HSMR: A New Approach for Measuring Hospital Mortality Trends in Canada

Canadian Institute for Health Information
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Table of Contents

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The core project team responsible for the development of this measurement and report includes: Eugene Wen, Carolyn Sandoval, Dragos Daniel Capan, Liudmila Husak, Brooke Kinniburgh, Jeremy Herring, Zeerak Chaudhary, Yana Gurevich, Yanyan Gong, Jun Liang, Kathy Nguyen and Sharon Relova.

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Overview

From vaccinations and pain medication to emergency care for heart attacks or injuries, many types of health care have been shown to save lives and improve quality of life. While the best intentions and superb care will not prevent all deaths or suffering, health care providers are committed to improving care and outcomes for their patients. To do so, they need good information. Experts suggest that measurement helps to prompt effective action to improve health care quality and safety, just as monitoring a patient's vital signs helps to inform patient care plans.

Different measures are needed at different levels. Boards and senior teams tend to focus on what are sometimes called "big dot" measures. These measures track progress on broad outcomes at a system level. Hospital standardized mortality ratios (HSMRs) are one example. First developed in England, health care providers in a number of countries now use HSMR results to inform efforts to improve care. The measure compares the actual number of deaths in a hospital with the average experience. The comparisons take into account the age, sex and main diagnosis of patients, as well as other factors that may affect in-hospital mortality rates. CIHI began to adapt and validate the HSMR measure for use in Canada in 2005 at the request of hospitals and patient safety experts.

Internationally, there is emerging evidence that focused efforts can change these hospital mortality rates within a few years. For example, the Bradford Teaching Hospitals Trust in the United Kingdom reported on their experiences in the *Journal of the Royal Society of Medicine* last year. Their HSMR fell from 95 to 78 over four years. The hospital estimates that this improvement translates into 905 fewer deaths. This example and similar experiences elsewhere suggest that by offering a clearer picture of how hospital death rates are changing, the HSMR provides a starting point to better understand in-hospital mortality and helps to identify areas for improvement.

In Canada, standardized in-hospital death rates have fallen by 6% overall over the last three years.[i] However, results vary by patient group. For example, death rates for patients with heart attacks fell faster than those for patients with pneumonia. Trends also vary across the country, and this report includes the first publicly available HSMR trends by health region and hospital. The results are designed to be used by hospitals and health regions to monitor and understand their trends over time. Some are setting goals for improvement and tracking progress toward them. Others are using HSMR results as a starting point to investigate in-hospital mortality and identify opportunities to improve care.

This is the beginning, not the end, of the journey. Experience from other countries suggests that the effects of broad-based quality improvement efforts tend to be seen over years, not months. CIHI is committed to continuing to work with organizations that want to travel this path. We plan to make up-to-date local results available to hospitals electronically, to provide tools to support the use of HSMR and other measures, and to learn from the experience of organizations that use HSMR results in different ways. We will also continue to work with hospitals, regions and others to improve the quality of data, the methods and the usefulness of reports. Our hope is that over time we can work with partners to continue to build a set of measures that is useful for all those interested in improving care.

i Based on HSMR results that exclude patients identified by hospitals as having received palliative care. Also excludes results from Quebec due to historical differences in data collection.

For More Information

Highlights and the full text of *HSMR: A New Approach for Measuring Hospital Mortality Trends in Canada* are available free of charge in English and French on the CIHI website at www.cihi.ca. Technical details, as well as fact sheets and more background materials, can also be downloaded there.

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Introduction

Canada's last census counted more than 4,500 people who had passed their 100th birthday.[5] That's up nearly 50% from a decade before.

Life expectancy in Canada has risen by several decades over the last century.[6, 7] These gains are the result of many different factors that affect mortality. For example, control of infectious disease through clean water and improved sanitation[8] and lower risk of death for babies and mothers during and after childbirth have contributed to the trends.[9, 27] Deaths from heart disease, most injuries and several other causes have also fallen in recent decades.[10]

Patterns of health and disease are largely a consequence of how we live, learn, work and play.[11] For example, what we eat, whether we smoke and how much we exercise matter. Our income and education levels; our home, school and work environments; and our opportunities for childhood development also play a role, as do other factors.[11]

One of those factors is health care. From vaccinations to pain medication to urgent care for heart attacks or injuries, many interventions have been shown to save lives and improve quality of life. Most patients have good experiences, but like nuclear energy or aerospace, health care is complex and involves risk. The World Health Organization says that adverse events "are a challenge to quality of care, a significant avoidable cause of human suffering, and a high toll in financial loss and opportunity cost to health services."[12]

Many efforts to improve health care quality and safety emphasize that good measurement helps to prompt effective action, just as monitoring a patient's vital signs helps to design care plans. Considerable work is under way around the world. There is a focus on the collection and analysis of patient safety and quality data by individual health care providers, as well as at regional and national levels.[15]

Thinking About Patient Safety

Delivering safer and higher-quality care is a challenge shared by many countries. In Canada and elsewhere, it is also an enduring issue.[15] Decades ago, Florence Nightingale showed that injured soldiers were seven times more likely to die from disease in hospital than on the battlefield. In the early 20th century, Ernest Codman in the U.S. argued for the importance of tracking and learning from the outcomes of care.[19]

Since then, much progress has been made. For example, 50 years ago, there was one death for every 3,000 to 4,000 surgical anesthesia cases. By studying commonly occurring errors, improving procedures and system design, introducing standards of practice and enhancing training, anesthesiologists have improved safety. According to a 1998 study, the number of deaths had dropped from one per 200,000 to one per 300,000 cases.[16]

Interest in continuing to improve patient safety is high, in part because of recent research on adverse events. For example, the first national study of adverse events in hospitals in Canada found that 7.5% of adult medical or surgical patients admitted to acute care, non-specialty hospitals in 2000 had an adverse event.[17] Expert reviewers considered more than one-third of these events to be "highly preventable." Most patients recovered from the adverse events within six months, but about 21% died. (Researchers note that in the absence of the event, some would likely have died as a result of their existing medical conditions.) If similar rates apply across the country, that would mean that between 9,250 and 23,750 people per year experience a preventable adverse event and later die.[17] That's more than the number who die from breast cancer, motor vehicle and other transport accidents and HIV combined.

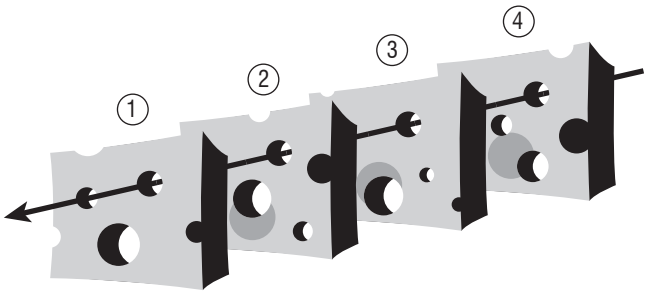
Thinking About Patient Safety (cont'd.)

These and other findings have led many patients, health care professionals, governments and others to focus on improving quality and safety in the health sector. In organizations around the world, patient safety initiatives and programs are being put into place and quality is a focus for many health care providers and institutions. Several active patient safety efforts are ongoing in Canada, including those spear-headed by the Canadian Patient Safety Institute.[18]

Experts see patient safety as a constant battle between the complexity of health care and multi-layered defences that protect patients.[13] These include alarms, standardized procedures and rules, and well-trained health professionals. Usually, the safeguards work. However, like Swiss cheese, each layer of defence has holes. When multiple system failures or gaps line up, mistakes that would usually be caught slip through. When this happens, errors can occur. In a 2003 national survey, about one in four Canadians (24%) said that they or a family member had experienced a preventable adverse event related to their care. About half (52%) said that the most recent event had had serious consequences.[14]

1 The Swiss Cheese Analogy

James Reason's analogy illustrates how layers of defences, barriers and safeguards, each of which has holes, can be used to describe the trajectory of adverse events. The picture below shows a few examples of the types of strategies that can be used to prevent medication errors, using a "Swiss cheese" analogy.



1 Thanks to supportive culture fostered by the health care team, the patient feels confident to check with the nurse that the medication is in fact theirs, not that of the patient in the next bed

2 A poster regarding look-alike, sound-alike drugs alerts nurses to verify drugs before administration

3 Storage of drugs in the pharmacy and packaging of medications is designed to reduce mix-ups during dispensing

4 A physician orders the medication using an automated system that flags potential drug interactions

Source: Adapted from J. Reason, "Human Error: Models and Management," *British Medical Journal* 320 (2000): pp. 768–770.

Different measures help at different levels. Local teams often try to improve care processes using "plan-do-study-act"[21] cycles. They need detailed data to assess their success. Examples include whether the head of the bed is raised for patients on ventilators or whether heart attack patients receive the right drugs at the right time. To track the results of their work over a longer period, teams and facilities may also use outcome measures, such as rates of ventilator-associated pneumonia or heart attack mortality. Boards and senior teams, on the other hand, tend to focus on what are sometimes called big-dot measures. These indicators track progress on broad

outcomes at a system level. Experts suggest that achieving progress on these measures requires widespread change, not just successful work at one particular level within the organization.[22]

The hospital standardized mortality ratio (HSMR) is an example of a big-dot summary measure. First developed in the United Kingdom, HSMRs are now used in a number of countries around the world.[1–4, 20] In the U.K., for example, HSMR results have become an important measure informing efforts to improve hospital care and are now available online to hospitals on a regular basis. In the United States, HSMRs have been calculated using Medicare data. This international experience suggests that HSMR results may help to analyze a hospital's mortality experience and track success in improving care and reducing inpatient deaths.[2]

In June 2005, at the request of hospitals, health regions and patient safety experts, the Canadian Institute for Health Information (CIHI) undertook to adapt HSMR calculation methods for use in Canada. Later that year, CIHI invited eligible acute care facilities and regions to join in the validation of their HSMR results. *HSMR: A New Approach for Measuring Hospital Mortality Trends in Canada* provides a summary of Canadian results to date. It also includes the first publicly available HSMR results by health region and hospital.

Measuring Mortality

Health care quality has many dimensions. For example, the Health Quality Council of Saskatchewan defines quality as “doing the right thing at the right time in the right way for the right person and having the best possible outcome.”[23] Its activities, and those in several other provinces,[24–26] draw on work of the Institute of Medicine (IOM) in the U.S., whose perspective emphasizes different dimensions of quality, such as safety, effectiveness, patient-centredness, timeliness, efficiency and equity.[28] As a result, there are many different ways of assessing progress in achieving high quality care. No single measure tells the whole story.

One commonly used approach is to track deaths.[29] Using death as an outcome measure has many advantages. For example, death is a definite and unique event, it must be recorded by law and records are likely to be complete and accurate. Nevertheless, while many health care and health system interventions are intended to save lives and improve quality of life, even with the best possible care, many deaths are not preventable.

A number of studies have tested strategies that are being used by health care providers who have made improving quality and safety a goal. For example, recent studies in the U.S. found that hospitals with processes of care aligned with clinical guidelines or recommended therapies tended to have lower risk-adjusted mortality for some cardiac outcomes.[30–32] That said, links between process of care and mortality are neither uniform nor fully understood.[33, 34, 41] Factors beyond the health care provided to patients can influence outcomes.

Nevertheless, there is emerging evidence that hospital death rates can change in the medium term.[2] For instance, Missouri Baptist Hospital in St. Louis reported a 22% reduction in its crude mortality rate over four years.[35] The hospital credits this success to a combination of strategies. It implemented improvements for several groups of patients, a successful rapid response team, a mortality review board, strict error reporting and adverse event identification. In addition, the hospital says that aligning mortality reduction work with other organizational goals and engaging everyone from board members to front-line staff in the changes were key. Similarly, the St. Peter Community Hospital in Minnesota saw a decrease in its crude mortality rate from 2.6% to 1.2% in just two years.[36] Like Missouri Baptist, the hospital believes that strong support from clinical staff for its improvement projects was a key to its success. Over the two-year period, this Minnesota hospital also reports reducing surgical site infections by 50%, decreasing transfers to higher levels of care by 28% and increasing medication reconciliation from 70% to over 95%. Several hospitals in the U.K. have also reported substantial improvements in death rates (see page 19). These types of results are one of the reasons for the current interest in tracking in-hospital mortality in Canada.

What Is the HSMR?

The hospital standardized mortality ratio (HSMR) compares the actual number of deaths in a region or a hospital to the number that would have been expected based on the types of patients a region or hospital treats. It is adjusted for various factors that may influence in-hospital mortality, such as patient demographics, diagnoses and how the patient arrived at the hospital. The HSMR calculation focuses on 65 diagnosis groups that account for about 80% of in-hospital deaths in Canada, excluding patients identified as having received palliative care.

$$\text{HSMR} = \frac{\text{Observed deaths}}{\text{Expected deaths}} \times 100$$

The HSMR is calculated as the ratio of actual (observed) deaths to expected deaths, multiplied by 100. A ratio equal to 100 suggests that there is no difference between a local mortality rate and the average national experience, given the types of patients cared for. An HSMR greater or less than 100 suggests that a local mortality rate is higher or lower than the national experience. The measure was originally developed by Sir Brian Jarman at the Imperial College in the U.K.[1] and is now used in several countries around the world. In each country, the methods used are similar, but HSMR results are calibrated based on the national mortality experience. For example, the diagnosis groups included may differ from country to country.

Results and trends vary across all countries in which HSMRs have been calculated. Data for Canadian health regions with at least 2,500 HSMR cases are included in Appendix I. Results for individual hospitals are included in Appendix II.

Calculating Hospital Standardized Mortality Ratios

The HSMR calculation focuses on the 65 diagnosis groups that account for about 80% of in-hospital deaths in Canada, excluding patients identified as having received palliative care. Our methods are based on those developed by Sir Brian Jarman.[1] The analyses cover the period between April 2004 and March 2007, where fiscal year 2004–2005 is used as the baseline year. Consequently, during this year, the national average is 100. An overview of the methods used to calculate HSMR results is provided in this report. More information can be found in Appendix IV and at www.cihi.ca/hsmr.

