Canadian MIS Database: Hospital Financial Performance Indicators, 2007–2008 to 2011–2012

Methodological Notes

Spending and Health Workforce

Canadian Institute for Health Information
Institut canadien d'information sur la santé

Our Vision

Better data. Better decisions.
Healthier Canadians.

Our Mandate

To lead the development and maintenance of comprehensive and integrated health information that enables sound policy and effective health system management that improve health and health care.

Our Values

Respect, Integrity, Collaboration, Excellence, Innovation

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Introduction

The Canadian MIS Database (CMDB) at the Canadian Institute for Health Information (CIHI) contains financial and statistical information from hospitals and limited data from health regions across Canada. The data is collected according to a standardized framework for collecting and reporting financial and statistical data on the day-to-day operations of health service organizations, known as the *Standards for Management Information Systems in Canadian Health Service Organizations (MIS Standards)*.

Currently, most information in the CMDB is specific to hospitals, including those that specialize in cancer care or mental health. In provinces and territories where hospitals are part of a regional health authority, data from other health service organizations is also submitted to the CMDB, providing a complete picture of health services for those jurisdictions.

To ensure the integrity and viability of its databases, CIHI developed a data quality framework to provide all databases and registries with a common comprehensive strategy for evaluating and assessing data quality and identifying priorities for continuous quality improvement. The following information was extracted from the CMDB data quality evaluation and is designed to help external users of the data assess its utility for their specific analysis. Additional information is available by contacting the CMDB team by phone at 613-241-7860, by fax at 613-241-8120 or by email at cmdb@cihi.ca.

Concepts

Mandate/Purpose

The CMDB contains records of financial and statistical information based on a standardized chart of accounts, general accounting policies and procedures, workload measurement systems, service activity statistics and indicators that support management decision-making in health service organizations.

The information in the CMDB can be used to cost the activities of health service organizations and forms the basis of management reporting, including annual general purpose financial statements, financial ratio analysis and operational budgeting. CMDB data has also informed costing models and methodologies and has been used in several financial performance benchmarking/scorecard reports across Canada.

Variables and Concepts

The variables and concepts used to capture information in the CMDB are based on the MIS Standards. The MIS Standards is used to report management information—which is ultimately submitted to the CMDB—related to staffing, costs, workload and provision of services. The MIS Standards is designed to apply across the continuum of services, from hospitals to community-based health service organizations, and provides a framework to generate, maintain and analyze information required for effective decision-making and accountability.

The main features of the MIS Standards are

- A chart of accounts—the coding structure for the data that is applicable across different service delivery settings;
- Accounting principles and procedures—rules that ensure consistency with generally accepted accounting principles contained in the handbook of the Canadian Institute of Chartered Accountants;
- Workload measurement systems—time-tracking management systems that provide a standardized method of measuring output; and
- Indicators—standardized ratios that demonstrate how the data can be used for planning, control and performance measurement.

Hospitals and health regions are expected to submit MIS Standards–compliant financial and statistical data relating to hospital services to the CMDB. Health regions also submit data for other health service activities outside of hospitals. MIS-submitting jurisdictions generally provide their data to the CMDB through their respective ministries of health, which then submit the data to the CMDB.

The CMDB contains profile-related information about the health regions and hospitals that supply data. The information includes unique organization identifiers and the organization's name, address, size and ownership. The CMDB also contains data relating to the financial position (balance sheet) and operations (income statement) of reporting organizations. Financial and statistical data is recorded by functional centre and by type of expense and revenue source. The functional centres correspond to the core activities carried out in the health service organization and include administrative and support services, ambulatory care services, community health services, diagnostic and therapeutic services, education, nursing inpatient services and research.

Broad groups of expenses include compensation, supplies, sundries, equipment, contracted-out services, and buildings and grounds expenses. The CMDB also records statistical information, such as the number of hours worked by staff, the number of inpatient days reported in nursing wards and workload information that is used to measure the volume of activity provided by employees of a specific functional centre in terms of a standardized unit of time.

Definitions of commonly used terms in the MIS Standards can be found in the appendix of this document.

Major Data Limitations

In 1995, CIHI began collecting financial and statistical data in the CMDB (previously known as the Annual Hospital Survey) for fiscal year 1995–1996. Prior to this time, a similar database was maintained by Statistics Canada. Historical data prior to 1995–1996 is not available in the CMDB but can be obtained from Statistics Canada.

For both 1995–1996 and 1996–1997, there was a very low response rate for data submissions. As a result, data for these years is incomplete. Subsequent fiscal years achieved response rates exceeding 90% of all Canadian hospitals. However, not all reporting hospitals provided a complete data set.

Other limitations that affect the comparability of reported data include the extent to which organizations apply the MIS Standards and the extent to which generally accepted accounting principles are applied to the data before it is reported to CIHI. For example, Quebec has not implemented the MIS Standards; hence its data is not submitted in the same format as that of other provinces, resulting in limited comparability of Quebec's data with data submitted from other jurisdictions.

The variation in the administrative structure of health services across jurisdictions must also be considered when comparing their data. For example, provinces like Ontario do not have regional administrative bodies that are comparable to those in other jurisdictions; provinces such as Alberta and Prince Edward Island presently operate under systems where the entire province can be considered one health authority. As such, fundamental differences between jurisdictional systems (such as variation in health system management structures and the use of centralized regional resources) will affect the comparability of the jurisdictions' data, particularly data that describes administrative services.

Major Data Limitations and Estimated Impact or Resolution

While the comprehensiveness of CMDB submissions has improved over time, data for 1997–1998 to 2011–2012 should be viewed with care. Users are cautioned when interpreting results from analysis of this data.

Many of the problems caused by limited reporting are overcome through statistical analysis of indicator results. Once this analysis has been completed, organizations with incomplete data can be eliminated from further analysis for specific indicators. As well, organizations with indicator values that fall outside of predetermined upper or lower limits can be flagged for further analysis or eliminated from results prior to comparative analysis.

Another issue the CMDB faces is the limited extent to which some organizations follow the requirements of the MIS Standards. For example, health regions within some regionalized provinces or territories are not required by the province or territory to allocate regional administrative expenses and expenses for shared services to all of the facilities within the region. Where necessary, CIHI allocated regional, centralized and shared services expenses on a systematic basis before using the data to calculate hospital-level performance indicators to ensure compliance with the MIS Standards.

Note that the province of Quebec collects financial and statistical data according to the *Manuel de gestion financière*, which is different than the MIS Standards used in the rest of Canada (except Nunavut). As a result, a mapping exercise was undertaken to allow data from Quebec to be used in several financial indicators in the national context. CIHI developed a data limitations document that describes some of the major differences between MIS data and data collected according to the *Manuel de gestion financière* in Quebec.

Coverage

Canadian MIS Database Frame

"Frame" refers to a list of entities that should supply data to a database. For the CMDB, the frame refers to all hospitals in MIS-submitting jurisdictions across Canada. Currently, all jurisdictions in Canada provide data for public hospitals under their purview to the CMDB, with the exception of Nunavut.

The CMDB welcomes and encourages MIS-compliant data submissions from all health service organizations in Canada. It presently contains data from some long-term care facilities, community health centres and home care agencies, though the data is not comprehensive. The CMDB does not receive data from private hospitals at this time.

Frame Maintenance

CIHI reviews the CMDB frame every year to determine changes in the submitting organizations from one year to the next that may impact analysis. These include changes to hospital bed counts as well as hospital closures, mergers and amalgamations. Confirmation from jurisdictions is sought when the review yields contradictory or questionable results.

Collection and Non-Response

Data Collection

Financial and statistical data from hospitals is collected with the cooperation of provincial and territorial governments to ensure the submission of MIS Standards–compliant hospital or regional data. Submissions related to the most recently ended fiscal year are generally provided in text format to CIHI by the end of the following October (for example, submissions for 2011–2012 were made by the end of October 2012). Once the data has been submitted, CIHI tests it for compliance with the MIS Standards through an elaborate data quality monitoring methodology.

Principles of the CMDB Data Quality Monitoring Methodology

The data quality monitoring methodology is applied to hospital data and asks four questions of each provincial and territorial CMDB submission:

- Was the submission received by the submission due date?
- Does the submission use the CMDB minimum chart of accounts?
- Does the submission report the minimum statistics required in the functional centre framework?
- Does the financial and statistical data appear reasonable?

The answer to each question is quantified in a transparent and objective way on a scale from 0 to 100. With few exceptions, each question is asked of only that portion of the CMDB that passed previous evaluations in the methodology. For example, data reasonableness is assessed for only valid functional centres with the minimum statistics.

The overall data quality monitoring assessment score is determined by multiplying the scores from each question. By doing so, one can interpret the overall score (for on-time submissions with mapping table sign-off) as an estimate of the percentage of the CMDB hospital resources that are in valid primary and secondary accounts with minimum statistics that pass a basic test of reasonableness.

In addition to assessing and scoring each submission, the methodology produces detailed diagnostic reports that can and should be used to

- Illustrate all examples of non-compliant reporting;
- Identify issues with the provincial or territorial mapping tables that may be corrected in the future;
- Identify individual providers that may require additional focus and support to improve MIS reporting; and
- Identify issues that may be common across providers in a given jurisdiction and help prioritize future MIS reporting initiatives to improve future CMDB submissions.

