



High Users of Hospital Beds: Methodology — Appendix

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For permission or information, please contact CIHI:

Canadian Institute for Health Information

495 Richmond Road, Suite 600

Ottawa, Ontario K2A 4H6

Phone: 613-241-7860

Fax: 613-241-8120

www.cihi.ca

copyright@cihi.ca

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Methodology for identifying high users

High users of acute care services (also known as high users of hospital beds) are defined as patients who had 3 or more acute care hospital admissions (episodes of care) within a 1-year period (365 days) with a cumulative length of stay (LOS) of longer than 30 days. The calculations are as follows:

1. Episodes of care are constructed to avoid analyzing transfers as 2 separate hospital admissions. An episode of care refers to all contiguous inpatient hospitalizations and day procedure visits. To construct an episode of care, a transfer is assumed to have occurred if admission to an acute care facility/day surgery facility occurred on the same day as discharge from another acute care facility/day surgery facility. Due to the absence of time of admission/discharge variables in the Ontario Mental Health Reporting System (OMHRS), episode-building involving these mental health records can be linked using only date of admission/discharge variables. A transfer is assumed if admission to an institution occurred on the same date as discharge from another institution (including overlapping hospitalizations on the same day). Day surgery records are used to build episodes of care and calculate the total LOS; when an episode of care is built from transfers from acute care and day surgery services, only the clinical or diagnosis information from acute care is retained.
2. The index episode of care is identified as the most recent admission date.
3. Any previous episodes of care that occurred within a 365-day period (the look-back period) from the index admission are counted to identify patients with 3 or more episodes of care. To ensure that all patients admitted to acute care in the fiscal year of reporting are followed up during the 365-day period, 3 fiscal years of data are used to identify high users.
4. Cumulative LOS is calculated for each patient by calculating the sum of LOS (including alternate level of care days and day surgery) across all episodes of care within the look-back period.

Risk adjustment

A logistic regression model is fitted with the independent variables from the index episode of care described below to ensure comparability across regional health authorities. Coefficients derived from the logistic regression model are used to calculate the probability that a patient could be a high user of inpatient acute care services. The expected number of high users for a regional health authority is the sum of these probabilities in that region. The risk-adjusted rate of high users of inpatient acute care services is calculated by dividing the number of high users (patients with 3 or more episodes of care within a 1-year [365-day] period and a cumulative length of stay greater than 30 days) in each region by the expected number of high users in the region and multiplying by the Canadian average high users rate. A 95% confidence interval for the risk-adjusted rate is also calculated using Byar's approximation; the formula used to calculate confidence intervals is available upon request.

Age

Age is treated as a categorical variable:

18–24, 25–49, 50–64, 65+

Sex

Male or female

Admission category

Urgent or elective

Patient clinical groups

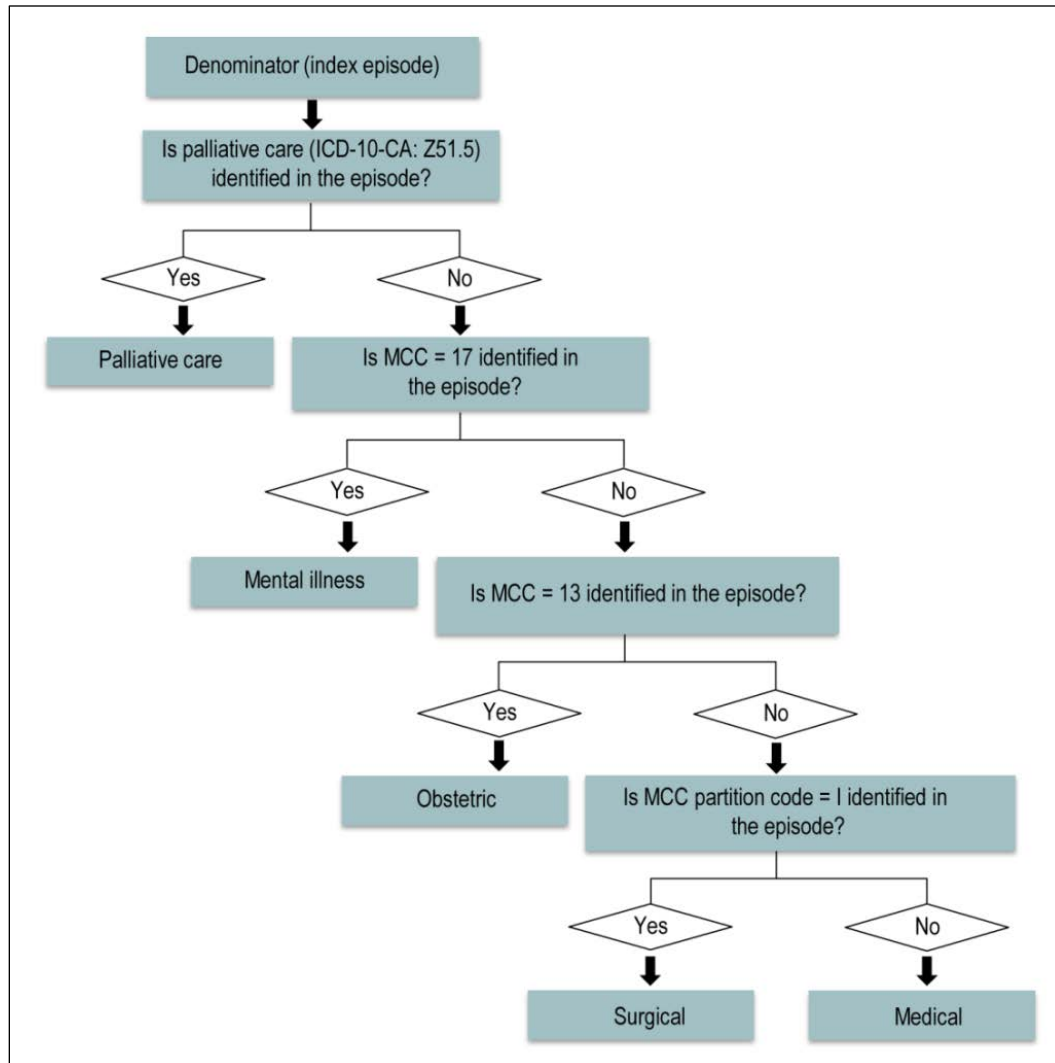
Patient clinical groups are assigned from the clinical information of the index episode of care (the most recent hospitalization) using the *International Statistical Classification of Diseases and Related Health Problems, 10th Revision, Canada* (ICD-10-CA) codes, major clinical categories (MCCs) and MCC Intervention and Diagnosis partition codes (see the table for the list and description of clinical groups).

To ensure that a unique patient clinical group is assigned to the index episode of care, clinical groups are hierarchically identified. Thus when the index episode of care has a combination of conditions that fall under multiple clinical groups (e.g., palliative care and surgery), the clinical group at the top of the hierarchy will be assigned based on the following order: palliative care, mental illness, obstetric, surgical and medical. (Please refer to the figure.)

Table Patient clinical groups, descriptions and ICD-10-CA codes

Clinical group	Description
Palliative care	ICD-10-CA: Z51.5 coded as most responsible diagnosis (MRDx); for Quebec data: Z51.5 coded as MRDx, or cancer (ICD-10-CA: C00–C97) coded as MRDx and Z51.5 coded in any secondary diagnosis field
Mental illness	MCC = 17 — Mental Diseases and Disorders
Obstetric	MCC = 13 — Pregnancy and Childbirth
Surgical	MCC partition code = I — Intervention partition code from the CMG methodology
Medical	MCC partition code = D — Diagnosis partition code from the CMG methodology

Figure Hierarchy for assigning patient clinical groups in the index episode



Appendix: Text alternative for visual

Denominator patients are assigned to one of the following hierarchically identified patient groups based on the clinical information of their index episode of care (the most recent hospitalization): palliative care, mental illness, obstetrical, surgical and medical.

The following steps outline how to assign denominator patients to a patient group:

Step 1: Assign patients to the *palliative care* group if ICD-10-CA code Z51.5 is identified in any record of the index episode.

Step 2: Of the remaining patients, assign patients to the *mental illness* group if MCC is 17 in any record of the index episode.

Step 3: Of the remaining patients, assign patients to the *obstetric* group if MCC is 13 in any record of the index episode.

Step 4: Of the remaining patients, assign patients to the *surgical* group if the MCC partition is “intervention” in any record of the index episode.

Step 5: Assign the remaining patients to the *medical* group.



CIHI Ottawa

495 Richmond Road
Suite 600
Ottawa, Ont.
K2A 4H6
613-241-7860

CIHI Toronto

4110 Yonge Street
Suite 300
Toronto, Ont.
M2P 2B7
416-481-2002

CIHI Victoria

880 Douglas Street
Suite 600
Victoria, B.C.
V8W 2B7
250-220-4100

CIHI Montréal

1010 Sherbrooke Street West
Suite 602
Montréal, Que.
H3A 2R7
514-842-2226

cihi.ca

17435-0418