Some types of patients are more likely than others to die in hospital. For example, older patients and those with certain health problems on admission (comorbidities) are at higher risk. Since these risk factors can change over time and vary from place to place, the HSMR calculation takes into account differences in age, sex, selected comorbidities and other factors, using a statistical technique known as logistic regression. We measured comorbidities using the Charlson Index.[42] The Charlson Index is a weighted score based on the number and type of diagnoses on the hospital discharge abstract. A higher score generally indicates a more complex case. We calculated this index based on preadmission diagnoses, with the exception of the most responsible diagnosis identified by the hospital.

The HSMR calculation also takes into account whether admissions were planned or urgent/emergent, length of stay and transfers from acute care institutions (“transfers in”). Some patients may also be transferred directly from one hospital’s emergency department to another hospital. We were not able to take this into account in our analyses.

Regional and facility HSMR results are based on where patients were treated, not where they lived. Results are only reported for regions and acute care facilities that meet a statistical threshold for public reporting: at least 2,500 qualifying cases in each of the three years reported.

Calculating Hospital Standardized Mortality Ratios (cont'd.)

Pediatric and specialty hospitals are not included due to the specialized nature of their patient populations. Likewise, results are not yet available for Quebec due to historical differences in the diagnosis and intervention classification systems used.

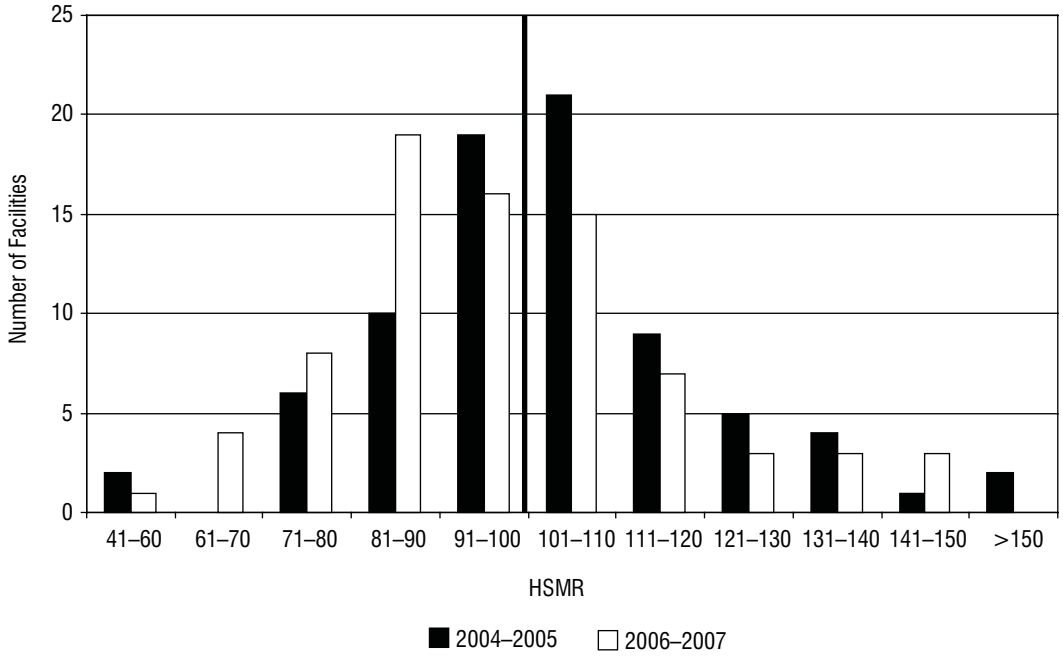
Confidence intervals are provided to aid interpretation. The confidence intervals are intended to help readers understand whether results for a given health region are statistically significantly different from the overall average. A confidence interval that includes 100 suggests that the HSMR is not statistically different from the overall average. These intervals tend to be larger (that is, the ratio estimate is less precise) for regions or facilities with fewer patients. HSMR values are estimated to be accurate within the upper and lower confidence interval, 19 times out of 20 (95% confidence interval).

Overall, mortality rates are falling. The HSMR excluding cases identified as having received palliative care dropped about 5.6% between 2004–2005 and 2006–2007. This trend takes into account changes in patient diagnoses, patient demographics and other factors.[i] Likewise, more hospitals and regions now have HSMR results below 100 than did in 2004–2005.

2 HSMR Trends in Canada

Distribution of HSMR for facilities with at least 2,500 HSMR-eligible cases

Just as the overall HSMR is falling, the distribution of facility-level HSMRs is changing. More hospitals now have HSMRs below 100, although not every hospital is improving at the same rate. In 2004–2005, among hospitals with more than 2,500 HSMR cases, 37 had an HSMR excluding palliative care cases less than 100. By 2006–2007, 48 facilities were below this level.



Notes: HSMRs excluding palliative care for acute care hospitals with at least 2,500 HSMR-eligible cases during the study period.
Source: Discharge Abstract Database, CIHI.

i Excludes cases identified by hospitals as having received palliative care. A separate analysis excluding the eight reportable hospitals that identified significant data-quality issues related to palliative care coding, and those where changes caused a break in the time series, showed a 5.4% fall over the same time frame. The trend was not as clear for the "all cases" HSMR.

While a single measure such as the HSMR offers useful information, it should be considered a starting point for further analysis. The main purpose of a big-dot measure such as this is to allow hospitals and regions to track their progress over time, not to develop league tables that rank facilities. The HSMR is about looking beyond the numbers, using them to guide further analysis that may identify areas for improvement. In this context, factors that should be considered when interpreting HSMR results include:

- **No statistical model is perfect.** While we have adjusted for a number of factors known to affect the risk of in-hospital mortality, we were not able to control for everything. As a result, HSMR results are likely to be most useful in tracking trends over time. Caution is required when comparing results between regions or facilities.

- **Factors other than the quality of care may affect results.** Despite the implementation of national coding standards,[58] there may be variations in charting and coding practices across the country that could affect the reliability of the data. In addition, experts suggest that a variety of factors both within and outside the health system may be important. (For more information about regional rates or some of the other risk factors that may affect mortality, please see www.cihi.ca/indicators.) Likewise, as noted above, research suggests that processes of care that more closely align with clinical guidelines can sometimes reduce death rates. But links between process of care and mortality are neither uniform nor fully understood. HSMR, like other measures, should be seen as a starting point for further investigation.

- **Not all deaths are preventable.** Research and practice continue to push the frontiers of what is possible. For example, some large facilities have now gone months without a single case of ventilator-associated pneumonia, something that would not have been considered possible a few years ago.[65] Nevertheless, even the best intentions and superb quality of care will not prevent all deaths. This is true both for deaths among patients receiving palliative care and others. The number and type of patients receiving hospital-based care at the end of their lives may affect HSMR results, particularly the “all cases” results.

- **Mortality matters but it is not the only outcome that matters to patients and their families.** No one measure can reflect all aspects of quality of care. Other indicators may be complementary and offer different perspectives on performance. For example, many suggest that it is important to understand quality of life outcomes, as well as mortality.

About Data Quality

In any data analysis, the quality of the information being used is an important consideration. This includes factors such as the completeness, validity, consistency, timeliness and accuracy of the information. For example, systematic differences in data collection or coding over time (or from place to place) may affect results.

The analyses in this report are based on hospitalization data from the Discharge Abstract Database. This database captures administrative, clinical and demographic information on inpatient events from hospitals in Canada. A variety of approaches are used to improve the quality of these data, including establishment of coding and abstracting standards, automated edits on data submission and database closure, and ongoing education for hospital staff and others involved in the data-submission process. Reabstraction studies suggest that accuracy rates for many of the data elements that we used to calculate and standardize in-hospital mortality, such as death, birth date, admission and discharge dates, and sex, are very high.[59] Results for diagnosis information vary by condition.

In previous studies, researchers explored whether the accuracy with which comorbidities are coded (or the fact that not all comorbidities could be included in the statistical models) was likely to affect results. On the first question, researchers examined the prevalence of comorbidities across institutions in relation to heart attack mortality rates. They also conducted sensitivity analyses by comparing risk-adjusted mortality rates that either included or excluded comorbid conditions and found a very high correlation ($r=0.95$) between the two rates.[60] In other words, after adjusting for age and sex, researchers found that differences in comorbidities led to relatively small changes in hospitals' mortality rates. All changes lay within the 99% confidence interval of a hospital's risk-adjusted mortality rate.[60] In Canada, hospital-level HSMR results that did—and did not—adjust for cormorbidities were highly correlated ($r^2=0.98$). Likewise, results from models to predict mortality based on administrative data were shown to be very similar to the model based on clinical registry data.[61, 62] A 1996 California acute myocardial infarction validation study also showed that unmeasured clinical risk factors account for less than 10% of observed differences in risk-adjusted mortality rates across hospitals.[63] Another study by researchers in the U.K. showed that using administrative databases to predict mortality was as suitable as using clinical databases.[64]

Nevertheless, systematic under- or over-coding of comorbidities may affect HSMR estimates, although the most responsible diagnosis continues to be the most important predictor of in-hospital mortality in most cases. Our hope is that further review of the data presented in this report will lead to more consistent coding and better data quality across the country, continuing gains seen during the HSMR validation process.

About Data Quality (cont'd.)

CIHI invited eligible acute care hospitals and health regions to participate in the validation of the Canadian adaptation of HSMR methods and data beginning in October 2005. Facilities have received up to eight quarterly reports since then, depending on when they began to participate in the validation process. As a result, a number of changes were made to the HSMR methodology and reporting process. In addition, based on feedback from hospitals, CIHI issued an interim guideline for the coding of palliative care services in June 2006. For some institutions, application of this guideline may have caused a break in the time series. Accordingly, this report shows regional and facility-level HSMR results for all eligible cases, as well as results that exclude cases that hospitals identified as having received palliative care.

In the fall of 2007, organizations were asked to indicate whether any minor or major data quality issues remained with the HSMR data to be presented in this report. In particular, eight reportable facilities (representing 4.5% of all eligible HSMR discharges in 2006–2007) identified major issues with palliative care coding sufficient to warrant not reporting their data. Five of these facilities (representing 2.7% of all eligible HSMR discharges in 2006–2007) also identified other major coding issues, which led to their data not being included. In addition, for one otherwise reportable region and facility, with the distribution of the interim national guideline to clarify the capture of data on palliative care, there were substantial breaks in the time series. Accordingly, comparable trends for HSMRs excluding palliative care are not available.

For more information about data quality, please see www.cihi.ca.

Who Is—And Is Not—Most Likely to Die in Hospital?

Some hospital patients are older or have more health problems than others. All else being equal, they are more likely to die during their stays. For example, the chance of having a heart attack or stroke rises with age, as does the risk of dying after having had one.[37–39] Likewise, patients admitted with a new heart attack or stroke who also have cancer or other comorbidities are more likely to die in hospital than those who do not.[40] These types of relationships hold for many of the conditions included in HSMR calculations (that is, the 65 diagnosis groups that together accounted for about 80% of hospital deaths, after excluding patients identified by hospitals as having received palliative care).

Age, comorbidities and other factors are individually related to the risk of dying, but they are also often related to one another. For instance, older patients are more likely to have multiple pre-existing conditions when they are admitted to hospital. Accordingly, we explored the extent to which seven factors affect patients' odds of dying in hospital, after adjusting for the effect of the others. Overall findings include:[i]

- **Age:** All else being equal, older patients have a higher risk of dying in hospital than their younger counterparts.

- **Sex:** Men and women face different risks of being hospitalized for health problems and different risks of dying in hospital after admission. The odds of dying for men were about 9% higher than those for women.

- **Diagnosis:** Hospital patients with different diagnoses have very different chances of dying during their stays. For example, the odds of dying for patients with heart attacks or pulmonary embolisms were much higher than those for patients with angina as their most responsible diagnosis. Patients' diagnoses were one of the most important predictors of in-hospital mortality in our analysis.

- **Comorbidities:** Our data support findings from a number of other studies that show that in-hospital death is more likely among patients with certain pre-admission comorbidities. The odds of dying were 95% higher among patients with a Charlson Index score[ii] of 1 or 2 (for example, those who had a heart attack or stroke in addition to their most responsible diagnosis) than those with a score of 0 (that is, no Charlson Index comorbidities). The effect was more pronounced for patients with a Charlson Index score of 3 or more (for example, a patient who had both renal disease and heart attack, or AIDS, as comorbidities). They were more than three times as likely to die in hospital as those with none of these comorbidities.

- **Urgent/Emergent Admissions:** Fourteen percent of the patients we studied had planned admissions. The odds of dying for their counterparts who had urgent/emergent hospitalizations were 2.6 times higher.

- **Transfers:** About 8.5% of patients studied had transferred from another acute care hospital. These patients, whose conditions may have necessitated a move to a setting able to provide different types of care, were more likely to die than patients not transferred.

- **Length of Stay:** The average length of stay for patients with HSMR-eligible most responsible diagnoses was nine days. The relationship between length of stay and the risk of dying was mixed. Those with the shortest and longest lengths of stay were more likely to die in hospital than those with mid-range stays.

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i The results reported are based on the experience of all patients with an HSMR condition as the most responsible diagnosis for their hospitalization, excluding cases identified by hospitals as having received palliative care. For a few cases, a diagnosis other than most responsible may be used. See Technical Notes available at www.cihi.ca/hsmr for details. The specific quantitative results differ slightly when patients reported to have received palliative care are included, but the direction of the effects is the same in all cases.

ii A weighted score based on the number and type of diagnoses on the hospital discharge abstract that has been used in many studies around the world.[42]

3 Odds of Dying in Hospital

An odds ratio indicates the strength of the association between a predictor and an outcome, for example age and mortality.[43, 44] It is also a way of comparing the likelihood of an outcome for multiple groups. The table below shows how the factors other than diagnosis that we take into consideration when calculating HSMRs affect the risk of dying in hospital. It shows the odds ratios or estimated increases in risk relative to others (for example, females relative to males) for patients admitted to Canadian acute care hospitals outside of Quebec between April 2004 and March 2005 who had an HSMR-diagnosis group, taking into account the effect of other factors considered in the model. The odds ratios are estimated to be accurate to within the range indicated by confidence interval (95% CI), 19 times out of 20.