CIHI endorses the use of this methodology as a means of gauging the general effectiveness of MIS reporting to the CMDB but acknowledges that, within the broad scope of MIS, there are many aspects and measures of data quality, including some that are not addressed by this methodology. CIHI will continue to explore ways to expand the data quality assessment tools so that other aspects may be addressed in the future.

Response

Response rates of data submissions to the CMDB have steadily increased since 1995, when the database was transferred from Statistics Canada to CIHI. In 2011–2012, 100% of all Canadian hospitals in submitting jurisdictions reported data to the CMDB. These hospitals represent 100% of all hospital beds in these jurisdictions. In contrast, only 51% of hospitals representing 56% of beds responded to the call for 1995–1996 data.

Major Changes

There have been no major changes to the data collection tools or data providers (provinces and territories) since the inception of the CMDB in 1995. The MIS Standards has evolved over time, however, to better reflect the reporting needs of CIHI's stakeholders and changes to the Canadian health care environment.

Revision History

The 2011–2012 data used in this publication was current as of May 17, 2013.

Major Revisions

- All weighted cases and indicators using weighted cases were restated using the most recent grouping methodology available at the time of publication (Case Mix Group+ 2013).
- Indicator values for all indicators for all years included in this report were recalculated to reflect changes to historical CMDB data that has been accepted by CIHI since the release of Hospital Financial Performance Indicators, 2006–2007 to 2010–2011.
- All related trim points, provincial averages and national averages were also recalculated because of the revisions listed above. For more information, please consult the Methodology for Identifying Outliers section of this document.

Comparability

Geography

In the CMDB, postal codes are collected from all responding organizations. Information about hospitals can be presented by postal code if the postal code contains more than five hospitals. Generally, the smallest geographic area reportable from the CMDB is the health region. Regions in provinces other than Ontario are defined as health regions.

In most jurisdictions, a regional health authority (reporting entity) provides health services within a specific geographic region. In Quebec, multiple regional entities provide health services within the same geographic region. In Ontario, a grouping of hospitals by local health integration network (LHIN) was used to approximate health regions on a go-forward basis as of 2003–2004.

Information on Facilities

Facility-level information from the CMDB can be linked to clinical information from the Discharge Abstract Database (DAD) based on the facility codes that are unique to each facility. Even though hospitals may report to the DAD using multiple facility codes, these facility codes can be mapped to only one hospital reporting to the CMDB.

Time Period

All provinces and territories submit data on a fiscal year basis that covers April 1 through March 31 of the following year.

Information on Individuals

Information in the CMDB is collected at the organization level and does not contain personal health information. In certain circumstances, it may be possible to derive certain other information about individuals from the CMDB; however, CMDB staff developed data quality procedures to ensure that this information is properly suppressed or aggregated when used in CMDB products.

Financial Performance Indicator Methodology

General Methods

The financial performance indicators used in this report were selected from a broader list of more than 40 measures drawn from research and literature. In 2001, an expert panel helped CIHI review and identify the most relevant indicators. Afterwards, CIHI's MIS Technical Working Group (a group of provincial and territorial MIS coordinators) was asked to provide comments on the MIS definitions of the indicators. CIHI incorporated the feedback provided by this group when developing the indicators. This group has also been consulted about modifications to these indicators since 2001.

In 2011, the list of financial performance indicators was expanded to include indicators that allow financial and statistical data provided to CIHI by Quebec to be compared with financial and statistical data provided by other jurisdictions. These indicators are

- **Total** worked hours for patient care functional centres as a percentage of total worked hours;
- Nursing inpatient services **total** worked hours per weighted case;
- Diagnostic services **total** worked hours per weighted case;
- Clinical laboratory **total** worked hours per weighted case; and
- Pharmacy **total** worked hours per weighted case.

In addition, Quebec values are available for the following pre-existing indicators:

- Total margin;
- Administrative services expense as a percentage of total expense; and
- Cost per weighted case (unadjusted).

Values for all indicators calculated from Quebec data (except for total margin and cost per weighted case) are available for all five years included in this report. Total margin values based on Quebec data are available for 2010–2011 and 2011–2012. Cost per weighted case (unadjusted) values based on Quebec data are available for 2009–2010, 2010–2011 and 2011–2012.

The following is intended as a general overview of the methods applied to calculate the financial performance indicators in this report. More detailed information can be obtained by contacting the Canadian MIS Database team by phone at 613-241-7860, by fax at 613-241-8120 or by email at cmdb@cihi.ca.

Unit of Analysis

Hospitals in Canada operate under a variety of legal organizations. In some situations, hospitals are included under the legal umbrella of a heath authority. The health authority may include long-term care organizations, community care organizations and other health service delivery organizations. In other situations, the hospital itself is the legal entity.

For this report, in Ontario and Yukon, the legal entity is a hospital. For Ontario, Quebec and Yukon, indicators are represented as the regional aggregate of individual legal entities that contain hospitals. The following indicators are calculated using the legal entity as the unit of analysis:

- Total margin
- Current ratio
- Administrative support expense as a percentage of total expense
- Information systems expense as a percentage of total expense
- Average age of equipment

The following indicators are calculated using individual hospitals, regardless of the legal entity:

- Unit-producing personnel (UPP) worked hours for patient care functional centres as a percentage of total worked hours
- Cost per weighted case (both versions)
- Nursing inpatient services UPP worked hours per weighted case
- Diagnostic services UPP worked hours per weighted case
- Clinical laboratory UPP worked hours per weighted case
- Pharmacy UPP worked hours per weighted case
- **Total** worked hours for patient care functional centres as a percentage of total worked hours
- Nursing inpatient services **total** worked hours per weighted case
- Diagnostic services **total** worked hours per weighted case
- Clinical laboratory **total** worked hours per weighted case
- Pharmacy **total** worked hours per weighted case

2011–2012 Indicator Methodology

1. **Total margin:** Total margin measures financial viability. It is strongly influenced by positive financial outcomes on a yearly basis. A positive value indicates that the legal entity had revenues in excess of expenses (a surplus), while a negative value indicates that the legal entity had expenses in excess of revenues (a deficit).

$$\frac{\text{Total Revenue} - \text{Total Expenses}}{\text{Revenue, Excluding Internal Recoveries}}$$

MIS account codes used in the numerator are primary accounts 7* and 8* and secondary financial accounts 1* and 3* to 9*.

MIS account codes used in the denominator are primary accounts 7* and 8* and secondary financial accounts 1*, excluding 1 21 and 1 22.

2. **Current ratio:** Current ratio is an indicator of a hospital's liquidity that measures how current assets and liabilities are managed. The inability to meet short-term obligations can hinder the delivery of quality patient care services. A current ratio value less than 1 indicates that the legal entity did not have sufficient short-term assets to meet its short-term debts.

$$\frac{\text{Current Assets + Debit Current Liability Balances, Excluding Current Portion of Deferred Contributions}}{\text{Current Liabilities, Excluding Current Portion of Deferred Contributions + Credit Current Assets, Except Current Asset Contra Accounts}}$$

MIS account codes used in the numerator are primary accounts 1* plus debit balances in primary accounts 4*, excluding 4* 8.

MIS account codes used in the denominator are primary accounts 4*, excluding 4* 8, plus credit balances in primary accounts 1*, except 1* 4.

Note: Data is adjusted for amounts not reallocated on the trial balance to be consistent with financial statement reporting (for example, only a net credit position across current cash accounts would be added to the denominator).

This indicator includes deferred revenue (MIS primary account 4* 6 Unearned Contributions) but excludes the current portion of deferred capital contributions (MIS primary account 4* 8). The current portion of deferred capital contributions represents the next year's amortization of grants received for capital purposes. Since the next year's amortization expenses of assets that directly relate to the deferred capital contributions are not included as a current asset, including the current portion of deferred capital contributions is unwarranted.

3. **Administrative services expense as a percentage of total expense:** Administrative expense is a measure of a hospital's efficiency. It represents the percentage of the legal entity's total expenses that were spent in administrative departments, such as finance and human resources.

$$\frac{\text{General Administration, Finance, Human Resources and Communication Expenses, Net of Recoveries}}{\text{Total Expenses, Net of Recoveries}}$$

MIS account codes used in the numerator are primary accounts 7* 1 10, 7* 1 15, 7* 1 20 and 7* 1 30 and secondary financial accounts 1 2* and 3* to 9*.

MIS account codes used in the denominator are primary accounts 7* and 8* and secondary financial accounts 1 2* and 3* to 9*.

4. **Information systems expense as a percentage of total expense:** This indicator examines a legal entity's expenditures on information services relative to its total expenditures.

$$\frac{\text{Systems Support, Net of Recoveries}}{\text{Total Expenses, Net of Recoveries}}$$

MIS account codes used in the numerator are primary accounts 7* 1 25 and secondary financial accounts 1 2* and 3* to 9*.

MIS account codes used in the denominator are primary accounts 7* and 8* and secondary financial accounts 1 2* and 3* to 9*.

