

# Estimated cost of hospital-acquired CDI cases

Resource for Indicator Standards (RIS)  
Health Analytics Branch, Ministry of Health and Long-Term Care

## Indicator description

### RIS indicator name

Estimated cost of hospital-acquired Hospital-acquired C.difficile infection (CDI) cases

### Other names for this indicator

N/A

### Indicator description

CDI is the leading cause of healthcare-associated infectious diarrhoea. Patients may contract during the course of hospitalization for unrelated health issues. If infected, patients require longer hospital stay and in rare instances can cause death. CDI can be life-threatening and is costly for the health care system. Estimating preventable adverse events costs may help create incentives for hospitals to promote patient safety, thus save lives and avoid excess costs and stays in hospital.

### Accountability agreement(s) or ministry initiative(s) the indicator supports

- Hospital Service Accountability Agreement (HSAA), 2017 – 2018
- Patient Safety Public Reporting
- The Quarterly

## Methodologies

### Data source

Discharge Abstract Database (DAD) and Ontario Case Costing Initiative (OCCI), the latest four years of data for each new reporting

## Inclusion/exclusion criteria for CDI cases

1. Discharged cases that have diagnosis of Enterocolitis due to Clostridium difficile (ICD10=A047) and the infection was acquired after admission (post-admit diagnosis type).
2. CDI cases have reported case cost in OCCI. Cost is inflation adjusted based on the latest year of the four years of data.
3. Patients less than 1 year of age are excluded.

## Inclusion/exclusion criteria for the control group

1. All discharged cases that are not CCI cases.
2. CDI cases have reported case cost in OCCI. Cost is inflation adjusted based on the latest year of the four years of data.
3. Patients less than 1 year of age are excluded.

## Other Data Elements

1. All cases are assigned a Charlson comorbidity index value of 0, 1 or 2 based on methodologies for Charlson Index (Quan et al. 2011), to indicate the patient acuity level.
2. CMI groups are based on the latest case mix grouping methodology year.

## Calculation

The methods used for incremental cost estimation follow the methods by Wardle (2010) and Encinosa & Hellinger (2008). Incremental cost was estimated by:

1. Establishing case-control matched sample using Propensity Score Matching technique for the case group of CDI and the control of group of non-CDI, on characteristics of sex, age group, CMG group, LHIN, comorbidity index and fiscal year.
2. Removing top high cost (high LOS) outliers.
3. Regressing patient cost (LOS) on relevant covariates, including sex, age group, CMG group, LHIN, comorbidity index, fiscal year, and whether it is a CDI case or not.
4. Using coefficients to impute the cost (LOS) for each record:
  - Assuming each record had the event of CDI (data 1)
  - Assuming no record had the event of CDI (data 2)
5. Calculate the mean difference of cost between data 1 and data 2 as the incremental cost of CDI.
6. Quarterly total cost of CDI is calculated by multiplying the annual estimated incremental cost by quarterly CDI cases.

## Timing and geography

### Timing/frequency of release

**How often and when data are being released (e.g., be as specific as possible...data are released annually in mid-May)**

Data by fiscal year are available annually; interim data are updated quarterly.

## Trending

### Years available for trending

CAD is used for calculating costs; they could be trended after inflation adjustments are made.

## Levels of comparability

Data are available at provincial level only.

## Additional information

### Limitations

#### Specific limitations

N/A

### Comments

#### Additional information regarding the calculation, interpretation, data source, etc.

Since the total cost of a CDI case is estimated based on four years of data, with cost adjusted for inflation in latest data year's dollar values. It is not the actual cost that incurred in the data year.

### References

#### Provide URLs of any key references (e.g., Diabetes in Canada, [http:// ...](#))

1. Quan, et al. (2011). "Updating and Validating the Charlson Comorbidity Index and Score for Risk Adjustment in Hospital Discharge Abstracts Using Data From 6 Countries," *American Journal of Epidemiology*, 173(6): 676–682.
2. Encinosa, W. and Hellinger, F. (2008). "The Impact of Medical Errors on Ninety-Day Costs and Outcomes: An Examination of Surgical Patients." *Health Services Research* 43, 2067-2085.
3. Wardle, G. (2010). "The Impact of Adverse Events on Hospital Outcomes and Sensitivity of Cost Estimates to Diagnostic Coding Error". Ph. D Dissertation, University of Toronto.

### Contact information

For more information about this indicator, please contact [RIS@ontario.ca](mailto:RIS@ontario.ca).

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