	Odds ratio	95% CI
Age (each additional year)	1.05	1.05–1.05
Urgent/emergent admission compared to planned admission	2.60	2.48–2.73
Men compared to women	1.09	1.07–1.12
Length of stay (compared to 3–9 days)		
1 day	3.70	3.59–3.82
2 days	1.80	1.73–1.87
10–15 days	1.01	0.98–1.04
16–21 days	1.17	1.12–1.22
22–365 days	1.53	1.48–1.58
Patient transferred from another acute care facility compared to Not transferred from another acute care facilitiy	1.35	1.30–1.41
Charlson Index score (compared to no Charlson Index comorbidities)		
1 or 2	1.95	1.91–2.00
3+	3.44	3.32–3.56

Note: Results are based on a logistic regression model that includes patients with an HSMR condition as the most responsible diagnosis for their hospitalization, excluding cases identified by hospitals as having received palliative care. For a few cases, a diagnosis other than most responsible may be used. See Technical Notes available at www.cihi.ca/hsmr for details. The specific quantitative results differ slightly when patients reported to have received palliative care are included, but the direction of the effects is the same.
Source: Discharge Abstract Database, CIHI.

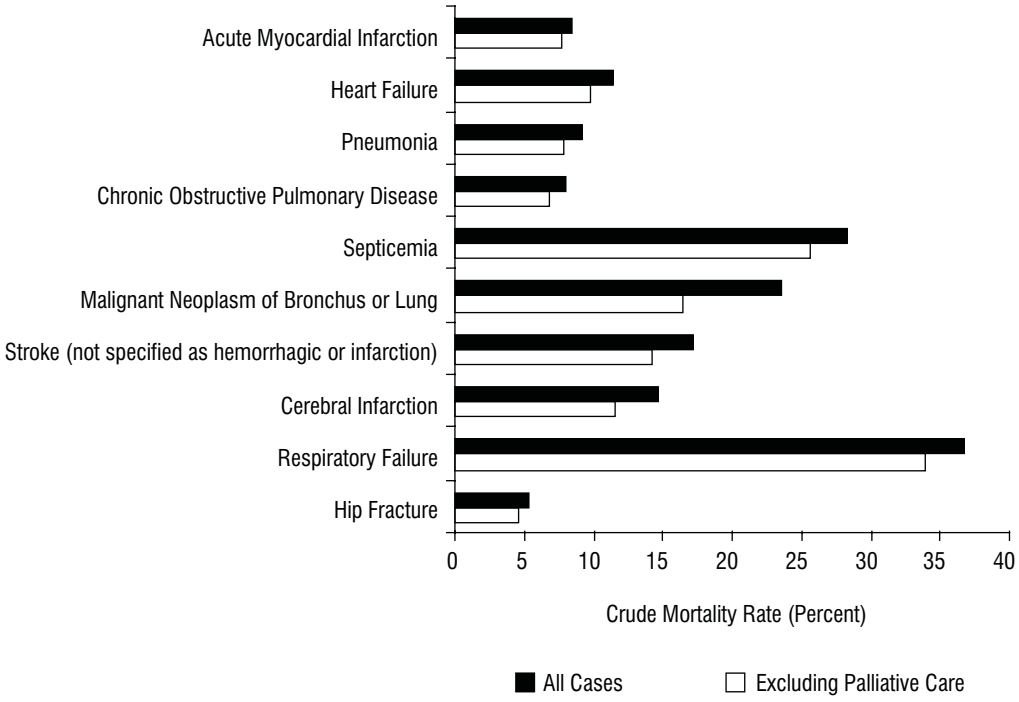
Which Patients Are Included?

In Canada, between April 2004 and March 2007, just over 254,000 patients died in hospitals outside of Quebec.[i] In 2004–2005, 65 diagnosis groups accounted for about 80% of deaths among patients who did not receive palliative care. The 10 with the most deaths were acute myocardial infarction (heart attack), heart failure, pneumonia, chronic obstructive pulmonary disease, septicemia, malignant neoplasm of bronchus and lung, stroke (not specified as hemorrhagic or infarction), cerebral infarction, respiratory failure and hip fracture. These groups represented 44% of all in-hospital deaths in 2004–2005.[ii]

Trends in mortality rates vary by patient group. For example, death rates for patients with heart attacks fell faster than those for patients with pneumonia over the study period. In contrast, mortality rates stayed constant or rose for other patient groups, such as those with chronic obstructive pulmonary disease and septicemia.[iii] This is consistent with earlier analyses, which show a steady drop in 30-day in-hospital mortality rates following admission with a new heart attack since at least 2004–2005.[40]

4 Leading Diagnoses Among Patients Who Died in Acute Care Hopitals

The 10 conditions shown below collectively accounted for 44% of all hospital deaths (excluding patients that hospitals recorded as having received palliative care). This fact reflects both how often hospitalized patients have these diagnoses and their associated death rates. The graph below shows crude (unadjusted) in-hospital death rates in 2006–2007, ordered from top to bottom based on the number of deaths by condition.



Note: Results are based on the diagnoses reported by hospitals. Excludes patients cared for in Quebec hospitals due to differences in data collection.

Source: Discharge Abstract Database, CIHI.

i Quebec data are not included because of differences in data collection.

ii Together, these groups accounted for 55% of deaths included in the calculation of hospital standardized mortality ratios.

iii Source: Discharge Abstract Database, CIHI.

Other factors present on admission may also matter, but not all are fully understood. For example, some studies suggest that the underlying health status of a population, the severity of illness (beyond comorbidities), the time from symptom recognition to presentation and patients' socioeconomic status may be related to the risk of dying from certain health conditions.[45–48] Other experts suggest that factors related to the organization and delivery of care may affect results. For example, a recent systematic review found mixed results on the relationship between staffing levels and hospital mortality.[49] Some studies included in the review found links, while others did not.

A number of studies have focused on the relationship between hospitalization rates and patients' socioeconomic status. For example, hospitalization rates tend to be higher for men and women with lower incomes than for the population as a whole. This relationship persists, but is less marked, even when other factors, such as pre-existing conditions, are taken into account.[50, 51] What about outcomes *after* admission to hospital? Research in the U.K. failed to find a significant relationship between social deprivation and hospital standardized mortality, after adjusting for age, sex, diagnoses and similar factors.[1] Likewise, we assessed the effect of neighbourhood income on hospital standardized mortality in Canada. Results showed little difference between hospital results that were adjusted for neighbourhood income and those that were not.[i]

Another factor with the potential to affect in-hospital mortality rates is end-of-life care. Where people die may reflect religious or cultural norms, personal or family preferences, health status, the quality and availability of health care, end-of-life policy and many other factors. According to Statistics Canada, approximately 67% of the 226,584 deaths in 2004 occurred in a hospital.[52, ii] This pattern has changed over time. In 1950, just over half of deaths took place in hospitals, and rates peaked at 81% in 1994.[53] Since then, rates have fallen. While accurate international comparisons are challenging, the proportion of deaths in hospital also seems to be on the decline in the U.S., but is moving in the other direction in many other developed countries.[54]

The extent to which end-of-life care affects hospital standardized mortality results is not entirely clear. Research from England suggests that statistically adjusting for the percentage of in-hospital deaths in hospitals' catchment areas may move at least some outlier hospitals closer to the average.[55] On the other hand, researchers who analyzed data for all hospitals (not just outliers) in 2000–2001 found little correlation with the percentage of deaths occurring in National Health Service hospitals in seven regions in England (r^2=0.02 to 0.20), except for the West Midlands (r^2=0.50).[56, iii] Likewise, Scottish standardized mortality ratios based on deaths in and outside of hospital within 30 days of admission to hospital were highly correlated with HSMRs that only included in-hospital deaths.[57]

In calculating HSMR results, we wanted to be able to take into account variations in end-of-life care. Some—but not all—other countries have taken the percentage of deaths in hospital by community into account when standardizing hospital mortality rates. Unfortunately, up-to-date information on the proportion of deaths in hospital

i The correlation between hospital-level results produced by the two models was 0.99. In addition, there was no difference in the c-statistic when neighbourhood income was added to the logistic regression model.

ii Includes residential and long-term care facilities in Quebec. About 25% of Canada's deaths occurred in Quebec in 2004. The rate of deaths occurring in hospital was 61% for the other provinces and territories.

iii For England as a whole, the Pearson correlation coefficient r^2 was 0.06.

was not available for Canada for all the years for which we calculated HSMR results. In addition, the fact that Canadian hospitals rarely have clearly defined catchment areas complicates the analysis. As a result, we were not able to include community-level rates of in-hospital death in the Canadian statistical risk-adjustment model.

Instead, we used data on palliative care provided to patients, as reported by hospitals. These patients tend to receive supportive care (sometimes called "comfort care"). In total, patients reported to have received palliative care accounted for approximately 2% of HSMR-eligible cases and 15% of deaths. This is likely an underestimate, since during the validation process a number of hospitals identified challenges with palliative care coding. Based on this feedback, CIHI issued an interim guideline for the coding of palliative care services in June 2006.[i] For some institutions, application of this guideline may have caused a break in the time series. Accordingly, this report shows HSMR results for all eligible cases, as well as results that exclude cases that hospitals identified as having received palliative care. We are also continuing to explore options for improving how the receipt of end-of-life care is addressed in HSMR calculations in the future.

i A national coding standard will be implemented in 2008.

From Measurement to Action

While not every in-hospital death is preventable, many health care providers have made reducing mortality a goal. There is interest in using HSMR results to identify opportunities for improvement, motivate change and track progress. For example:

- When English HSMRs were first published in 2000, the Walsall Hospitals NHS Trust had the highest ratio in the country.[3] It had 1,080 deaths, compared with the 830 that would be expected based on the mix of patients that it cared for. (This translated into an HSMR of 130.) Through a broad-based clinical governance strategy, it reduced its HSMR to 93 over four years. The hospital's approach included exploring options for improving end-of-life care, as well as a series of clinical quality improvement initiatives. Recently, Walsall's HSMR has begun to trend back up,[73, 74] and the hospital set reducing hospital mortality as a top priority for improving patient safety for 2006–2007.[66]

- In 2001, the HSMR at Tallahassee Memorial Hospital in the U.S. was 129.[2] The hospital identified areas that needed improvement and, through the implementation of communications frameworks, rapid response teams, multi-disciplinary rounds and other initiatives, reduced its HSMR to 89 by 2004.

- Another example from the U.K. shows that hospitals with HSMRs under 100 can improve their results.[4] In 2001, the Bradford Teaching Hospitals Trust had an HSMR of 95. It implemented a mortality reduction program, including chart audit of deaths and identifying processes of care that could be improved. It also reported coordinating processes across the whole system, aligning senior leadership and hospital department efforts. Four years later, the HSMR for Bradford was 78. The hospital estimates that this improvement translated to 905 fewer deaths.

Learning From Others

The Institute for Healthcare Improvement (IHI) works with organizations in the U.S. and elsewhere to improve care. Its Move Your Dot™ initiative involved providing hospitals with tools to examine mortality rates and identify strategies to reduce their rates.[67, 68] IHI recently issued a white paper summarizing the lessons that it has learned about how to reduce deaths in hospital.[69] It also highlights successes in reducing mortality on its website.[2] A number of the organizations profiled attribute their success to a series of interventions promoted by IHI's 100,000 Lives campaign. Safer Healthcare Now!, the Canadian counterpart, adopted the same six strategies:

- **Improved Care for Acute Myocardial Infarction:** Prevent deaths among patients hospitalized for acute myocardial infarction (AMI) by ensuring the reliable delivery of evidence-based care.
- **Prevention of Central Line-Associated Bloodstream Infection:** Prevent central venous catheter-related bloodstream infection (CR-BSI) and deaths from CR-BSI by implementing a set of evidence-based interventions in all patients requiring a central line.
- **Medication Reconciliation:** Prevent adverse drug events (ADEs) by implementing medication reconciliation.[i]
- **Rapid Response Teams:** Prevent deaths in patients who are progressively failing outside the ICU by implementing rapid response teams.
- **Prevention of Surgical Site Infection:** Prevent surgical site infection (SSI) and deaths from SSI by implementing a set of evidence-based interventions in all surgical patients.

i Medication reconciliation is the process of reviewing the drugs that patients are taking before and after transitions in care, such as admissions to hospital.

Learning From Others (cont'd.)

- **Prevention of Ventilator-Associated Pneumonia:** Prevent ventilator-associated pneumonia (VAP) and deaths from VAP and other complications in patients on ventilators by implementing a set of interventions known as the "VAP bundle."[i]

For example, as part of its latest strategic plan, the Saskatoon Health Region has committed to a focus on transforming the care and service experience within the region, including reduced hospital mortality. In support of this goal, the Saskatoon Health Region is working on several of the Safer Healthcare Now! interventions, including rapid response teams.[70] At St. Paul's Hospital, an intensive care unit outreach team aims to respond within 10 minutes to patients outside the ICU whose conditions have worsened. Between July 2006 and April 2007, the team responded to about 110 calls. ICU staff at St. Paul's and Royal University Hospital are also working on adopting the VAP bundle to prevent ventilator-associated pneumonia. Within one year, three of the four recommended practices were being used about 90% of the time. Effort continues in these areas and others, such as medication reconciliation, infection control and standardization of wound and skin care. The region considers this work a key plank in its efforts to improve patient safety. Others, such as the New Brunswick Department of Health, also link participation in Safer Healthcare Now! to local improvements in patient outcomes, including standardized hospital mortality.[71]

While HSMR is still a relatively new tool in Canada, hospitals, health regions and ministries of health have begun to use it in a variety of ways. Most begin by validating their data. For example, they may review detailed reports provided by CIHI, check calculations or data quality or invest time in understanding the methods used to derive HSMR results. In some cases, validation processes find data issues. In others, ideas for improving care begin to surface.