5. **Unit-producing personnel (UPP) worked hours for patient care functional centres as a percentage of total worked hours:** This indicator measures the percentage of the total worked hours of a hospital (excluding medical personnel) that were worked by UPP (that is, those personnel whose primary function is to carry out activities that directly contribute to fulfilling the mandate of the functional centre in which they work) in patient care functional centres.

$$\frac{\text{UPP Inpatient Nursing, Ambulatory Care, and Diagnostic and Therapeutic Worked and Purchased Hours}}{\text{Total Worked Hours, Excluding Medical Compensation Hours}}$$

MIS account codes used in the numerator are primary accounts 7* 2, 7* 3 and 7* 4 and secondary statistical accounts 3 50 10 and 3 50 90.

MIS account codes used in the denominator are primary accounts 7* and 8*, excluding primary account 7* 5, and secondary statistical accounts 3 10 10, 3 10 90, 3 50 10 and 3 50 90.

6. ***Total* worked hours for patient care functional centres as a percentage of total worked hours:** This indicator measures the percentage of the total worked hours of a hospital (excluding medical personnel) that was worked by all personnel (that is, both unit-producing personnel and management and operational support personnel) in patient care functional centres.

$$\frac{\text{Total Inpatient Nursing, Ambulatory Care, and Diagnostic and Therapeutic Worked and Purchased Hours}}{\text{Total Worked Hours, Excluding Medical Compensation Hours}}$$

MIS account codes used in the numerator are primary accounts 7* 2, 7* 3 and 7* 4 and secondary statistical accounts 3 10 10, 3 10 90, 3 50 10 and 3 50 90.

MIS account codes used in the denominator are primary accounts 7* and 8*, excluding primary account 7* 5, and secondary statistical accounts 3 10 10, 3 10 90, 3 50 10 and 3 50 90.

7. **Nursing inpatient services unit-producing personnel (UPP) worked hours per weighted case:** This indicator measures the number of worked hours required from UPP in hospital nursing units to produce a weighted case.

$$\frac{\text{UPP Inpatient Nursing Worked and Purchased Hours (Excluding Long-Term/Chronic Care)}}{\text{Total Inpatient Weighted Cases}}$$

MIS account codes used in the numerator are primary accounts 7* 2 (excluding 7* 2 76 and 7* 2 92) and secondary statistical accounts 3 50 10 and 3 50 90.

The denominator includes total acute inpatient weighted cases (obtained from the DAD), excluding day procedures. **Note:** Ideally, this indicator will reflect acute care only. For some hospitals, worked hours and weighted cases related to mental health and/or rehabilitation services could not be easily removed from the indicator. For these hospitals, data related to mental health and/or rehabilitation services may be included in the indicator.

8. **Nursing inpatient services *total* worked hours per weighted case:** This indicator measures the number of worked hours required from all personnel in hospital nursing units (excluding medical personnel) to produce a weighted case.

$$\frac{\text{Total Inpatient Nursing Worked and Purchased Hours (Excluding Long-Term/Chronic Care)}}{\text{Total Inpatient Weighted Cases}}$$

MIS account codes used in the numerator are primary accounts 7* 2 (excluding 7* 2 76 and 7* 2 92) and secondary statistical accounts 3 10 10, 3 10 90, 3 50 10 and 3 50 90.

The denominator includes total acute inpatient weighted cases (obtained from the DAD), excluding day procedures. **Note:** Ideally, this indicator will reflect acute care only. For some hospitals, worked hours and weighted cases related to mental health and/or rehabilitation services could not be easily removed from the indicator. For these hospitals, data related to mental health and/or rehabilitation services may be included in the indicator.

9. **Diagnostic services unit-producing personnel (UPP) worked hours per weighted case:** This indicator measures the number of worked hours required from UPP working in hospital diagnostic units to produce a weighted case.

$$\frac{\text{UPP Diagnostic Services Worked and Purchased Hours (Adjusted for Inpatient Activity)}}{\text{Total Inpatient Weighted Cases}}$$

MIS account codes used in the numerator are primary accounts 7* 4 05, 7* 4 15, 7* 4 25 and 7* 4 30 and secondary statistical accounts 3 50 10 and 3 50 90. The numerator is adjusted for the proportion of inpatient activity as determined by the hospital's reported workload. If workload is not available, the hospital's service activity statistics for the related functional centres are used. If this data is also unavailable, a national proportion based on workload provided by MIS-submitting jurisdictions is used. Please note that the proportion of the numerator related to long-term care is removed for all hospitals.

The denominator includes total acute inpatient weighted cases (obtained from the DAD), excluding day procedures. **Note:** Ideally, this indicator will reflect diagnostic services provided for acute care only. For some hospitals, worked hours and weighted cases related to mental health and/or rehabilitation services could not be easily removed from the indicator. For these hospitals, data related to mental health and/or rehabilitation services may be included in the indicator.

10. **Diagnostic services *total* worked hours per weighted case:** This indicator measures the number of worked hours required from all personnel working in hospital diagnostic units (excluding medical personnel) to produce a weighted case.

$$\frac{\text{Total Diagnostic Services Worked and Purchased Hours (Adjusted for Inpatient Activity)}}{\text{Total Inpatient Weighted Cases}}$$

MIS account codes used in the numerator are primary accounts 7* 4 05, 7* 4 15, 7* 4 25 and 7* 4 30 and secondary statistical accounts 3 10 10, 3 10 90, 3 50 10 and 3 50 90. The numerator is adjusted for the proportion of inpatient activity as determined by the hospital's reported workload. If workload is not available, the hospital's service activity statistics for the related functional centres are used. If this data is also unavailable, a national proportion based on workload data provided by MIS-submitting jurisdictions is used. Please note that the proportion of the numerator related to long-term care is removed for all hospitals.

The denominator includes total acute inpatient weighted cases (obtained from the DAD), excluding day procedures. **Note:** Ideally, this indicator will reflect diagnostic services provided for acute care only. For some hospitals, worked hours and weighted cases related to mental health and/or rehabilitation services could not be easily removed from the indicator. For these hospitals, data related to mental health and/or rehabilitation services may be included in the indicator.

11. **Clinical laboratory unit-producing personnel (UPP) worked hours per weighted case:** This indicator measures the number of worked hours required from UPP working in hospital laboratory units to produce a weighted case.

$$\frac{\text{UPP Laboratory Services Worked and Purchased Hours (Adjusted for Inpatient Activity)}}{\text{Total Inpatient Weighted Cases}}$$

MIS account codes used in the numerator are primary accounts 7* 4 10 and secondary statistical accounts 3 50 10 and 3 50 90. The numerator is adjusted for the proportion of inpatient activity as determined by the hospital's reported workload. If workload is not available, the hospital's service activity statistics for the clinical laboratory functional centres are used. If this data is also unavailable, a national proportion based on workload data provided by MIS-submitting jurisdictions is used. Please note that the proportion of the numerator related to long-term care is removed for all hospitals.

The denominator includes total acute inpatient weighted cases (obtained from the DAD), excluding day procedures. **Note:** Ideally, this indicator will reflect clinical laboratory services provided for acute care only. For some hospitals, worked hours and weighted cases related to mental health and/or rehabilitation services could not be easily removed from the indicator. For these hospitals, data related to mental health and/or rehabilitation services may be included in the indicator.

12. **Clinical laboratory *total* worked hours per weighted case:** This indicator measures the number of worked hours required from all personnel working in hospital laboratory units (excluding medical personnel) to produce a weighted case.

$$\frac{\text{Total Laboratory Services Worked and Purchased Hours (Adjusted for Inpatient Activity)}}{\text{Total Inpatient Weighted Cases}}$$

MIS account codes used in the numerator are primary accounts 7* 4 10 and secondary statistical accounts 3 10 10, 3 10 90, 3 50 10 and 3 50 90. The numerator is adjusted for the proportion of inpatient activity as determined by the hospital's reported workload. If workload is not available, the hospital's service activity statistics for the clinical laboratory functional centres are used. If this data is also unavailable, a national proportion based on workload data provided by MIS-submitting jurisdictions is used. Please note that the proportion of the numerator related to long-term care is removed for all hospitals.

The denominator includes total acute inpatient weighted cases (obtained from the DAD), excluding day procedures. **Note:** Ideally, this indicator will reflect clinical laboratory services provided for acute care only. For some hospitals, worked hours and weighted cases related to mental health and/or rehabilitation services could not be easily removed from the indicator. For these hospitals, data related to mental health and/or rehabilitation services may be included in the indicator.

13. **Pharmacy unit-producing personnel (UPP) worked hours per weighted case:** This indicator measures the number of worked hours required from UPP working in hospital pharmacy functional centres to produce a weighted case.

$$\frac{\text{UPP Pharmacy Worked and Purchased Hours (Adjusted for Inpatient Activity)}}{\text{Total Inpatient Weighted Cases}}$$

MIS account codes used in the numerator are primary accounts 7* 4 40 and secondary statistical accounts 3 50 10 and 3 50 90. The numerator is adjusted for the proportion of inpatient activity as determined by the hospital's reported workload. If workload is not available, the hospital's service activity statistics for the pharmacy functional centres are used. If this data is also unavailable, a national proportion based on workload data provided by MIS-submitting jurisdictions is used. Please note that the proportion of the numerator related to long-term care is removed for all hospitals.

