 5 or more are in group 2.

Charlson group	Charlson score	
	Outside Quebec	Quebec
0	0	0–1
1	1–2	2–4
2	3+	5+

How the Charlson score is assigned: Flowchart



Notes

* Dx Q is the diagnosis of interest.

† Only certain conditions with Type 3 are included.

Text alternative for flowchart

To determine whether a diagnosis should be included in Charlson score calculations, the following steps are applied:

- **Step 1:** Diagnosis of interest is included if it is in the list of Charlson diagnoses.
- **Step 2:** Diagnosis of interest is excluded if it determines the diagnostic group.
- **Step 3:** This step is a check for the diagnosis type of the diagnosis of interest and depends on the presence or absence of diagnosis type 6 in the abstract:
  - If there **is** a type 6 diagnosis in the abstract, and the diagnosis of interest is type 1, 3, W, X, Y or M and the diagnosis of interest does not appear in the abstract as type 2 or 6, the diagnosis of interest is included in the Charlson score calculation.
  - If there is **no** type 6 diagnosis in the abstract, and the diagnosis of interest is type 1, 3, W, X or Y and the diagnosis of interest does not appear in the abstract as type 2 or M, the diagnosis of interest is included in the Charlson score calculation.

Appendix VI: Peer groups

The peer group methodology was first developed based on 2010–2011 to 2012–2013 data, when hospitals were assigned to 1 of 4 hospital peer groups. This assignment was used to report indicator results until 2017–2018. Hospitals were re-evaluated based on 2015–2016 to 2017–2018 data. Starting in 2018–2019, results are reported using the updated peer group assignment.

The following criteria were used for peer group assignment:

Teaching

- Had confirmed Teaching status from the provincial ministry; or
- Were identified as Teaching in the provincial ministry's submission to the Canadian MIS Database.

H1

Community — Large

2 of the following 3 criteria:

- ≥8,000 inpatient cases
- ≥10,000 weighted cases
- ≥50,000 inpatient days

H2

Community — Medium

Do not meet H1 criteria and

- ≥2,000 weighted cases

H3

Community — Small

Do not meet H1 criteria and

- <2,000 weighted cases

Appendix VII: Model coefficients

See the All Cases Coefficients file, which includes descriptions of coefficients and variables.

For questions regarding the file, please contact us at hsp@cihi.ca.

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