Next steps vary depending on the organization's goals. Examples include:

- **Aligning measurement to support strategy** through using HSMR as a board or senior team big-dot measure or including it in accountability agreements. For example, a number of organizations monitor HSMR through their corporate scorecards and the measure is now part of provincial accountability agreements in several jurisdictions.

i Source: Reproduced with permission from the Canadian Patient Safety Institute. Safer Healthcare Now!, *Information for Individuals and Organizations*, [online], cited October 2007, from <http://saferhealthcarenow.ca/ViewResource.aspx?resourceId=82>.

- **Identifying opportunities for improvement.** Across the country, many organizations are using a 2X2 matrix developed by the Institute for Healthcare Improvement to identify priorities for action.[68] For instance, pneumonitis due to inhaling solids and liquids is one of the top 20 diagnosis groups related to in-hospital deaths. Because of data they were able to obtain from the HSMR validation process, New Brunswick is able to focus on opportunities to improve feeding practices for patients with dementia who have trouble swallowing.[71] Others are using HSMR data to test ideas about where the potential for improvement might lie. For example, two hospitals asked how the presence of a cancer centre affected their results; another wondered whether patients referred to them from other regions had a different mortality experience than local patients. These analyses help to separate factors that affect mortality from those that do not, facilitating the identification of priorities for improvement.

- **Setting goals and tracking results.** As they become more familiar with HSMR results, some organizations are beginning to use the measure to set overall improvement goals and track results. These goals are usually expressed in terms of "how good, by when" targets, such as reducing a hospital's standardized mortality rate by X points in Y months.

Next Steps

In 1942, Sir Winston Churchill famously said “Now this is not the end. It is not even the beginning of the end. But it is, perhaps, the end of the beginning.”[72] Likewise, this report represents an important milestone in the efforts to understand, measure and improve outcomes for patients. HSMR, first developed in the U.K., has now been adapted for use in the Canadian health information environment. Hospitals and health regions have received their results, and a number have completed the validation process and moved on to explore how best to use the measure to motivate and track improvement.

But this is by no means the end of the journey. Experience from other countries suggests that systemic improvement efforts take time to implement. Their effects tend to be seen over years, not months. CIHI is committed to continuing to work with organizations that want to travel this path. We plan to make up-to-date local results available to hospitals electronically within a few days of data submission, to provide tools to support the use of HSMR and other health and health care information and to learn from the experience of organizations that use HSMR results in different ways. We will also continue to work with hospitals, regions and ministries of health to improve the quality of data, the methods and the usefulness of reports.

In addition, we recognize that while mortality is important, it is not the only outcome that matters to patients, families or health care providers. Nor are hospitals the only place that patients receive care. HSMR is one tool available to inform quality improvement efforts, but it is not the only one that may be useful. In cooperation with the Canadian Patient Safety Institute, we will be commissioning a review of big-dot quality measures beyond mortality in use outside of acute care hospitals, both within Canada and internationally. Our hope is that over time we can work with partners to develop a set of complementary whole-system measures that will provide useful information to leaders and managers, policy-makers and the public.

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71 Personal communication with Shauna Figler, New Brunswick Department of Health.

72 The Churchill Society London, [online], cited October 2007, from <http://www.churchill-society-london.org.uk/EndoBegn.html>.

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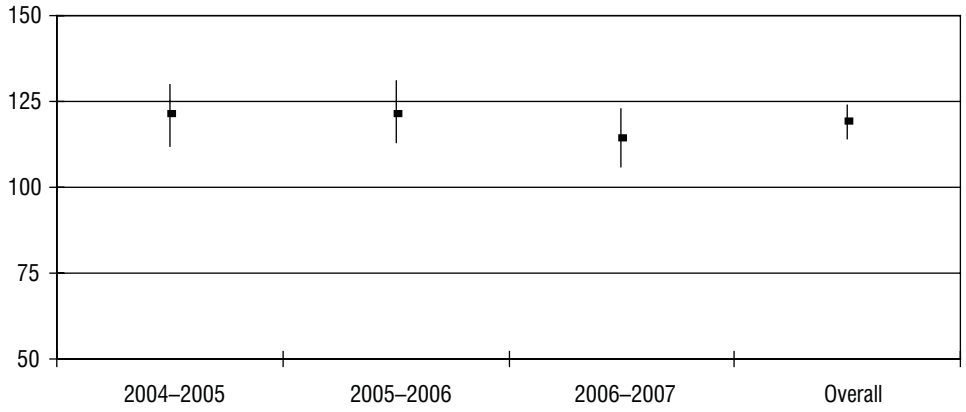
Appendix I

HSMR Tables by Health Region

Newfoundland and Labrador
Eastern Regional Integrated Health Authority

Hospital Standardized Mortality Ratio, Excluding Palliative Care, 2004–2005, 2005–2006 and 2006–2007



	HSMR Excluding PC	HSMR Excluding PC 95% CI	HSMR All Cases	HSMR All Cases 95% CI
2004–2005	121	112–130	114	106–122
2005–2006	121	113–131	122	114–131
2006–2007	114	106–123	115	107–123
Overall	**119**	**114–124**	**117**	**112–122**

Hospitals included in the regional result:

- Bonavista Community Health Centre
- Burin Peninsula Health Care Centre
- Carbonear General Hospital
- Dr. A. A. Wilkinson Memorial Health Centre
- Dr. G. B. Cross Memorial Hospital
- Dr. Walter Templeman Health Centre
- Placentia Health Care Centre
- St. John's Acute Care‡

Notes:

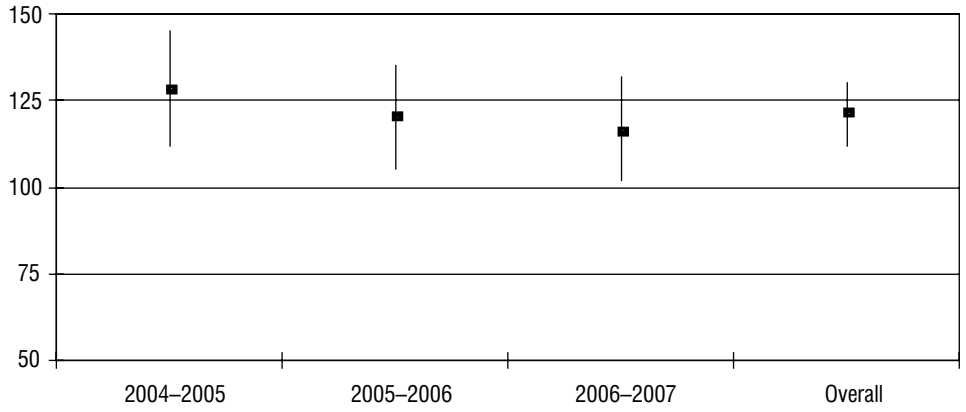
‡ St. John's Acute Care designates care provided at the following facilities: General Hospital (Health Sciences Centre), St. Clare's Mercy Hospital, Waterford Hospital, Janeway Children's Health and Rehabilitation Centre (2006–2007 only) and the Dr. L. A. Miller Centre.

95% CI 95 percent confidence interval

PC Palliative care

Newfoundland and Labrador
Central Regional Integrated Health Authority

Hospital Standardized Mortality Ratio, Excluding Palliative Care, 2004–2005, 2005–2006 and 2006–2007



	HSMR Excluding PC	HSMR Excluding PC 95% CI	HSMR All Cases	HSMR All Cases 95% CI
2004–2005	128	112–145	123	109–138
2005–2006	120	105–135	121	107–135
2006–2007	116	102–132	122	108–136
Overall	**121**	**112–130**	**122**	**114–130**

Hospitals included in the regional result:

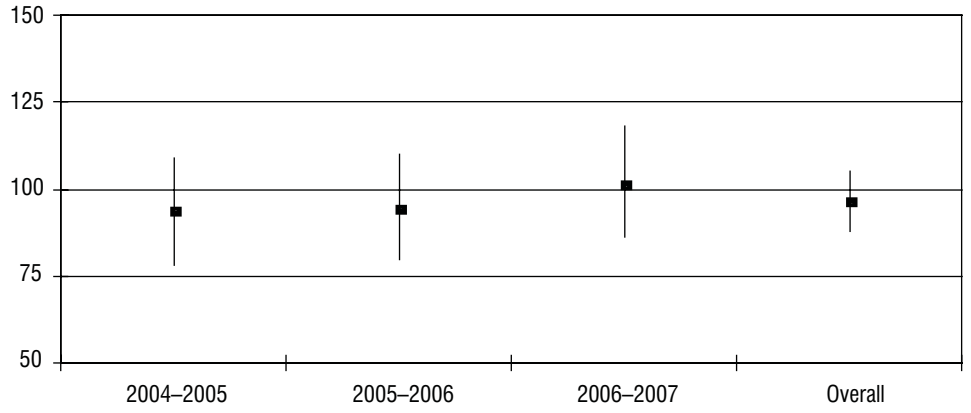
- A. M. Guy Memorial Hospital
- Baie Verte Health Care Centre
- Brookfield/Bonnews Health Care Centre
- Central Newfoundland Regional Health Centre
- Connaigre Peninsula Community Health Centre
- Fogo Island Hospital
- Green Bay Community Health Centre
- James Paton Memorial Hospital
- Notre Dame Bay Memorial Health Centre

Notes:

95% CI 95 percent confidence interval
PC Palliative care

Newfoundland and Labrador
Western Regional Integrated Health Authority

Hospital Standardized Mortality Ratio, Excluding Palliative Care, 2004–2005, 2005–2006 and 2006–2007



	HSMR Excluding PC	HSMR Excluding PC 95% CI	HSMR All Cases	HSMR All Cases 95% CI
2004–2005	93	78–109	108	94–123
2005–2006	94	80–110	111	97–126
2006–2007	101	86–118	125	110–141
Overall	**96**	**88–105**	**115**	**106–123**

Hospitals included in the regional result:

- Bonne Bay Health Centre
- Calder Health Care Centre
- Dr. Charles L. Legrow Health Centre
- Rufus Guinchard Health Care Centre
- Sir Thomas Roddick Hospital
- Western Memorial Regional Hospital

Notes:

95% CI 95 percent confidence interval
PC Palliative care

Nova Scotia
Cape Breton District Health Authority

Hospital Standardized Mortality Ratio, Excluding Palliative Care, 2004–2005, 2005–2006 and 2006–2007

HSMR excluding palliative care not reported.

	HSMR Excluding PC	HSMR Excluding PC 95% CI	HSMR All Cases	HSMR All Cases 95% CI
2004–2005	*	*	137	126–149
2005–2006	*	*	139	128–152
2006–2007	*	*	127	116–139
Overall	*****	*****	**135**	**128–141**

Hospitals included in the regional result:

- Buchanan Memorial Community Health Centre
- Cape Breton Healthcare Complex†
- Inverness Consolidated Memorial Hospital
- Sacred Heart Hospital
- Victoria County Memorial Hospital

Notes:

* When data for the Cape Breton Healthcare Complex are removed from the regional result the eligibility threshold of 2,500 is no longer met. Consequently, HSMR excluding palliative care data are not reported for this region.

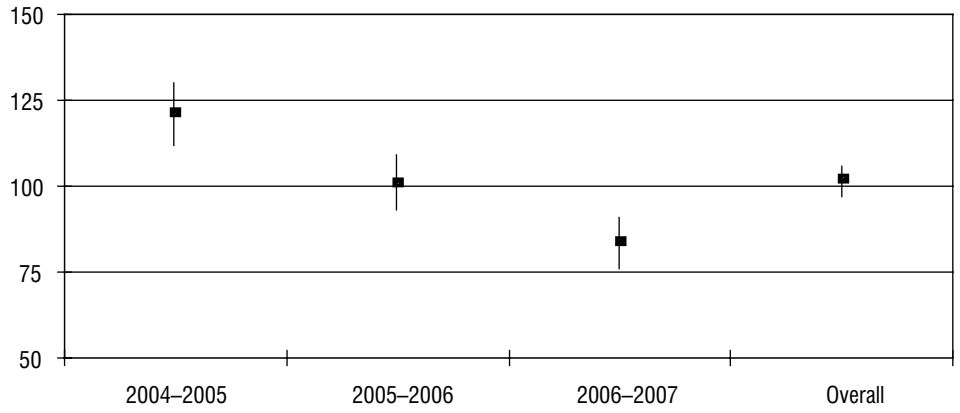
† Cape Breton Healthcare Complex is located within this region but identified significant data-related issues with respect to the data submitted for its HSMR cases. Accordingly, the data for this facility are not included in the calculation for HSMR excluding palliative care.

95% CI 95 percent confidence interval

PC Palliative care

Nova Scotia
Capital District Health Authority

Hospital Standardized Mortality Ratio, Excluding Palliative Care, 2004–2005, 2005–2006 and 2006–2007



	HSMR Excluding PC	HSMR Excluding PC 95% CI	HSMR All Cases	HSMR All Cases 95% CI
2004–2005	121	112–130	125	118–133
2005–2006	101	93–109	113	106–120
2006–2007	84	76–91	107	100–114
Overall	**102**	**97–106**	**115**	**111–119**

Hospitals included in the regional result:

- Dartmouth General Hospital†
- Eastern Shore Memorial
- Hants Community Hospital†
- Musquodoboit Valley Memorial Hospital
- Queen Elizabeth II Health Sciences Centre
- Twin Oaks Memorial Hospital

Notes:

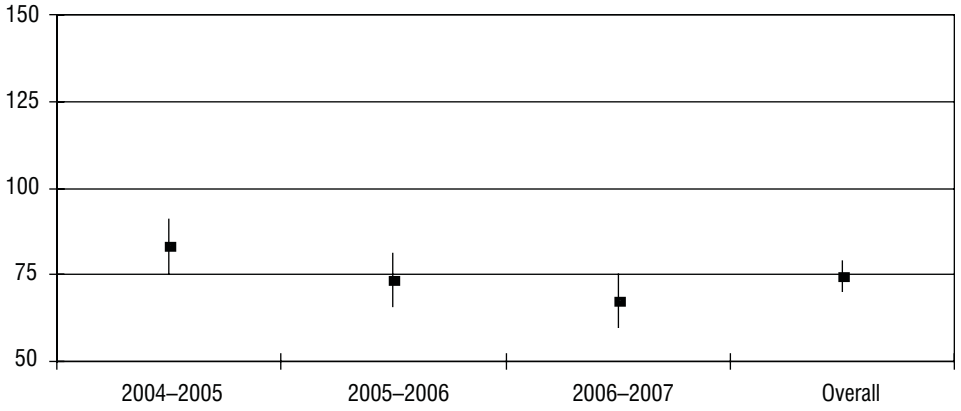
† Dartmouth General Hospital and Hants Community Hospital are located within this region but identified significant data-related issues with respect to the data submitted for their HSMR cases. Accordingly, the data for these facilities are not included in the above calculation for HSMR excluding palliative care.