The denominator includes total acute inpatient weighted cases (obtained from the DAD), excluding day procedures. **Note:** Ideally, this indicator will reflect pharmacy services provided for acute care only. For some hospitals, worked hours and weighted cases related to mental health and/or rehabilitation services could not be easily removed from the indicator. For these hospitals, data related to mental health and/or rehabilitation services may be included in the indicator.

14. **Pharmacy *total* worked hours per weighted case:** This indicator measures the number of worked hours required from all personnel working in hospital pharmacy functional centres (excluding medical personnel) to produce a weighted case.

$$\frac{\text{Total Pharmacy Worked and Purchased Hours (Adjusted for Inpatient Activity)}}{\text{Total Inpatient Weighted Cases}}$$

MIS account codes used in the numerator are primary accounts 7* 4 40 and secondary statistical accounts 3 10 10, 3 10 90, 3 50 10 and 3 50 90. The numerator is adjusted for the proportion of inpatient activity as determined by the hospital's reported workload. If workload is not available, the hospital's service activity statistics for the pharmacy functional centres are used. If this data is also unavailable, a national proportion based on workload data provided by MIS-submitting jurisdictions is used. Please note that the proportion of the numerator related to long-term care is removed for all hospitals.

The denominator includes total acute inpatient weighted cases (obtained from the DAD), excluding day procedures. **Note:** Ideally, this indicator will reflect pharmacy services provided for acute care only. For some hospitals, worked hours and weighted cases related to mental health and/or rehabilitation services could not be easily removed from the indicator. For these hospitals, data related to mental health and/or rehabilitation services may be included in the indicator.

15. **Average age of equipment:** This is a measure of capital that examines the relationship between a legal entity's yearly equipment amortization expenses and its total accumulated amortization for equipment assets.

$$\frac{\text{Accumulated Equipment Amortization (Distributed/Undistributed)}}{\text{Equipment Amortization Expense (Distributed/Undistributed)}}$$

MIS account codes used in the numerator are primary accounts 3* 8 53 and 3* 8 63.

MIS account codes used in the denominator are primary accounts 7* and 8* and secondary financial account 7 50.

Cost per weighted case: Cost per weighted case (CPWC) measures the relative cost-efficiency of a hospital's ability to provide acute inpatient care. This indicator compares a hospital's total acute inpatient care expenses with the number of acute inpatient weighted cases related to the inpatients that it provided care for. The result is the hospital's average full cost of treating the average acute inpatient.

CPWC can be used in conjunction with a Resource Intensity Weight (RIW) to estimate the cost of an acute inpatient hospital stay for a specific Case Mix Group (CMG) or for a specific patient. An RIW is a relative cost weight value derived from patient cost data submitted to CIHI's Canadian Patient Cost Database. The term "weighted cases" is applied to the sum of RIWs within a defined group of cases or within a hospital, region or jurisdiction.

All RIWs are relative to the average typical inpatient case, which is assigned an RIW of 1.0. For example, a patient with an RIW of 2.0 would have required twice as many resources during his or her course of hospital treatment as the average typical inpatient.

When interpreting the CPWC indicator, users should take note of several caveats. Though the numerator of CPWC includes the vast majority of a hospital's full inpatient costs, it excludes physician compensation. Physician compensation within the hospital environment is treated and reported differently across jurisdictions due to varying provincial and territorial policies. It has therefore been removed from the CPWC model to better ensure comparability across jurisdictions. Note also that a hospital's cost-efficiency, and by extension its CPWC, can be influenced by a variety of factors, including

- Staff mix;
- Volume of administration and support services;
- Teaching status;
- Rural/urban location;
- Size;
- Type (pediatric, specialty, etc.);
- Delivery of care;
- Percentage of employee benefits; and
- Labour rates.

Labour rate variation has particularly impeded comparisons of CPWC values of hospitals from different jurisdictions. Varying labour rates across Canada can drive hospital CPWC values upward or downward. For example, provinces in the Maritimes tend to have lower labour rates than other jurisdictions in Canada, while Ontario and Alberta tend to have higher labour rates. If interjurisdictional labour rate differences aren't controlled for, CPWC yields limited comparative value.

To address this issue, two CPWC indicators are presented in this release. The first methodology (indicator 16) portrays each hospital's CPWC based on the hospital's labour rates. The second methodology (indicator 17) adjusts the labour component of each hospital's CPWC using a national labour-rate index calculated from CMDB data, thereby yielding values that remove the labour-rate variation between jurisdictions. Both methodologies employ new techniques to improve the data quality of CPWC estimates. A summary of general changes to the historical CPWC methodology and descriptions of the methodologies are provided below. Specific adjustments made to permit the use of Quebec data in the calculation of the unadjusted CPWC are also described.

Adjustments to Historical Methodology for CPWC

Allocations for Patient Care

A key principle of CPWC is the extraction of inpatient costs from a hospital's MIS data submission in whatever part of the hospital they occur. For some functional centres, identifying inpatient costs is straightforward because of the nature of the functional centre itself (for example, the intensive care unit). Other functional centres, by their very nature, serve both the hospital's acute inpatient populations as well as other types of patients (for example, medical imaging). It is more difficult to identify inpatient costs in these functional centres.

In the CMDB, statistical data that measures workload or volumes of activity by patient category can be used to identify costs as inpatient costs. The historical CPWC methodology used a hospital's own statistical data to do so, but it did not examine that data for reasonableness. The historical methodology also used the statistical data to develop national average allocations for use in hospitals that lacked their own statistical data, but again did so regardless of its reasonableness. Going forward, the CPWC methodology will assess the statistical data used for allocations through linear regression. Hospitals that pass these tests of reasonableness will use their own statistics to allocate costs. For those whose statistical reporting is insufficient or unreliable, provincially tailored allocation factors calculated from hospitals that passed the regressions will be used instead. These allocation factors will therefore be based only on data that has been deemed reasonable.

Additional Data Quality Adjustments

Other data quality adjustments were also implemented in the new CPWC to improve the robustness of the methodology. The table below displays a summary of the additional differences between the two methodologies.

Historical CPWC Methodology	New CPWC Methodology
Does not distribute clearing accounts	Distributes clearing accounts to consuming functional centres
Uses all expenses, regardless of balance	Removes expenses with a negative balance
Uses all recoveries, regardless of balance	Removes recoveries with a positive balance
Uses only one year of data at a time	Uses two years of data (the current year and the previous year) to fulfill sample sizes in regressions and calculates the CPWC based on the current year's expenses and weighted cases
Allocates clinical services reported at the regional level to all facilities within that region	Does not allocate clinical services reported at the regional level; these services remain in the regional entity and receive their share of other allocated expenses (for example, administrative services)

Specific adjustments are made to MIS-mapped Quebec data to align it more closely with MIS reporting practices in other jurisdictions. Equipment amortization expenses, which are reported within the Quebec data as undistributed amounts, are distributed to MIS functional centres. Data from MIS-submitting jurisdictions is used to inform this distribution.

As the employer's share of pension contribution is paid directly by the government in Quebec, this component of expenses does not appear in that province's data. In MIS-compliant jurisdictions, this expense is found in secondary financial account 3 ** 44 (Provincial Pension Plan). Using information from the organization that administers the pension plans, pension contributions were estimated for each functional centre in each organization and used in the CPWC analysis.

As for other jurisdictions, Quebec data that was mapped to clearing accounts was distributed to absorbing functional centres as specified in the MIS Standards.

Labour-Rate Adjustment

The historical CPWC methodology did not adjust the indicator for labour-rate differences. The resulting values accurately reported the hospital's real average cost of treating the average acute inpatient; however, as compensation makes up approximately two-thirds of a hospital's expenses, the labour rate was the largest component of differences in CPWC comparisons.

To mitigate the effect of jurisdictional labour-rate differences on CPWC, the labour component of the CPWC value of hospitals in each jurisdiction is now adjusted so that jurisdictional labour rates are equivalent. Hospital compensation in provinces and territories with labour rates lower than the national average is scaled upwards so that it reflects the national average; conversely, hospital compensation in provinces and territories with labour rates higher than the national average is scaled downward. This adjustment is the principal feature of indicator 17, but it is also used in interim steps of indicator 16 whenever national cost per unit calculations are performed or unreasonable data is removed via linear regression.

A multi-step approach is used to determine the scaling factor for each functional centre in each jurisdiction. The first step in this process is to remove all outlier functional centres—those with labour rates greater than $500/hour and those that fall below the provincial or territorial minimum wage. The remaining functional centres are then passed through a regression analysis to remove further outliers and to obtain a national labour rate for each level 3 functional centre and a provincial labour rate for each level 3 functional centre. The national and provincial labour rates are used together to create a scaling factor that will determine whether provincial/territorial labour rates for a functional centre should be scaled upward or downward.

16. **Cost per weighted case (unadjusted for variation in labour rates)**

Data Preparation

Prior to calculating the CPWC indicator, the CMDB data is processed to ensure adequate data consistency across the jurisdictions for indicator calculations and to promote appropriate data quality practices. This data preparation includes the adjustments described in Additional Data Quality Adjustments. It also includes distributing all regionalized undistributed data to health service organizations for all regional health authorities in the CMDB and converting all functional centre and accounting centre fund types to the operating fund.