95% CI 95 percent confidence interval

PC Palliative care

New Brunswick
Atlantic Health Sciences Corporation

Hospital Standardized Mortality Ratio, Excluding Palliative Care, 2004–2005, 2005–2006 and 2006–2007



	HSMR Excluding PC	HSMR Excluding PC 95% CI	HSMR All Cases	HSMR All Cases 95% CI
2004–2005	83	75–91	94	86–103
2005–2006	73	66–81	84	76–92
2006–2007	67	60–75	86	79–94
Overall	**74**	**70–79**	**88**	**84–93**

Hospitals included in the regional result:

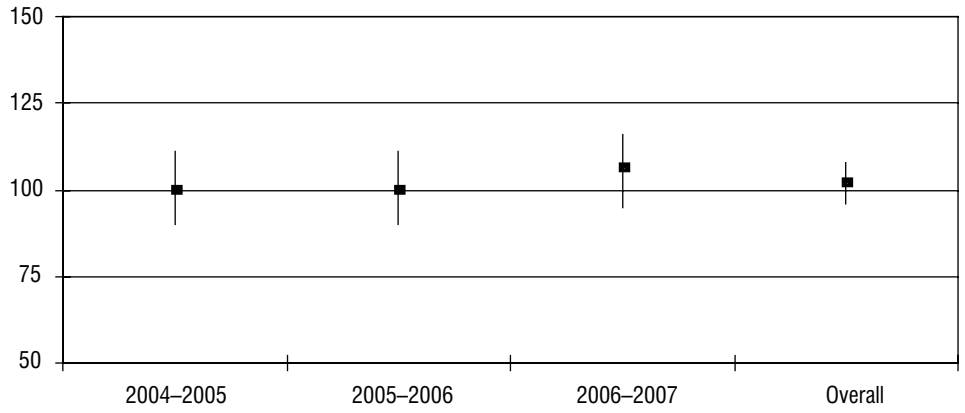
- Charlotte County Hospital
- Grand Manan Hospital
- Saint John Regional Hospital
- Sussex Health Centre

Notes:

95% CI 95 percent confidence interval
PC Palliative care

New Brunswick
River Valley Health

Hospital Standardized Mortality Ratio, Excluding Palliative Care, 2004–2005, 2005–2006 and 2006–2007



	HSMR Excluding PC	HSMR Excluding PC 95% CI	HSMR All Cases	HSMR All Cases 95% CI
2004–2005	100	90–111	99	90–109
2005–2006	100	90–111	100	91–110
2006–2007	106	95–116	104	95–114
Overall	**102**	**96–108**	**101**	**96–107**

Hospitals included in the regional result:

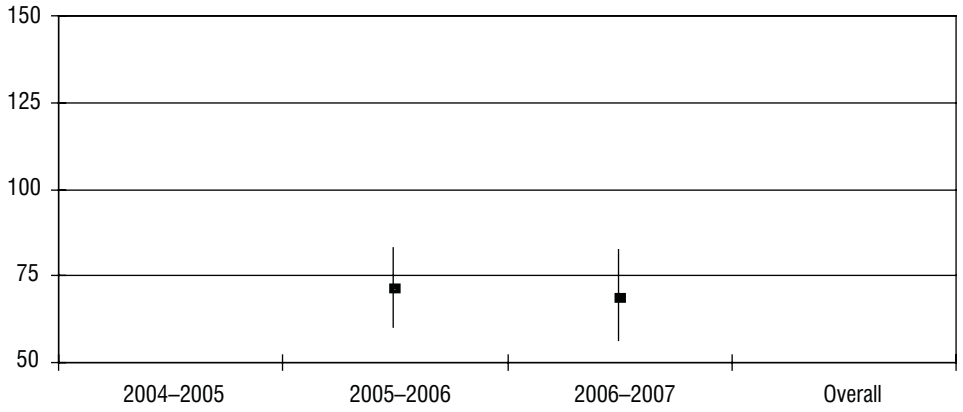
- Carleton Memorial Hospital
- Dr. Everett Chalmers Regional Hospital
- Hotel Dieu of St. Joseph
- Northern Carleton Hospital
- Oromocto Public Hospital Inc.
- Tobique Valley Hospital Inc.

Notes:

95% CI 95 percent confidence interval
PC Palliative care

New Brunswick
Régie de la santé Acadie Bathurst Health Authority

Hospital Standardized Mortality Ratio, Excluding Palliative Care, 2004–2005, 2005–2006 and 2006–2007



	HSMR Excluding PC	HSMR Excluding PC 95% CI	HSMR All Cases	HSMR All Cases 95% CI
2004–2005	~	~	~	~
2005–2006	71	60–83	80	69–92
2006–2007	68	56–82	92	79–106
Overall	**~**	**~**	**~**	**~**

Hospitals included in the regional result:

- Chaleur Regional Hospital
- Hopital De L'Enfant Jesus RHSJ
- Lameque Hospital and Community Health Centre
- Tracadie Sheila Hospital

Notes:

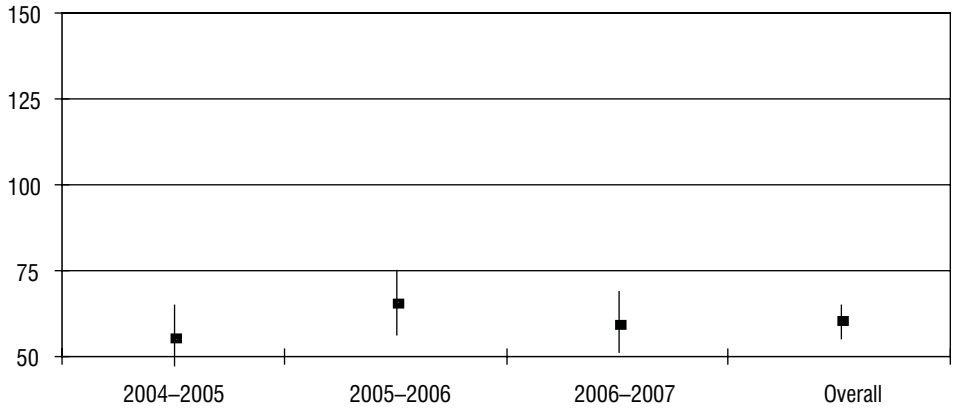
~ Data submitted for Régie de la santé Acadie Bathurst Health Authority were incomplete for 2004–2005. As a result, the HSMRs for 2004–2005 and overall are not reported here.

95% CI 95 percent confidence interval

PC Palliative care

New Brunswick
South-East Regional Health Authority

Hospital Standardized Mortality Ratio, Excluding Palliative Care, 2004–2005, 2005–2006 and 2006–2007



	HSMR Excluding PC	HSMR Excluding PC 95% CI	HSMR All Cases	HSMR All Cases 95% CI
2004–2005	55	47–65	79	71–89
2005–2006	65	56–75	91	81–101
2006–2007	59	51–69	86	77–96
Overall	**60**	**55–65**	**85**	**80–91**

Hospitals included in the regional result:

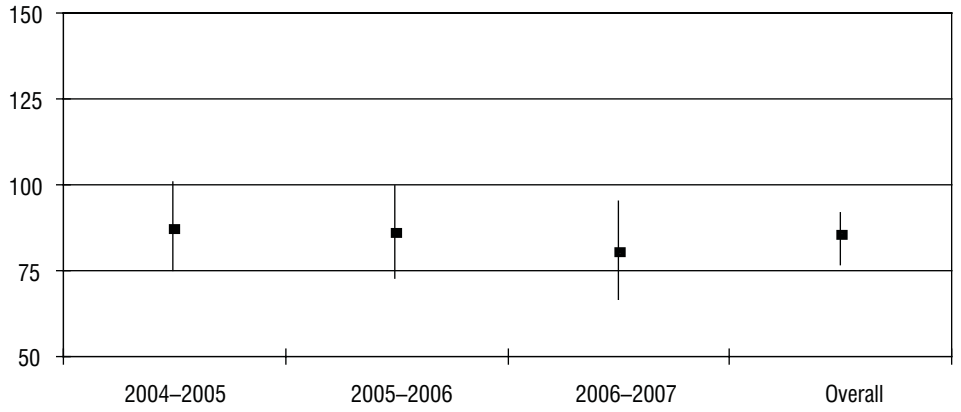
- Sackville Memorial Hospital
- The Moncton Hospital

Notes:

95% CI 95 percent confidence interval
PC Palliative care

New Brunswick
Régie régionale de la santé Beauséjour Regional Health Authority

Hospital Standardized Mortality Ratio, Excluding Palliative Care, 2004–2005, 2005–2006 and 2006–2007



	HSMR Excluding PC	HSMR Excluding PC 95% CI	HSMR All Cases	HSMR All Cases 95% CI
2004–2005	87	75–101	94	82–106
2005–2006	86	73–100	96	84–109
2006–2007	80	67–95	98	85–112
Overall	**85**	**77–92**	**96**	**89–103**

Hospitals included in the regional result:

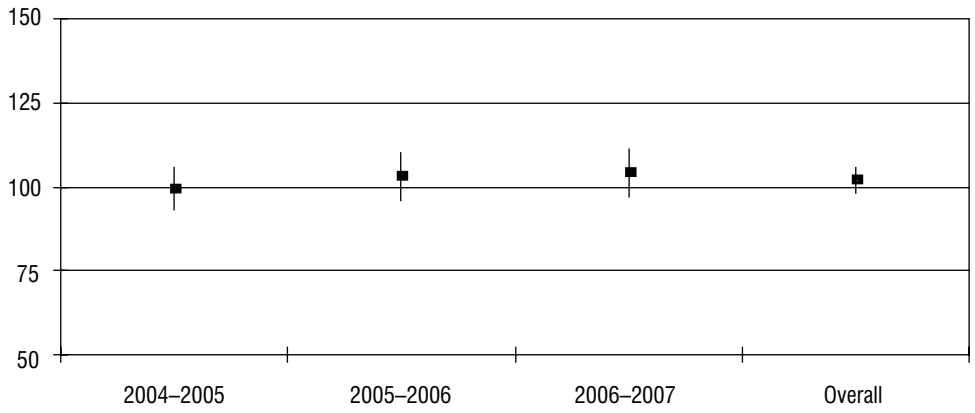
- Dr. Georges L. Dumont Regional Hospital
- Stella Maris De Kent Hospital

Notes:

95% CI 95 percent confidence interval
PC Palliative care

Ontario
Erie St. Clair LHIN

Hospital Standardized Mortality Ratio, Excluding Palliative Care, 2004–2005, 2005–2006 and 2006–2007



	HSMR Excluding PC	HSMR Excluding PC 95% CI	HSMR All Cases	HSMR All Cases 95% CI
2004–2005	99	93–106	99	93–105
2005–2006	103	96–110	105	98–111
2006–2007	104	97–111	108	102–115
Overall	**102**	**98–106**	**104**	**100–107**

Hospitals included in the regional result:

- Bluewater Health Charlotte Eleanor Englehart Site
- Bluewater Health Sarnia Site
- Chatham Kent Health Alliance St. Joseph's Hospital Campus
- Chatham Public General Hospital Society of Chatham
- Hotel Dieu Grace Hospital Hotel Dieu Site
- Leamington District Memorial Hospital
- Sydenham District Hospital

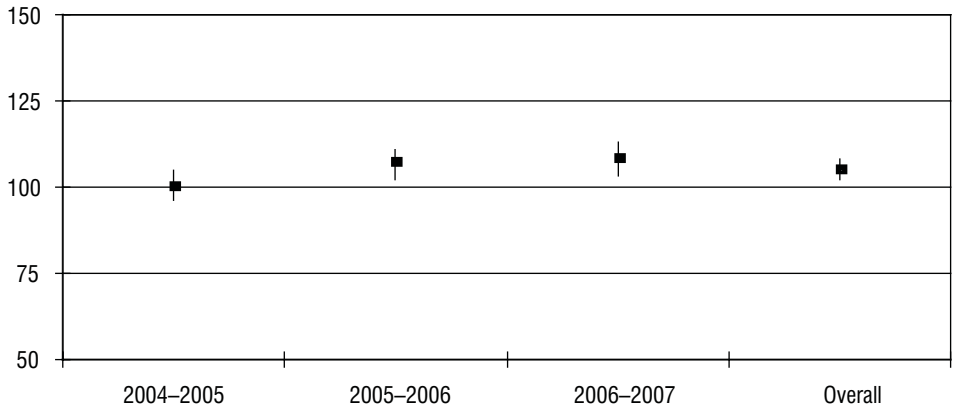
Notes:

Windsor Regional Hospital (Windsor Regional Hospital and Windsor Regional Hopital Metropolitan Campus) is located within this region but identified significant data-related issues with respect to the data submitted for their HSMR cases. Accordingly, the data for these facilities are not included in the above calculations for HSMR.

95% CI 95 percent confidence interval
PC Palliative care

Ontario
South West LHIN

Hospital Standardized Mortality Ratio, Excluding Palliative Care, 2004–2005, 2005–2006 and 2006–2007



	HSMR Excluding PC	HSMR Excluding PC 95% CI	HSMR All Cases	HSMR All Cases 95% CI
2004–2005	100	96–105	103	98–107
2005–2006	107	102–111	109	105–113
2006–2007	108	103–113	113	109–118
Overall	**105**	**102–108**	**108**	**106–111**

Hospitals included in the regional result:

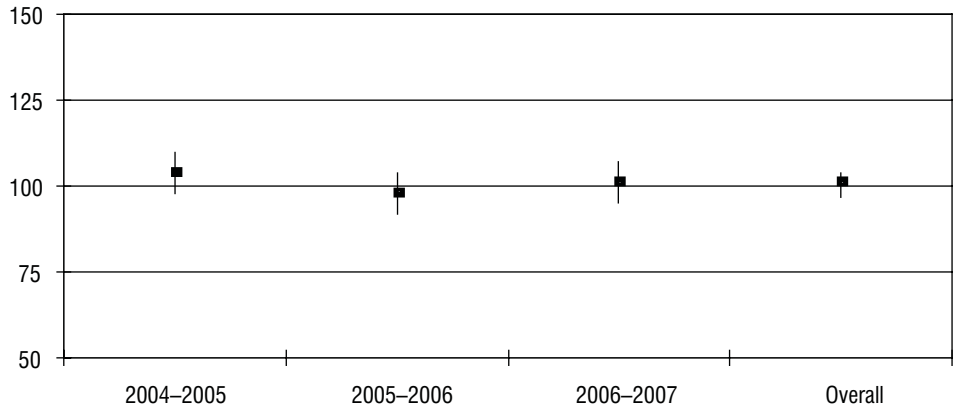
- Alexandra Hospital
- Alexandra Marine and General Hospital
- Clinton Public Hospital
- Four Counties Health Services
- Grey Bruce Health Centre Grey Site
- Grey Bruce Health Services Lion's Head Hospital
- Grey Bruce Health Services Meaford Site
- Grey Bruce Health Services Owen Sound Site
- Grey Bruce Health Services Southampton Site
- Grey Bruce Health Services Wiarton Site
- Hanover and District Hospital
- Listowel Memorial Hospital
- London Health Sciences Centre
- Seaforth Community Hospital
- South Bruce Grey Health Centre Chesley Site
- South Bruce Grey Health Centre Durham Site
- South Bruce Grey Health Centre Kincardine Site
- South Bruce Grey Health Centre Walkerton Site
- South Huron Hospital
- St. Joseph's Healthcare London
- St. Marys Memorial Hospital
- St. Thomas Elgin General Hospital
- Stratford General Hospital
- Strathroy Middlesex General Hospital
- Tillsonburg District Memorial Hospital
- Wingham and District Hospital
- Woodstock General Hospital

Notes:

95% CI 95 percent confidence interval
PC Palliative care

Ontario
Waterloo Wellington LHIN

Hospital Standardized Mortality Ratio, Excluding Palliative Care, 2004–2005, 2005–2006 and 2006–2007



	HSMR Excluding PC	HSMR Excluding PC 95% CI	HSMR All Cases	HSMR All Cases 95% CI
2004–2005	104	98–110	101	95–106
2005–2006	98	92–104	95	90–101
2006–2007	101	95–107	104	99–110
Overall	**101**	**97–104**	**100**	**97–103**

Hospitals included in the regional result:

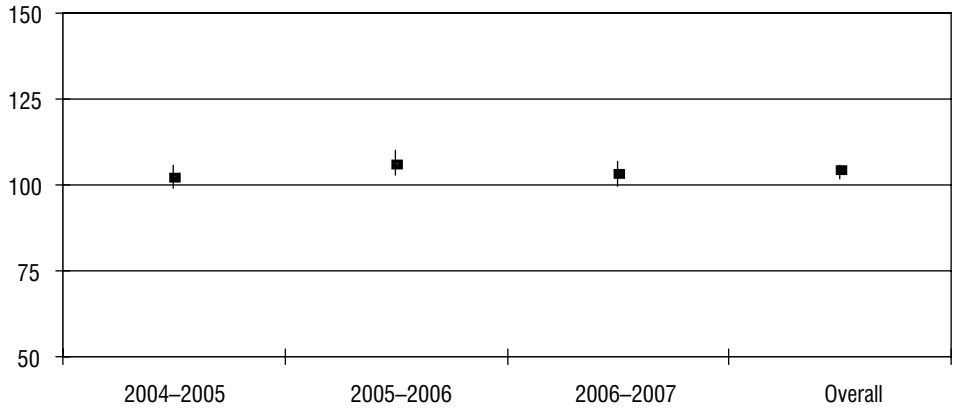
- Cambridge Memorial Hospital
- Grand River Hospital K. W. Health Centre
- Groves Memorial Community Hospital
- Guelph General Hospital
- North Wellington Health Care Louise Marshall Site
- North Wellington Health Care Palmerston Site
- St. Mary's General Hospital

Notes:

95% CI 95 percent confidence interval
PC Palliative care

Ontario
Hamilton Niagara Haldimand Brant LHIN

Hospital Standardized Mortality Ratio, Excluding Palliative Care, 2004–2005, 2005–2006 and 2006–2007



	HSMR Excluding PC	HSMR Excluding PC 95% CI	HSMR All Cases	HSMR All Cases 95% CI
2004–2005	102	99–106	100	97–103
2005–2006	106	103–110	105	102–109
2006–2007	103	100–107	105	102–109
Overall	**104**	**102–106**	**103**	**102–105**

Hospitals included in the regional result:

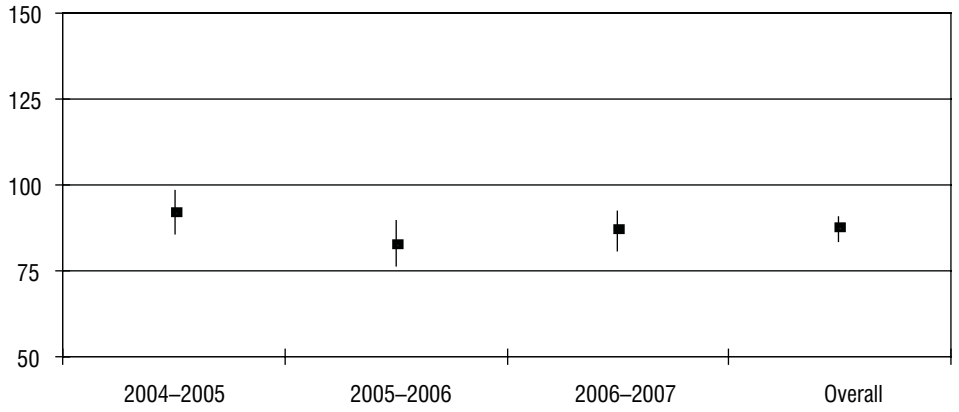
- Brantford General Hospital
- Haldimand War Memorial Hospital
- Hamilton Health Sciences Corporation Hamilton Division
- Hamilton Health Sciences Corporation Henderson Division
- Hamilton Health Sciences Corporation McMaster Division
- Hotel Dieu Hospital
- Joseph Brant Memorial Hospital
- Niagara Health System Fort Erie Site
- Niagara Health System Greater Niagara Site
- Niagara Health System Niagara on the Lake Site
- Niagara Health System Ontario Street Site
- Niagara Health System Port Colborne General Hospital Site
- Niagara Health System St. Catharines General Site
- Niagara Health System Welland County General Site
- Norfolk General Hospital
- St. Joseph's Healthcare Hamilton
- West Haldimand General Hospital
- West Lincoln Memorial Hospital
- Willett Hospital

Notes:

95% CI 95 percent confidence interval
PC Palliative care

Ontario
Central West LHIN

Hospital Standardized Mortality Ratio, Excluding Palliative Care, 2004–2005, 2005–2006 and 2006–2007



	HSMR Excluding PC	HSMR Excluding PC 95% CI	HSMR All Cases	HSMR All Cases 95% CI
2004–2005	91	85–98	86	80–92
2005–2006	82	76–89	79	74–85
2006–2007	86	80–92	84	78–90
Overall	**87**	**83–90**	**83**	**80–86**

Hospitals included in the regional result:

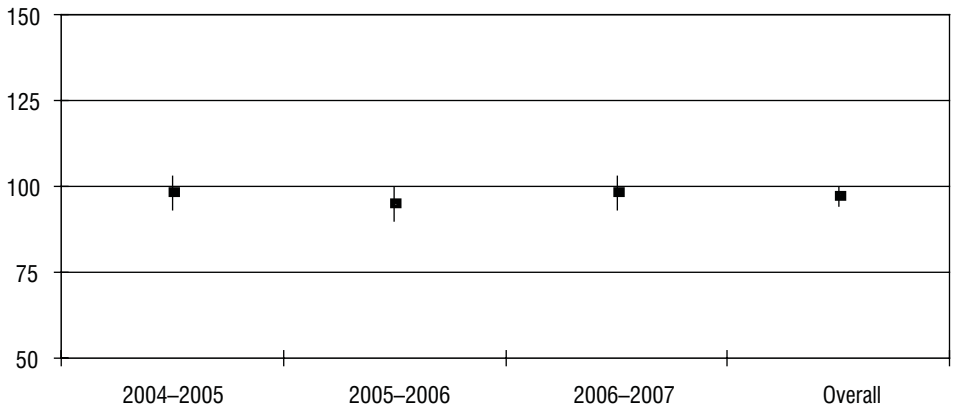
- Headwaters Health Care Centre
- William Osler Health Centre Etobicoke General Hospital
- William Osler Health Centre Peel Memorial Hospital

Notes:

95% CI 95 percent confidence interval
PC Palliative care

Ontario
Mississauga Halton LHIN

Hospital Standardized Mortality Ratio, Excluding Palliative Care, 2004–2005, 2005–2006 and 2006–2007



	HSMR Excluding PC	HSMR Excluding PC 95% CI	HSMR All Cases	HSMR All Cases 95% CI
2004–2005	98	93–103	102	97–107
2005–2006	95	90–100	99	94–104
2006–2007	98	93–103	104	99–109
Overall	**97**	**94–100**	**101**	**99–104**

Hospitals included in the regional result:

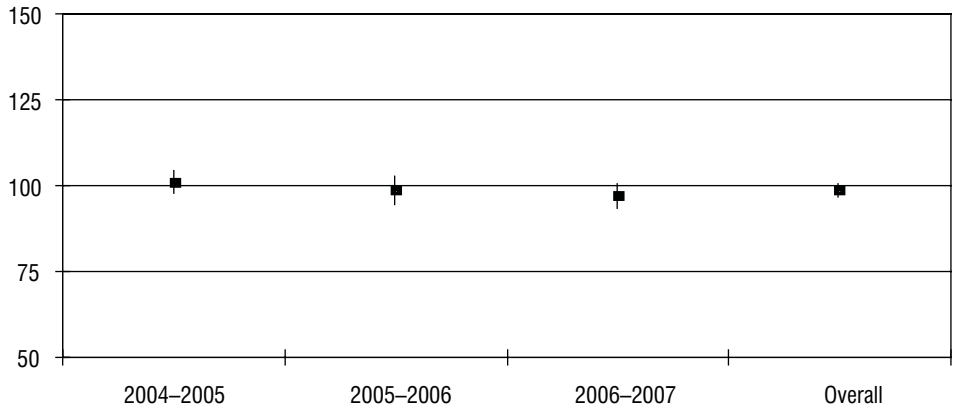
- Credit Valley Hospital
- Halton Healthcare Services Georgetown Site
- Halton Healthcare Services Milton Site
- Halton Healthcare Services Oakville Trafalgar Site
- Trillium Health Centre Mississauga
- William Osler Health Centre Georgetown Site

Notes:

95% CI 95 percent confidence interval
PC Palliative care

Ontario
Toronto Central LHIN

Hospital Standardized Mortality Ratio, Excluding Palliative Care, 2004–2005, 2005–2006 and 2006–2007



	HSMR Excluding PC	HSMR Excluding PC 95% CI	HSMR All Cases	HSMR All Cases 95% CI
2004–2005	100	97–104	96	93–100
2005–2006	98	94–102	97	94–100
2006–2007	96	93–100	97	94–100
Overall	**98**	**96–100**	**97**	**95–99**

Hospitals included in the regional result:

- Mount Sinai Hospital†
- St. Joseph's Health Centre Toronto
- St. Michael's Hospital
- Sunnybrook Health Sciences Centre
- Toronto East General Hospital
- University Health Network

Notes:

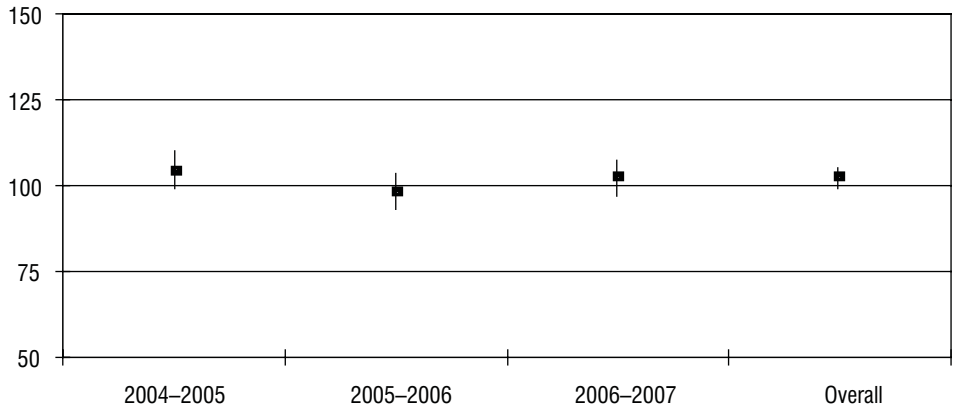
† Mount Sinai Hospital is located within this region but identified significant data-related issues with respect to the data submitted for its HSMR cases. Accordingly, the data for this facility are not included in the above calculation for HSMR excluding palliative care.