Determining Full Costs

1. The first step in calculating CPWC values is to determine the full inpatient cost for each individual hospital that reports data to the CMDB. Most expenses in the CMDB are used in this calculation; there are, however, some expenses in the hospital submissions that must be removed to facilitate comparability of CPWC values. The following adjustments are made:

Secondary Financial Account	Description	Action
1 20 **1 21** **1 22**	Recoveries From External Sources Recoveries Within Legal Entity Recoveries—Interdepartmental	Net against expenses
3 10 85 **3 50 85**	Compensation—Management and Operational Support Personnel—Other Termination Benefits Compensation—Unit-Producing Personnel—Other Termination Benefits	Exclude
3 90	Compensation—Medical Personnel	Exclude
9 50 20	Amortization—Undistributed Land Improvements[i]	Exclude
9 50 40	Amortization—Undistributed Buildings[i]	Exclude
9 50 60	Amortization—Undistributed Building Service Equipment[i]	Exclude
9 55	Interest on Long-Term Liabilities	Exclude

Quebec data includes the cost of blood and blood products; this cost is not reported in other jurisdictions. This data has been mapped to a special functional centre that is removed from the data set for this analysis.

2. Once these adjustments have been implemented, all remaining hospital costs must be assigned to one of the following three cost pools:

- Inpatient Cost Pool: These costs are incurred through the direct care of hospital inpatients.
- Other Patient Cost Pool: These costs are incurred through the direct care of non-inpatients, such as hospital clients.
- Non-Patient Cost Pool: These costs are incurred through non–patient care activities.

i. Undistributed amortization is sometimes incorrectly reported rolled up as secondary financial account 9 50 00, so the portion applicable to land improvements, buildings and building service equipment cannot be ascertained. Nationally, CIHI has determined that 70% of the reported undistributed amortization applies to these types of assets, so this percentage is excluded and thus only the costs associated with major equipment amortization—undistributed will remain for allocation purposes.

To properly allocate hospital costs in the CMDB to these cost pools, the costs in functional centres are assigned to the cost pool they best fit. This assignment is primarily based on the first five digits (level 3) of the functional centre, though the assignment can become complicated for functional centres whose services relate to more than one cost pool.

To describe how these costs are identified, functional centres and accounting centres are grouped into seven logical sections and discussed separately. The groupings are

- Nursing inpatient units;
- Operating rooms and post-anesthetic recovery rooms;
- Emergency departments;
- Specified ambulatory care functional centres;
- Diagnostic and therapeutic functional centres;
- Other patient care functional centres; and
- Remaining functional centres and accounting centres.

The section below describes how the costs in each of these seven groupings are allocated to the Inpatient, Other Patient and Non-Patient cost pools.

a) Nursing Inpatient Units

The vast majority of costs reported in nursing inpatient units are expected to be inpatient costs. However, other patient activity is occasionally reported in nursing inpatient units in the form of workload or visits.

Account Number	Description	Inpatient Costs	Other Patient Costs	Non-Patient Costs
71 2 10	Medical Nursing Unit	Yes	Potentially	No
71 2 20	Surgical Nursing Unit	Yes	Potentially	No
71 2 30	Combined Medical/Surgical Nursing Unit	Yes	Potentially	No
71 2 40	Intensive Care Nursing Unit	Yes	Potentially	No
71 2 50	Obstetrics Nursing Unit	Yes	Potentially	No
71 2 70	Pediatric Nursing Unit	Yes	Potentially	No
71 2 75	Mental Health and Addiction Services Nursing Unit	Yes	Potentially	No
71 2 80	Physical Rehabilitation Nursing Unit	Yes	Potentially	No
71 2 90	Palliative Nursing Unit	Yes	Potentially	No

To determine the amount of expenses that should be allocated to the Other Patient Cost Pool, all of the above functional centres that report other patient visits or other patient workload are identified. These functional centres are passed through a two-phase algorithm to determine an appropriate allocation to the Other Patient Cost Pool.

Phase 1: All nursing inpatient functional centres with workload are passed through a linear regression that uses their labour-adjusted cost per workload unit as the dependent variable and fiscal year and functional centre as the independent variables.

All functional centres that pass this regression are deemed to demonstrate a reasonable relationship between total workload and labour-adjusted expenses; their allocation to the Other Patient Cost Pool is based on their proportion of reported workload by category of service recipient.

Phase 2: All nursing inpatient functional centres with other patient visits and other patient workload are passed through three consecutive models of linear regression, where only those functional centres that pass one model are passed on to the subsequent model. The independent variables for each model are the fiscal year and functional centre. The dependent variables are

- Other patient workload per other patient visit;
- Labour-adjusted expenses per workload unit; and
- Other patient portion of labour-adjusted expenses per other patient visit.

Those functional centres that pass all three regressions are deemed to demonstrate a reasonable relationship between the three variables and are used to calculate a national cost per other patient visit. This national cost per other patient visit is then scaled for each jurisdiction to reflect its own labour rates and multiplied against the other patient visits of each functional centre that failed Phase 1.

Functional centres that report workload and visits in service recipient categories that contradict one another are deemed to consist of 100% inpatient expenses.

Quebec data mapped to MIS nursing inpatient functional centres is deemed to consist entirely of inpatient costs and is assigned 100% to the Inpatient Cost Pool. The sole exception to this rule is the Quebec data mapped to the obstetrics nursing unit functional centre (71 2 50*). These functional centres are adjudicated for reasonableness using a linear regression. The independent variable of the model is the fiscal year. The dependent variable is the cost per individual treated in the functional centre. Those functional centres that pass the regression are deemed to demonstrate a reasonable relationship between expenses and individuals treated; they use the volume of individuals treated by category of service recipient to allocate expenses to the Inpatient and Other Patient cost pools. Functional centres that fail this regression use a provincial allocation percentage based on those functional centres that passed.

b) Operating Rooms and Post-Anesthetic Recovery Rooms

It is reasonable for operating rooms (ORs) and post-anesthetic recovery rooms (PARRs) to contain a mix of expenses related to inpatients and other patients.

Account Number	Description	Inpatient Costs	Other Patient Costs	Non-Patient Costs
71 2 60	Operating Room	Yes	Potentially	No
71 2 62	Combined Operating and Post-Anesthetic Recovery Room	Yes	Potentially	No
71 2 65	Post-Anesthetic Recovery Room	Yes	Potentially	No
71 3 60	Day Surgery Operating Room	Potentially	Yes	No
71 3 62	Day Surgery Combined OR and PARR	Potentially	Yes	No
71 3 65	Day Surgery Post-Anesthetic Recovery Room	Potentially	Yes	No
71 3 69	Day Surgery Combined OR-PARR and Pre- and Post-Operative Care	Potentially	Yes	No

To determine the amount of expenses that should be allocated to the Other Patient Cost Pool in these functional centres, all of the above functional centres that report workload and whose workload does not conflict in category of service recipient with its service activity statistics are identified. These functional centres are passed through a two-phase algorithm to determine an appropriate allocation to the Other Patient Cost Pool.

Phase 1: All OR and PARR functional centres reporting workload are passed through a linear regression that uses their labour-adjusted expenses per workload unit of the functional centre as the dependent variable and the fiscal year and functional centre as the independent variables. Regressions are conducted separately for the OR and PARR.

All functional centres that pass this regression are deemed to demonstrate a reasonable relationship between workload and labour-adjusted expenses; their allocation to the Other Patient Cost Pool is based on their proportion of reported workload by category of service recipient. A national proportion of inpatient to other patient activity based on the functional centres that passed the regression is applied to the functional centres that failed the regression and did not report service activity statistics in the functional centre. This national average is also used for functional centres whose workload conflicted in category of service recipient with their service activity statistics and for functional centres lacking both workload and service activity.

Phase 2: For OR and PARR functional centres that report surgical visits, PARR visits or face-to-face visits and do not report workload, labour-adjusted national cost estimates are calculated for a surgical visit, a PARR visit and a face-to-face visit. These estimates are then applied against the service activity of the functional centres that are admitted to Phase 2 to derive an Other Patient Cost Pool allocation.

Quebec data mapped to the OR functional centres is allocated to the Inpatient and Other Patient cost pools using a linear regression. The independent variable of this regression is the fiscal year and the dependent variable is weighted surgical hours. Those functional centres that pass the regression are deemed to demonstrate a reasonable relationship between expenses and weighted surgical hours; they use the volume of weighted surgical hours by category of service recipient to allocate their expenses to the Inpatient and Other Patient cost pools. Functional centres that fail this regression use a provincial allocation percentage based on those functional centres that passed.

c) Emergency Department

Account Number	Description	Inpatient Costs	Other Patient Costs	Non-Patient Costs
71 3 10	Emergency	Potentially	Yes	No

An emergency functional centre may contain inpatient activity data, as reflected by the volumes of inpatient days and inpatient face-to-face visits reported within it. To estimate the costs of these volumes, the data is passed through a two-phase algorithm.

Phase 1: Emergency functional centres that report workload are passed through a linear regression that uses their labour-adjusted cost per workload unit as the dependent variable and fiscal year, functional centre and hospital cohort as the independent variables. Those functional centres that pass the regression use their own workload by category of service recipient to allocate expenses to the Inpatient and Other Patient cost pools.

Phase 2: For emergency functional centres reporting inpatient service activity without workload, or with workload that conflicts with service activity due to the reported category of service recipient, labour-adjusted national cost estimates are calculated for inpatient days, inpatient visits and other patient visits. These estimates are multiplied by the service activity volumes of the functional centres that lack appropriate workload reporting to derive a proportion of inpatient activity to total activity. This proportion is then applied against the total expenses of the functional centre, resulting in Inpatient and Other Patient cost pool allocations.

Emergency functional centres that do not report service activity or workload are deemed to consist of 100% other patient expenses.

Quebec data mapped to the MIS emergency functional centres is deemed to consist entirely of other patient costs and is assigned 100% to the Other Patient Cost Pool.

d) Specified Ambulatory Care Functional Centres

Account Number	Description	Inpatient Costs	Other Patient Costs	Non-Patient Costs
71 3 40	Specialty Day/Night Care	Potentially	Yes	No
71 3 50	Specialty Clinics	Potentially	Yes	No
71 3 55	Private Clinics	Potentially	Yes	No
71 3 67	Day Surgery Pre- and Post-Operative Care	Potentially	Yes	No

Other ambulatory care functional centres may contain inpatient activity, as reflected by the volumes of inpatient days and inpatient face-to-face visits reported within them. To estimate the costs of these volumes, the ambulatory care functional centres specified above are passed through a two-phase algorithm.

Phase 1: The specified ambulatory care functional centres that report workload are passed through a statistical regression that uses their labour-adjusted cost per workload unit as the dependent variable and fiscal year and functional centre as the independent variables. Those functional centres that pass the regression use their own workload by category of service recipient to allocate expenses to the Inpatient and Other Patient cost pools.

Phase 2: For functional centres from this list that report inpatient service activity without workload, or with workload that conflicts with service activity in the category of service recipient, labour-adjusted national cost estimates are calculated for visits and inpatient days. These estimates are multiplied by the service activity volumes of the functional centres that lack appropriate workload reporting to derive a proportion of inpatient activity to total activity. This proportion is then applied against the total expenses of the functional centre, resulting in Inpatient and Other Patient cost pool allocations.

The functional centres from this list that report neither service activity nor workload are deemed to consist of 100% other patient expenses.

Quebec data mapped to the MIS ambulatory care functional centres is deemed to consist entirely of other patient costs and is assigned 100% to the Other Patient Cost Pool.

e) Diagnostic and Therapeutic Functional Centres

Account Number	Description	Inpatient Costs	Other Patient Costs	Non-Patient Costs
71 4 05	Diagnostic and Therapeutic Nursing	Potentially	Potentially	No
71 4 10	Clinical Laboratory	Potentially	Potentially	No
71 4 15	Diagnostic Imaging	Potentially	Potentially	No
71 4 20	Radiation Oncology	Potentially	Potentially	No
71 4 25	Electrodiagnostic Laboratories	Potentially	Potentially	No
71 4 30	Non-Invasive Cardiology and Vascular Laboratories	Potentially	Potentially	No
71 4 35	Respiratory Services	Potentially	Potentially	No

Account Number	Description	Inpatient Costs	Other Patient Costs	Non-Patient Costs
71 4 40	Pharmacy	Potentially	Potentially	No
71 4 45	Clinical Nutrition	Potentially	Potentially	No
71 4 50	Physiotherapy	Potentially	Potentially	No
71 4 55	Occupational Therapy	Potentially	Potentially	No
71 4 60	Audiology and Speech–Language Pathology	Potentially	Potentially	No
71 4 65	Rehabilitation Engineering	Potentially	Potentially	No
71 4 70	Social Work	Potentially	Potentially	No
71 4 75	Psychology	Potentially	Potentially	No
71 4 76	Genetic Counselling	Potentially	Potentially	No
71 4 80	Pastoral Care	Potentially	Potentially	No
71 4 85	Recreation	Potentially	Potentially	No
71 4 90	Child Life	Potentially	Potentially	No

It is expected that most (if not all) diagnostic and therapeutic functional centres will serve both inpatient populations and other patient populations. To determine the amount of expenses in these functional centres that should be allocated to the Inpatient and Other Patient cost pools, all of the above functional centres are passed through a three-phase algorithm.

Phase 1: All diagnostic and therapeutic functional centres that report workload are entered into a linear regression that uses their labour-adjusted cost per workload unit as the dependent variable and hospital cohort as the independent variable. This regression is conducted for each type of diagnostic and therapeutic functional centre. All functional centres that pass this regression are deemed to demonstrate a reasonable relationship between workload and labour-adjusted expenses; their allocation to the Inpatient and Other Patient cost pools is based on their proportion of reported workload by category of service recipient.

Phase 2: All diagnostic and therapeutic functional centres that report service activity are entered into a linear regression that uses their labour-adjusted cost per service activity unit as the dependent variable and hospital cohort as the independent variable. This regression is conducted for each type of diagnostic and therapeutic functional centre. All functional centres that pass the Phase 2 regression are deemed to demonstrate a reasonable relationship between service activity and labour-adjusted expenses. Functional centres that were ineligible for Phase 1 or that failed Phase 1 use their reported service activity to allocate expenses to the Inpatient and Other Patient cost pools by category of service recipient.

Phase 3: All diagnostic and therapeutic functional centres with service activity and workload are processed through three consecutive models of linear regression, where only those functional centres that pass one model are passed on to the subsequent model. The models are

- Other patient workload per other patient service activity;
- Labour-adjusted expenses per total workload unit; and
- Other patient portion of labour-adjusted expenses per other patient service activity.

Those functional centres that pass all three regressions are used to calculate a national average inpatient-to–total workload percentage. This percentage is applied to each functional centre that failed Phase 1 and Phase 2 to determine Inpatient and Other Patient cost pool allocations.

Quebec data that is mapped to most diagnostic and therapeutic MIS functional centres is also allocated to the Inpatient and Other Patient cost pools using regression models. In essence, service activity statistics pertinent to the specific functional centres are used in the model. For each model and for each functional centre, the independent variable of this regression is the fiscal year and the dependent variable is the cost per service activity. Those functional centres that pass the regression are deemed to demonstrate a reasonable relationship between expenses and the volume of service activity; they use the volume of service activity by patient category to allocate their expenses to the Inpatient and Other Patient cost pools. Functional centres that fail this regression are entered into regression models that use alternate types of service activity statistics. If a functional centre fails the regression models, it uses an average inpatient percentage calculated from all identical Quebec functional centres that passed the initial regression model.

f) Other Patient Care Functional Centres

Account Number	Description	Inpatient Costs	Other Patient Costs	Non-Patient Costs
71 2 76	Mental Health Long-Term Care Nursing Unit	No	Yes	No
71 2 92	Long-Term Care Nursing Unit	No	Yes	No
71 2 96	Contracted-Out Surgical Services	No	Yes	No
71 3 14	Telephone Health Services	No	Yes	No
71 3 20	Poison and Drug Information Services	No	Yes	No
71 3 96	Contracted-Out Day Surgery Services	No	Yes	No
All 71 5* Accounts	Community Health Services	No	Yes	No

All remaining patient care–related functional centres in the nursing, ambulatory care, and diagnostic and therapeutic framework are assigned to the Other Patient Cost Pool.

g) Other Hospital Costs

Account Number	Description	Inpatient Costs	Other Patient Costs	Non-Patient Costs
71 7*	Research	No	No	Yes
All 71 8* Accounts Other Than 71 8 40* (In-Service Education)	Education	No	No	Yes
All 71 9* Accounts	Undistributed	No	No	Yes

All expenses in these functional centres are allocated to the Non-Patient Cost Pool.

h) Remaining Functional Centres and Accounting Centres

Account Number	Description	Inpatient Costs	Other Patient Costs	Non-Patient Costs
All 71 1* Accounts	Administration and Support	Allocation	Allocation	Allocation
71 8 40*	In-Service Education	Allocation	Allocation	No
All 81 9* Accounts	Undistributed	Allocation	Allocation	Allocation

For these functional centres, the costs are allocated to the cost pools as described in steps 5, 6 and 7.

3. For those hospitals where clinical data can be separated for mental health patients (for example, when using a distinct institution number in the DAD or reporting to a different database, or when the entire facility is a mental health facility), any expenses reported in the Inpatient Cost Pool in 71 2 75 (Mental Health and Addiction Services Nursing Unit) are moved to the Other Patient Cost Pool. For all diagnostic and therapeutic functional centres (71 4*) of these same hospitals, the portion of the Inpatient Cost Pool expenses that belongs to mental health inpatients (based on the mental health inpatient expenses as a proportion of the total Inpatient Cost Pool expenses) is calculated and moved to the Other Patient Cost Pool. This calculation is performed so an acute CPWC can be calculated. In those cases where either the financial or clinical data for mental health services cannot be separated, the existence of some mental health expenses along with the associated mental health weighted cases should not make a material difference to the CPWC.
4. For those hospitals where clinical data can be separated for rehabilitation patients (for example, when using a distinct institution number in the DAD or reporting to a different database, or when the entire facility is a rehabilitation facility), any expenses reported in the Inpatient Cost Pool in 71 2 80 (Physical Rehabilitation Services Nursing Unit) are moved to the Other Patient Cost Pool. For all diagnostic and therapeutic functional centres (71 4*) of these same hospitals, the portion of the Inpatient Cost Pool expenses that belongs to rehabilitation inpatients (based on the rehabilitation inpatient expense as a proportion of the total Inpatient Cost Pool expenses) is calculated and moved to the Other Patient Cost Pool. This calculation is performed so an acute CPWC can be calculated. In those cases where either the financial or clinical data for rehabilitation services cannot be separated, the existence of some rehabilitation expenses along with the associated rehabilitation weighted cases should not make a material difference to the CPWC.
5. Administration and support services (71 1*) functional centre expenses are distributed to the three cost pools based on the share of each hospital's cost pool's total expenses relative to the hospital's total expenses.
6. Accounting centre expenses (81 9*) and its share of 71 1* expenses are distributed to the three cost pools based on the share of each hospital's cost pool's total expenses relative to the hospital's total expenses.