95% CI 95 percent confidence interval

PC Palliative care

Ontario
Central LHIN

Hospital Standardized Mortality Ratio, Excluding Palliative Care, 2004–2005, 2005–2006 and 2006–2007



	HSMR Excluding PC	HSMR Excluding PC 95% CI	HSMR All Cases	HSMR All Cases 95% CI
2004–2005	104	99–110	100	95–105
2005–2006	98	93–103	96	91–101
2006–2007	102	97–107	100	96–105
Overall	**102**	**99–105**	**99**	**96–101**

Hospitals included in the regional result:

- Markham Stouffville Hospital Markham Site
- North York General Hospital General Site
- Southlake Regional Health Centre
- Stevenson Memorial Hospital
- York Central Hospital

Notes:

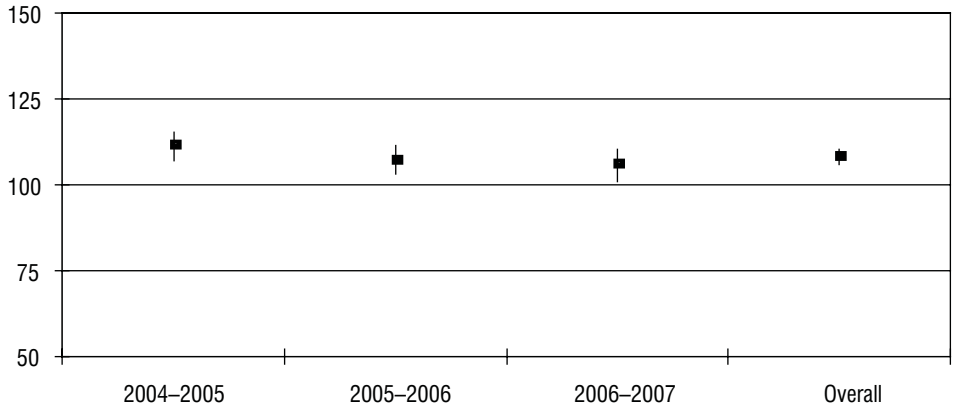
Humber River Regional Hospital (Finch Site, Keele Site and Church Street Site) is located within this region but identified significant data-related issues with respect to the data submitted for its HSMR cases. Accordingly, the data for these facilities are not included in the above calculations for HSMR.

95% CI 95 percent confidence interval

PC Palliative care

Ontario
Central East LHIN

Hospital Standardized Mortality Ratio, Excluding Palliative Care, 2004–2005, 2005–2006 and 2006–2007



	HSMR Excluding PC	HSMR Excluding PC 95% CI	HSMR All Cases	HSMR All Cases 95% CI
2004–2005	111	107–115	110	106–114
2005–2006	107	103–111	109	105–113
2006–2007	106	101–110	110	107–114
Overall	**108**	**106–110**	**110**	**108–112**

Hospitals included in the regional result:

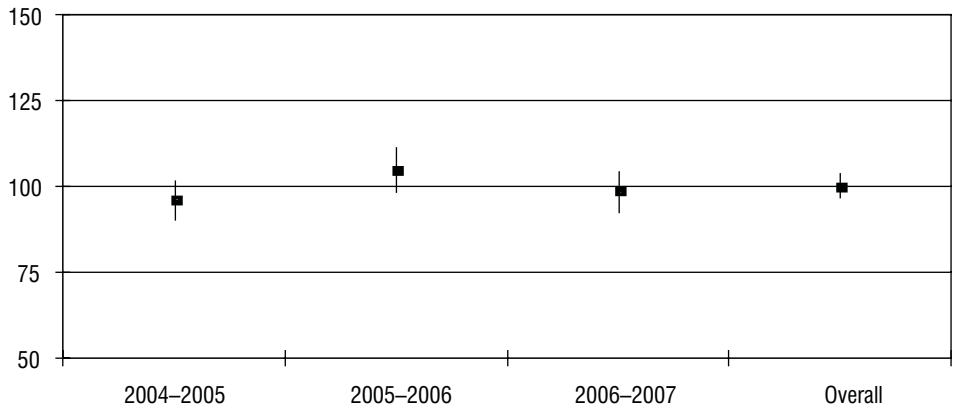
- Campbellford Memorial Hospital
- Haliburton Highlands Health Service
- Lakeridge Health Bowmanville Memorial Site
- Lakeridge Health Oshawa Site
- Lakeridge Health Port Perry Site
- Markham Stouffville Hospital Uxbridge Site
- Northumberland Hills Hospital
- Peterborough Regional Health Centre
- Ross Memorial Hospital
- Rouge Valley Health System Ajax and Pickering Health Centre
- Rouge Valley Health System Centenary Site
- The Scarborough Hospital General Site
- The Scarborough Hospital Grace Site

Notes:

95% CI 95 percent confidence interval
PC Palliative care

Ontario
South East LHIN

Hospital Standardized Mortality Ratio, Excluding Palliative Care, 2004–2005, 2005–2006 and 2006–2007



	HSMR Excluding PC	HSMR Excluding PC 95% CI	HSMR All Cases	HSMR All Cases 95% CI
2004–2005	95	90–101	103	98–109
2005–2006	104	98–111	104	99–110
2006–2007	98	92–104	110	104–116
Overall	**99**	**96–103**	**106**	**102–109**

Hospitals included in the regional result:

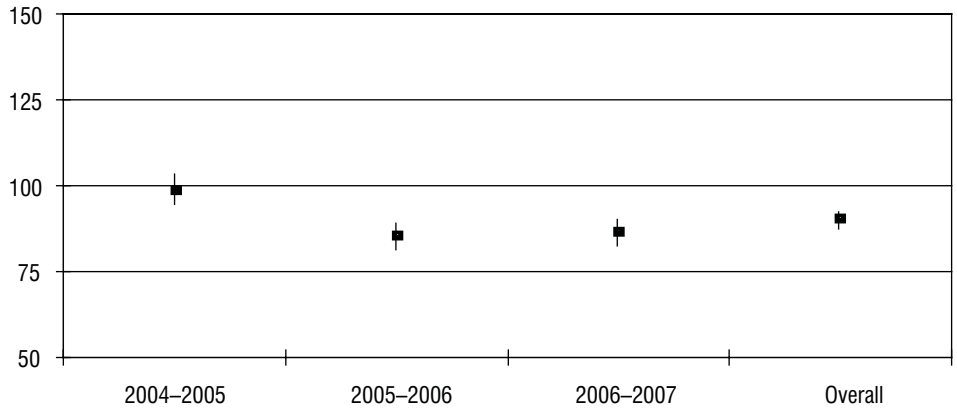
- Brockville General Hospital
- Hotel Dieu Hospital
- Kingston General Hospital
- Lennox and Addington County General Hospital
- Perth and Smiths Falls District Hospital Perth Site
- Perth and Smiths Falls District Hospital Smith Site
- Quinte Healthcare Corporation Belleville General Site
- Quinte Healthcare Corporation North Hastings Site
- Quinte Healthcare Corporation Prince Edward County Memorial Site
- Quinte Healthcare Corporation Trenton Memorial Site
- St. Francis Memorial Hospital Site

Notes:

95% CI 95 percent confidence interval
PC Palliative care

Ontario
Champlain LHIN

Hospital Standardized Mortality Ratio, Excluding Palliative Care, 2004–2005, 2005–2006 and 2006–2007



	HSMR Excluding PC	HSMR Excluding PC 95% CI	HSMR All Cases	HSMR All Cases 95% CI
2004–2005	98	94–103	103	99–107
2005–2006	85	81–89	98	94–102
2006–2007	86	82–90	102	98–106
Overall	**90**	**87–92**	**101**	**98–103**

Hospitals included in the regional result:

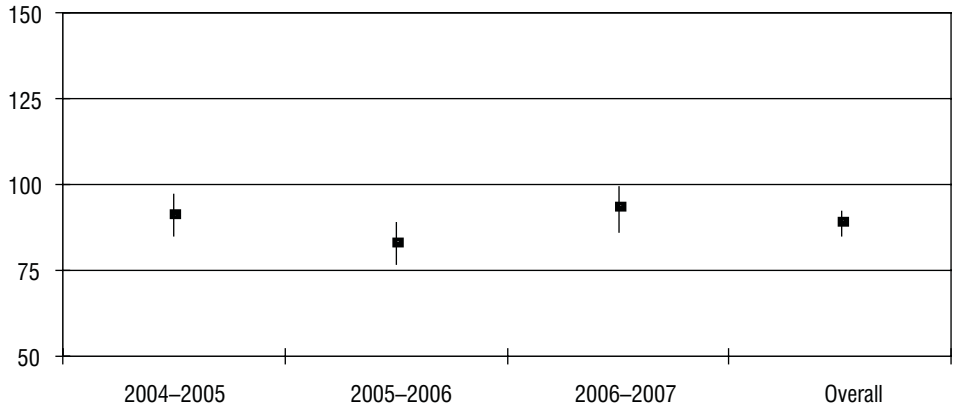
- Almonte General Hospital
- Arnprior and District Memorial Hospital
- Carleton Place and District Memorial Hospital
- Cornwall Community Hospital 2nd Street Site
- Cornwall Community Hospital McConnell Site
- Deep River and District Hospital
- Glengarry Memorial Hospital
- Hawkesbury and District General Hospital
- Hôpital Montfort Hospital
- Kemptville District Hospital
- Pembroke Regional Hospital Inc.
- Queensway Carleton Hospital
- Renfrew Victoria Hospital
- The Ottawa Hospital Civic Campus
- The Ottawa Hospital General Campus
- Winchester District Memorial Hospital

Notes:

95% CI 95 percent confidence interval
PC Palliative care

Ontario
North Simcoe Muskoka LHIN

Hospital Standardized Mortality Ratio, Excluding Palliative Care, 2004–2005, 2005–2006 and 2006–2007



	HSMR Excluding PC	HSMR Excluding PC 95% CI	HSMR All Cases	HSMR All Cases 95% CI
2004–2005	91	85–97	93	88–99
2005–2006	83	77–89	90	85–96
2006–2007	93	86–99	99	93–106
Overall	**89**	**85–92**	**94**	**91–98**

Hospitals included in the regional result:

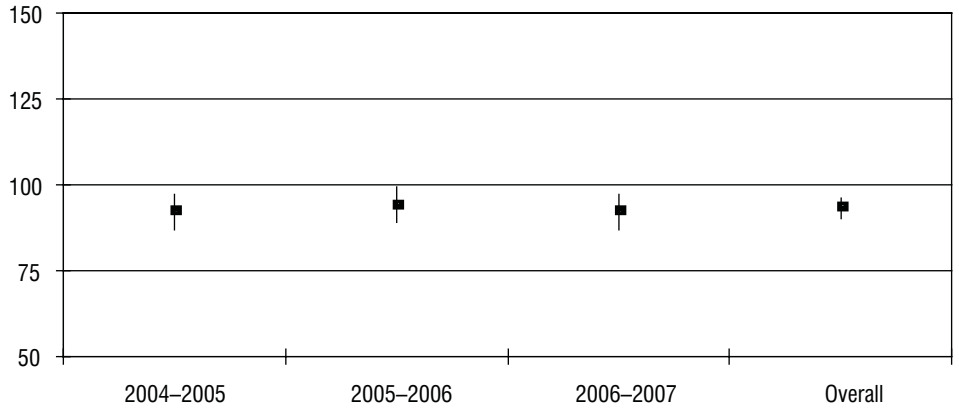
- Collingwood General and Marine Hospital
- Huntsville District Memorial Hospital Site
- Huronia District Hospital
- Orillia Soldiers' Memorial Hospital
- Royal Victoria Hospital of Barrie
- South Muskoka Memorial Hospital Site

Notes:

95% CI 95 percent confidence interval
PC Palliative care

Ontario
North East LHIN

Hospital Standardized Mortality Ratio, Excluding Palliative Care, 2004–2005, 2005–2006 and 2006–2007



	HSMR Excluding PC	HSMR Excluding PC 95% CI	HSMR All Cases	HSMR All Cases 95% CI
2004–2005	92	87–97	102	97–107
2005–2006	94	89–99	107	102–112
2006–2007	92	87–97	105	100–110
Overall	**93**	**90–96**	**104**	**102–107**

Hospitals included in the regional result:

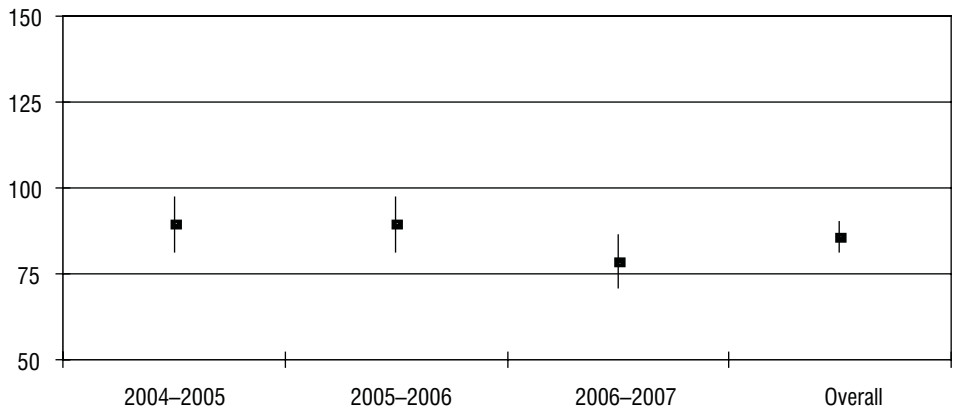
- Anson General Hospital
- Bingham Memorial Hospital
- Blind River District Health Centre
- Englehart and District Hospital
- Espanola General Hospital
- Hornepayne Community Hospital
- Kirkland and District Hospital
- Lady Dunn Health Centre
- Lady Minto Hospital
- Manitoulin Health Centre Little Current Site
- Manitoulin Health Centre Mindemoya Hospital Site
- Mattawa General Hospital
- North Bay General Hospital
- Notre Dame Hospital
- Sault Area Hospitals
- Sensenbrenner Hospital
- Services De Sante De Chapleau Health Services
- Smooth Rock Falls Hospital
- St. Joseph's General Hospital
- Sudbury Regional Hospital Laurentian Site
- Temiskaming Hospital
- Timmins and District General Hospital
- Weeneebayko Hospital
- West Nipissing General Hospital
- West Parry Sound Health Centre

Notes:

95% CI 95 percent confidence interval
PC Palliative care

Ontario
North West LHIN

Hospital Standardized Mortality Ratio, Excluding Palliative Care, 2004–2005, 2005–2006 and 2006–2007



	HSMR Excluding PC	HSMR Excluding PC 95% CI	HSMR All Cases	HSMR All Cases 95% CI
2004–2005	89	81–97	84	77–91
2005–2006	89	81–97	84	77–91
2006–2007	78	71–86	75	69–82
Overall	**85**	**81–90**	**81**	**77–85**

Hospitals included in the regional result:

- Atikokan General Hospital
- Dryden Regional Health Centre
- Geraldton District Hospital
- Lake of the Woods District Hospital
- Manitouwadge General Hospital
- McCausland Hospital
- Nipigon District Memorial Hospital
- Red Lake Margaret Cochenour Memorial Hospital
- Riverside Health Care Facilities Inc. Emo Hospital
- Riverside Health Care Facilities Inc. La Verendyre Hospital
- Riverside Health Care Facilities Inc. Rainy River Hospital
- Sioux Lookout Meno Ya Win Health Centre 5th Avenue Site
- Thunder Bay Regional Health Sciences Centre
- Wilson Memorial General Hospital

Notes:

95% CI 95 percent confidence interval
PC Palliative care

Manitoba
Winnipeg Regional Health Authority

Hospital Standardized Mortality Ratio, Excluding Palliative Care, 2004–2005, 2005–2006 and 2006–2007

HSMR excluding palliative care not reported.