7. In-service education (71 8 40*) expenses are allocated to the Inpatient and Other Patient cost pools based on each of these cost pools' share of their combined sum at the hospital level, prior to 71 1 and 81 9 allocation in steps 5 and 6.

8. The costs in the Inpatient Cost Pool are totalled. This figure is used to determine the CPWC.

Determining Weighted Cases

1. The hospital's total acute, rehabilitation and mental health inpatient weighted cases from health records (that were calculated by CIHI using data from the DAD) are obtained.

2. The inpatient weighted cases for mental health inpatients for those hospitals that have matching calculated inpatient costs in functional centre 71 2 75 (that is, those that are reporting mental health inpatient data to the Ontario Mental Health Reporting System or to the DAD using an institution number that is unique for mental health patients) are removed.

3. The inpatient weighted cases for rehabilitation inpatients for those hospitals that have matching calculated inpatient costs in functional centre 71 2 80 (that is, those that are reporting rehabilitation patient data to the National Rehabilitation Reporting System or are reporting rehabilitation patient data to the DAD using an institution number that is unique for rehabilitation patients) are removed.

Calculating the Cost per Weighted Case

1. Match the inpatient cost and weighted case data for each hospital.

2. Calculate the CPWC:

$$\text{Cost per Weighted Case} = \frac{\text{Total Inpatient Costs}}{\text{Total Weighted Cases}}$$

Please note that weighted cases used in these methodologies are grouped using CMG+ 2013, CIHI's most recent case mix grouping methodology at the time of this release.

17. **Cost per weighted case (labour rate–adjusted)**

The labour rate–adjusted CPWC follows the same methodology as the unadjusted CPWC (indicator 16), with one additional step: after step 7 (under Determining Full Costs), all compensation in all functional centres is adjusted for labour-rate differences.

A jurisdictional labour rate–adjustment factor is determined for each level 3 functional centre by comparing the jurisdictional labour rate with the national labour rate for that functional centre. The jurisdictional labour-rate factor is then multiplied by the labour rate for that functional centre in each facility within that jurisdiction.

A functional centre's compensation will be scaled upwards if its labour rate is lower at the jurisdictional level than at the national level. A functional centre's compensation will be scaled downwards if its labour rate is higher at the jurisdictional level than at the national level.

Once all functional centres have been appropriately scaled, the Inpatient Cost Pool can be summarized in step 8 (under Determining Full Costs). The remaining steps in calculating the unadjusted CPWC can then be followed.

Labour rate–adjusted CPWC values for Quebec are unavailable at this time.

Performance Indicator Weighted Average Methodology

All of the indicator averages reported in *Canadian MIS Database: Hospital Financial Performance Indicators, 2007–2008 to 2011–2012* are weighted averages. Weighting is applied by calculating the indicator value based on the sum of all the numerators divided by the sum of all the denominators.

Provincial/territorial indicator averages are calculated as the sum of all provincial/territorial organizations' numerators divided by the sum of all provincial/territorial organizations' denominators, excluding outliers. National indicator averages are calculated as the sum of all organizations' numerators divided by the sum of all organizations' denominators, excluding outliers.

Suppression of Provincial/Territorial Results

A suppression note is provided for a regional average of hospital-specific indicators (worked hours and weighted cases indicators) if, after removing outliers, the average represents less than 50% of the total hospital expenses of the region.

A suppression note is provided for LHIN averages for Ontario and health region averages for Quebec of region-specific indicators (total margin, administrative expenses, etc.) if, after removing outliers, the average represents less than 50% of the total organization expenses of the Ontario LHIN or total expenses of the Quebec health region, respectively.

A suppression note is provided for a provincial/territorial average of hospital-specific indicators (worked hours and weighted cases indicators) if, after removing outliers, the average represents less than 50% of the total hospital expenses of the province/territory.

A suppression note is provided for a provincial/territorial average of region-specific indicators (current ratio, total margin, administrative expenses, etc.), if, after removing outliers, the average represents less than 50% of the total expenses of the province/territory.

While the suppression note is provided to facilitate better interpretation of the results, the values are still used in calculating the regional averages for hospital-specific indicators and provincial and national averages for both hospital- and region-specific indicators.

Methodology for Identifying Outliers

An outlier is defined as an indicator value that is greater than or less than a predetermined range of acceptable indicator values. For this report, the range of acceptable values is

1st quartile (25th percentile) − 1.5 × IQR to 3rd quartile (75th percentile) + 1.5 × IQR

where IQR stands for the interquartile range.

Any indicator that falls outside this acceptable range is carefully reviewed. Unless there is a compelling reason for retaining the value, it is removed, or trimmed, from further analysis.

Trim Rules for Regional, Provincial/Territorial and National Averages

The following rules apply to all regional, provincial/territorial and national averages that are published throughout the report:

- For hospital-specific indicators (worked hours and weighted cases indicators), hospital values are trimmed if they are beyond the range of acceptable values.
- For region-specific indicators (current ratio, total margin, administrative expenses, etc.), regional values are trimmed if they are beyond the range of acceptable values. As Ontario and Quebec do not have regional entities similar to those in other jurisdictions, their data is trimmed at the level of the hospital and établissement, respectively. Post-trim results are then grouped to regional values for these jurisdictions. This is a change to the historical trim rules for these jurisdictions; it has been applied to all years of indicator results depicted in this release.

Appendix: MIS Definitions

Administrative and support services: The functional centre framework section pertaining to the provision of all administrative and support services required by the health service organization including provision and management of all physical assets and services necessary to support its staffing, operation and maintenance

Ambulatory care services: The functional centre framework section pertaining to specialized diagnostic, consultative, treatment and teaching services provided primarily for registered clients and their significant others. Access to these services is generally with a referral from a primary care practitioner or a specialist. These services are generally provided in a hospital setting.

Includes

- Community-based dialysis, oncology, surgery and urgent care services.

Excludes

- Services provided to ambulatory care service recipients by personnel who are accountable to and charged to nursing inpatient or diagnostic and therapeutic services; or
- Community clinics/programs, community day/night care, home care and public health services provided to clients of community health services.

Ambulatory care services—face-to-face visits (MIS primary account 71 3* and MIS secondary statistical accounts 4 50*): The occasions during which service recipient activities are provided face-to-face or by videoconference on an individual or group basis. These services are documented according to the health service organization's policy and are provided for longer than five minutes.

Beds staffed and in operation (MIS secondary statistical account 8 25*): The beds and cribs available and staffed to provide services to inpatients/residents at the required type and level of service, at the beginning of the fiscal year. Includes bassinets set up outside the nursery and used for infants other than newborns.

Chart of accounts: A list of the account numbers and designations in a ledger.

Client Community
An individual

- who has been officially accepted to receive one or more health services from a community health services organization (other than home care), or a public health organization without being admitted as a resident; and
- whose person identifiable data is recorded in the registration or information system of the organization and to whom a unique identifier is assigned to record and track services; or whose encounter is recorded within a uniquely-identifiable, hard-copy file or record (rather than in the organization's registration or information system) that is used to record and track services.

Examples include:

- a man attending an urgent care centre at a community location;
- a woman receiving contracted-out surgical services for cataract surgery from a third party provider;
- a mother-to-be attending a prenatal class;
- a teenager who was immunized against mumps by the school nurse;
- a woman seen by the mental health outreach team; and
- a elderly senior who attended the community geriatric day program.

Client Home Care
An individual

- who has been officially accepted by an organized home care program-providing organization to receive one or more services in their place of residence (e.g. private residence, assisted living residence), at an alternative health delivery location (e.g. clinic, hospital), or at a location that meets the client's needs (e.g. school, public place); and
- whose person identifiable data is recorded in the registration or information system of the organization and to whom a unique identifier is assigned to record and track services.

Examples include individuals receiving acute home health services and homemaking home support services at their private residence.

Excludes: Outreach services provided by hospital or community-services-based health professionals (e.g. home dialysis services provided by hospital staff, mental health services provided by the staff of a mental health outreach program).

Client Hospital
An individual

- who has been officially accepted by a hospital and receives one or more health services without being admitted as an inpatient;
- whose person identifiable data is recorded in the registration or information system of the organization and to whom a unique identifier is assigned to record and track services; and
- who, if the hospital desires to separate clients of the hospital from those referred for service by another health service organization, is not referred-in.

Includes: Clients receiving hospital emergency, abstracted day surgery, specialty day/night care, specialty clinic, outreach, mental health, rehabilitation, and "independent" diagnostic and therapeutic services.

Excludes: Clients receiving services from a public health organization or community health service organization including those dedicated to providing home care services.

Community health services: The functional centre framework section pertaining to the provision of health (for example, primary care, prevention, wellness) and social services on an ambulatory/outreach basis to individuals, groups and/or communities. Access to these services is typically self-determined. These services are considered the first level of contact for individuals, families and communities with the health system.

Includes

- Curative, restorative, supportive, disease prevention and health promotion/ education and protection services.

Excludes

- Community-based dialysis, oncology, surgical and urgent care services (See 71 3 40 **)

Compensation expense: The sum of gross salaries expense, benefit contribution expense, purchased compensation expense and fees for service expense arising from the remuneration of management and operational support personnel, unit-producing personnel and medical personnel employed by or under contract to the health service organization.

Community health service organizations: Organizations primarily engaged in providing health care services directly to clients in the community who do not require inpatient services. This includes organizations specializing in day treatment programs and in the delivery of home care services. Consequently, these organizations do not usually provide inpatient services.

Diagnostic and therapeutic services: The functional centre framework section pertaining to diagnostic and therapeutic services. Diagnostic services includes professional and technical services which assist in the clinical investigation of service recipients, either to detect the presence of disease, disability or injury or to assess the severity of known disease, disability or injury.

Therapeutic services include professional and technical services provided to service recipients, which assist in the alleviation or cure of the causes, symptoms and/or sequelae of disease, disability or injury.

Excludes

- Professional and technical services provided by personnel who are accountable and charged to nursing inpatient services in the functional centre framework.

Education: The functional centre framework section pertaining to the provision of in-service education programs to the health service organization's personnel, as well as formal education programs to undergraduate and post-graduate technical, professional and medical students/trainees.

Emergency functional centre—visits face-to-face (MIS primary account 71 3 10* and MIS secondary statistical accounts 4 50*): The occasions during which service recipient activities are provided face-to-face or by videoconference within the emergency department on an individual or group basis. These services are documented according to the health service organization's policy and are provided for longer than five minutes.

Functional centre: A subdivision of an organization used in a functional accounting system to record the budget and actual direct expenses, statistics and/or revenues, if any, which pertain to the function or activity being carried out.

Global funding (MIS financial secondary account 1 10 10): This account is used to record the revenue arising from the provision of service recipient services that are the responsibility of the ministry of health of the province or territory in which the health service organization is located, as distinct from the Provincial/Territorial Health Insurance Plan. Revenue from this source will normally in the form of operating grants that are received directly from the province or territory or from a health region that has entered into an affiliated arrangement with a health service organization.

Hospital: Institutions where service recipients are accommodated on the basis of medical and nursing need and are provided with continuing medical and nursing care and supporting diagnostic and therapeutic services, and that are licensed or approved as a hospital by a provincial/territorial government. Ambulatory care services can also be provided by hospitals.

Hospital types in the CMDB are specified as follows:

Type of Hospital	Description
General Hospital	A hospital which provides primarily for the diagnosis and short-term treatment of inpatients and clients with a wide range of diseases or injuries; the services of a general hospital are not restricted to a specific age group or sex
Pediatric Hospital	A specialty hospital, or a group of beds or rooms, or a separate wing or building for pediatrics, which is recognized as a distinct and separate treatment unit of the hospital, which provides exclusively for the diagnosis and short-term treatment of pediatric inpatients and clients who are generally 18 years of age or younger
Cancer Treatment Hospital	A specialty hospital, or a group of beds or rooms, or a separate wing or building, which is recognized as a distinct and separate treatment unit of the hospital, that provides exclusively for the diagnosis and treatment of inpatients and clients with neoplastic tumours/diseases
Psychiatric and Substance Abuse Hospital	A hospital, or a group of beds or rooms, or a separate wing or building, which provides exclusively for the assessment and treatment of inpatients/clients/residents with short- and/or long-term psychiatric and substance abuse disorders, and which is recognized as a distinct and separate treatment unit of the hospital
Other Specialty Hospital	A specialty hospital, or a group of beds or rooms, or a separate wing or building for a specialty that is not elsewhere classified, which is recognized as a distinct and separate treatment unit of the hospital, that provides exclusively for the diagnosis and treatment of inpatients and/or clients receiving specialty care that is not elsewhere classified (for example, obstetrical, orthopedic)
Rehabilitation Hospital	A specialty hospital, or a group of beds or rooms, or a separate wing or building, which is recognized as a distinct and separate treatment unit of the hospital, that provides exclusively for the continuing assessment and treatment of inpatients and clients whose condition is expected to improve significantly through the provision of physical medicine and other rehabilitative services
Extended Care Hospital (Including Chronic)	A specialty hospital, or a group of beds or rooms, or a separate wing or building for long-term care, which is recognized as a distinct and separate treatment unit of the hospital, which provides exclusively for the continuing treatment of service recipients with long-term illness or with a low potential for recovery and who require regular medical assessment and continuing nursing care

Inpatient days (MIS statistical secondary account 4 03*): The days during which services are provided to an inpatient, between the census-taking hours on successive days. The day of admission is counted as an inpatient day, but the day of separation is not an inpatient day. When the service recipient is admitted and separated (discharged or died) on the same day, one inpatient day is counted.

Inpatient admissions (MIS statistical secondary account 4 01*): The official acceptance into the health service organization of an adult/child/newborn/postnatal newborn who requires medical and/or health services on a time-limited basis. The admission procedure involves the assignment of a bed, bassinet or incubator. Admission of a newborn is deemed to occur at the time of birth or, in the case of postnatal newborns, at the time of admission of the mother to the health service organization.

Nursing inpatient services: The functional centre framework section pertaining to the nursing services provided to inpatients and their significant others to meet their physical and psychosocial needs.

Includes

- Ambulatory care clients receiving services in inpatient nursing units if separate ambulatory care functional centres have not been established for these services.
- Direct expense data for physicians contracted by the health service organization to provide services within a specific level 3, 4 or 5 nursing inpatient and resident functional centre.

Public health organizations: Organizations that administrate and provide public health programs such as health promotion and protection.

Research: The functional centre framework section pertaining to formally organized research.

Residential care facilities: Include homes for the aged (including nursing homes), facilities for persons with physical disabilities, developmental delays, mental health and/or addiction disabilities and facilities for emotionally disturbed children. Facilities solely of a custodial or domiciliary nature and facilities for transients or delinquents are excluded.

Revenue (MIS financial secondary account 1*): Revenues earned by the health service organization from all sources, including payments for services provided to service recipients, recoveries, contributed services, donations, grants, investment revenue, etc.

Social services program organizations: Organizations that administer and provide programs of a social service nature.

Specialty day/night care visits (MIS primary accounts 71 3 40* and MIS statistical secondary account 4 50*): The occasions during which service recipient activities are provided face-to-face or by videoconference within specialty day/night care functional centres on an individual or group basis. These services are documented according to the health service organization's policy. Registered persons in these functional centres attend for 3 to 12 hours on average, typically as the result of a referral from a primary care practitioner.

Teaching status: In the CMDB, a hospital is considered a teaching hospital if it provides medical education programs approved by the appropriate authorities for major clinical instruction in at least the medical disciplines of internal medicine and general surgery to undergraduate medical students in their final two years.

Total long-term debt (MIS primary accounts 5* 2, excluding 5* 24*): Liabilities of the health service organization's funds (where * denotes the fund types) that are due more than one year from the balance sheet date. Such liabilities might be any loan, advance or trade account that is to be repaid in instalments over a number of future years. Generally, however, they will consist of a more formal type of debt such bonds, debentures or mortgages taken over in connection with real estate donated to the health service organization. Excludes Bonds Payable, which are amounts owing by the health service organization on account of bonds issued by it for fund purposes (where * denotes the fund types), not due within one year of the balance sheet date.

Unit-producing personnel (UPP): Those personnel whose primary function is to carry out activities that directly contribute to the fulfillment of the service mandate. Examples include RNs, RNAs, laboratory technologists, accounts payable clerks, pharmacists, housekeepers, home care workers and public health officers. Excluded are practising physicians, medical residents, interns and students and, in most cases, diagnostic, therapeutic, nursing and support services students.

Worked hours: Hours spent carrying out the mandate of the functional centre. They include regular, overtime and call back hours.

Workload measurement system: A tool for measuring the volume of activity provided by a specific functional centre in terms of a standard unit of time.

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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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Talk to Us

CIHI Ottawa
495 Richmond Road, Suite 600
Ottawa, Ontario K2A 4H6
Phone: 613-241-7860

CIHI Toronto
4110 Yonge Street, Suite 300
Toronto, Ontario M2P 2B7
Phone: 416-481-2002

CIHI Victoria
880 Douglas Street, Suite 600
Victoria, British Columbia V8W 2B7
Phone: 250-220-4100

CIHI Montréal
1010 Sherbrooke Street West, Suite 300
Montréal, Quebec H3A 2R7
Phone: 514-842-2226

CIHI St. John's
140 Water Street, Suite 701
St. John's, Newfoundland and Labrador A1C 6H6
Phone: 709-576-7006

www.cihi.ca
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