	HSMR Excluding PC	HSMR Excluding PC 95% CI	HSMR All Cases	HSMR All Cases 95% CI
2004–2005	**	**	115	110–120
2005–2006	**	**	115	110–120
2006–2007	**	**	108	104–113
Overall	**	**	**113**	**110–116**

Hospitals included in the regional result:

- Concordia Hospital
- Health Sciences Centre
- Misericordia General Hospital
- Salvation Army Grace General Hospital
- Seven Oaks General Hospital
- St. Boniface General Hospital
- Victoria General Hospital

Notes:

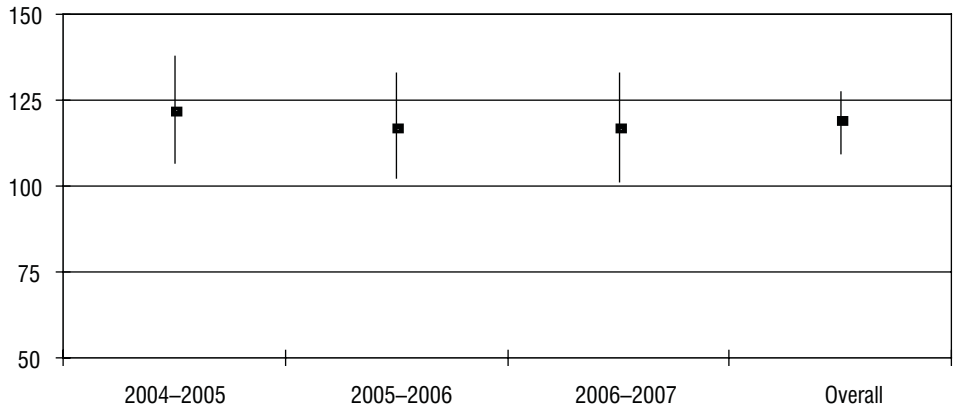
** With the introduction of new national guidelines to clarify palliative care coding in 2006, there were substantial breaks in the time series for this region. Accordingly, comparable trends for hospital standardized mortality ratios excluding palliative care are not available.

95% CI 95 percent confidence interval

PC Palliative care

Manitoba
Central Regional Health Authority

Hospital Standardized Mortality Ratio, Excluding Palliative Care, 2004–2005, 2005–2006 and 2006–2007



	HSMR Excluding PC	HSMR Excluding PC 95% CI	HSMR All Cases	HSMR All Cases 95% CI
2004–2005	121	106–137	115	101–129
2005–2006	116	102–132	111	98–126
2006–2007	116	101–132	122	108–138
Overall	**118**	**109–127**	**116**	**108–124**

Hospitals included in the regional result:

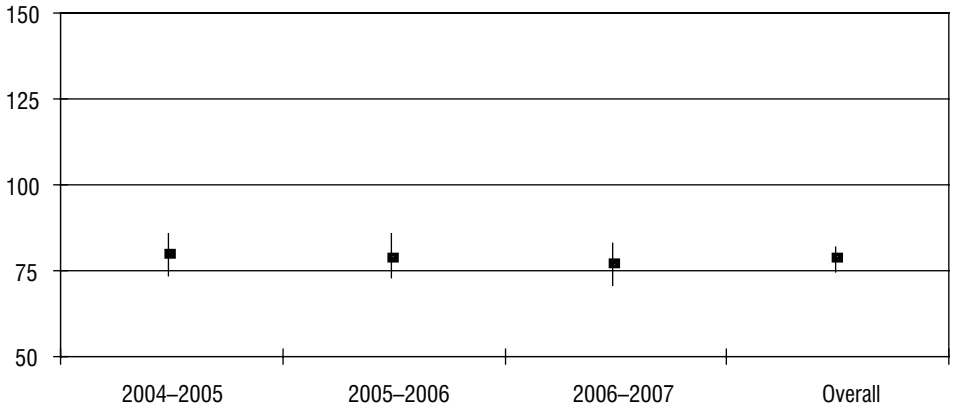
- Altona Community Memorial
- Boundary Trails Health Centre
- Carman Memorial Hospital
- Lorne Memorial Hospital
- Macgregor and District Health Centre
- Morris General Hospital
- Notre Dame Medical Nursing Unit
- Pembina Manitou Health Centre
- Portage District General Hospital
- Rock Lake Health District Hospital
- Seven Regions Health Centre
- St. Claude Health Centre

Notes:

95% CI 95 percent confidence interval
PC Palliative care

Saskatchewan
Regina Qu'Appelle Regional Health Authority

Hospital Standardized Mortality Ratio, Excluding Palliative Care, 2004–2005, 2005–2006 and 2006–2007



	HSMR Excluding PC	HSMR Excluding PC 95% CI	HSMR All Cases	HSMR All Cases 95% CI
2004–2005	80	74–86	80	75–86
2005–2006	79	73–86	80	74–86
2006–2007	77	71–83	78	72–84
Overall	**79**	**75–82**	**79**	**76–83**

Hospitals included in the regional result:

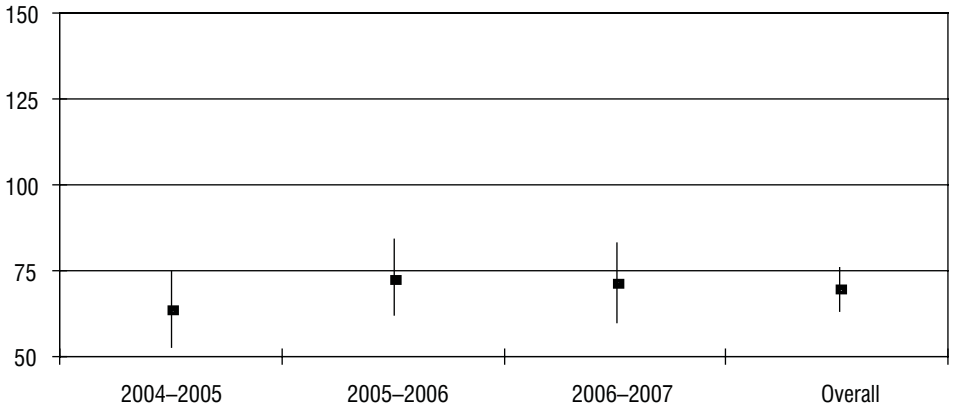
- All Nations' Healing Hospital
- Balcarres Integrated Care Centre
- Broadview Hospital
- Indian Head Hospital
- Moosomin Hospital
- Pasqua Hospital
- Regina General Hospital
- St. Joseph's Integrated Care Centre
- Wolseley Memorial Hospital

Notes:

95% CI 95 percent confidence interval
PC Palliative care

Saskatchewan
Sunrise Regional Health Authority

Hospital Standardized Mortality Ratio, Excluding Palliative Care, 2004–2005, 2005–2006 and 2006–2007



	HSMR Excluding PC	HSMR Excluding PC 95% CI	HSMR All Cases	HSMR All Cases 95% CI
2004–2005	63	53–75	62	52–73
2005–2006	72	62–84	69	59–81
2006–2007	71	60–83	70	60–82
Overall	**69**	**63–76**	**67**	**61–73**

Hospitals included in the regional result:

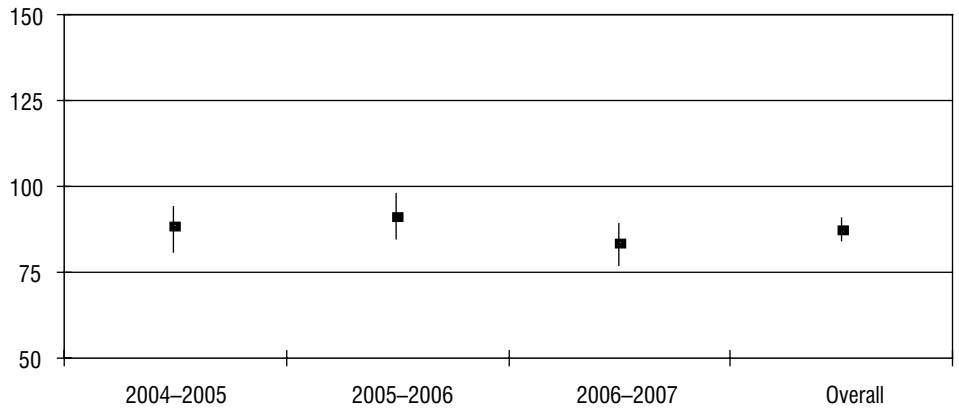
- Canora Hospital
- Foam Lake Health Centre
- Kamsack District Hospital and Nursing Home
- Preeceville Hospital
- St. Anthony's Hospital
- St. Peter's Hospital
- Yorkton Regional Health Centre

Notes:

95% CI 95 percent confidence interval
PC Palliative care

Saskatchewan
Saskatoon Regional Health Authority

Hospital Standardized Mortality Ratio, Excluding Palliative Care, 2004–2005, 2005–2006 and 2006–2007



	HSMR Excluding PC	HSMR Excluding PC 95% CI	HSMR All Cases	HSMR All Cases 95% CI
2004–2005	88	81–94	82	77–88
2005–2006	91	85–98	87	81–93
2006–2007	83	77–89	81	76–86
Overall	**87**	**84–91**	**83**	**80–87**

Hospitals included in the regional result:

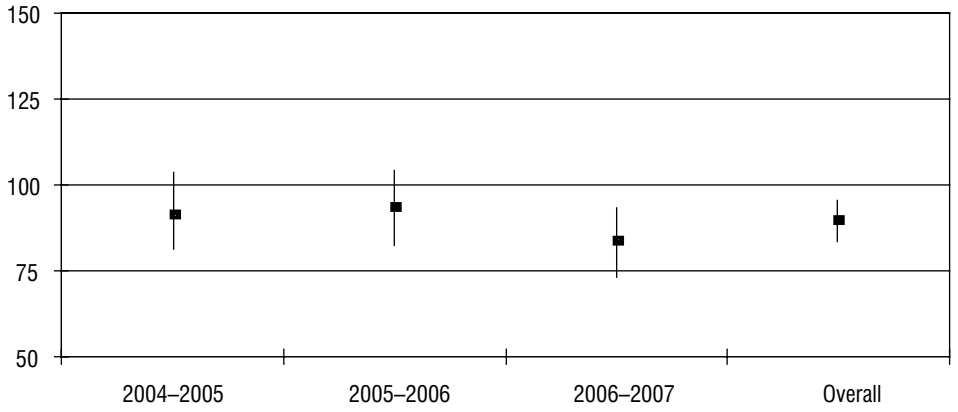
- Lanigan Hospital
- Rosthern Hospital
- Royal University Hospital
- Saskatoon City Hospital
- St. Elizabeth's Hospital
- St. Paul's Hospital
- Wadena Hospital
- Wakaw Hospital
- Watrous Hospital
- Wynyard Hospital

Notes:

95% CI 95 percent confidence interval
PC Palliative care

Alberta
Chinook Regional Health Authority

Hospital Standardized Mortality Ratio, Excluding Palliative Care, 2004–2005, 2005–2006 and 2006–2007



	HSMR Excluding PC	HSMR Excluding PC 95% CI	HSMR All Cases	HSMR All Cases 95% CI
2004–2005	91	81–103	90	80–100
2005–2006	93	82–104	89	79–99
2006–2007	83	73–93	82	73–92
Overall	**89**	**83–95**	**87**	**81–93**

Hospitals included in the regional result:

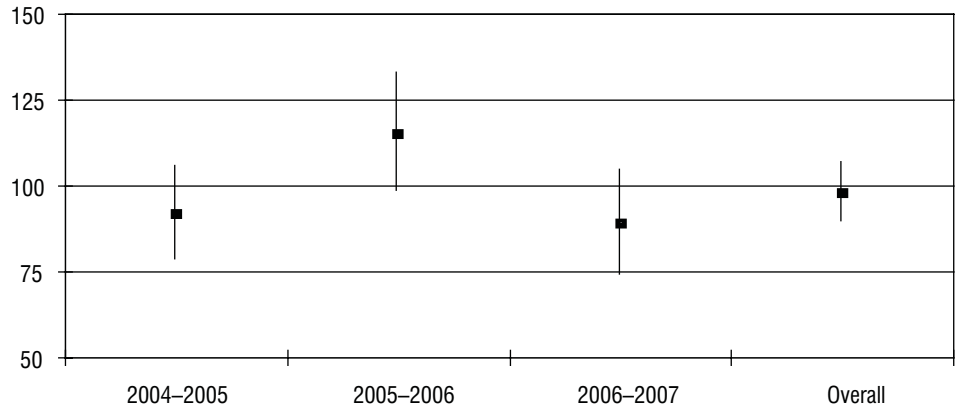
- Cardston Hospital
- Crowsnest Pass Hospital
- Lethbridge Regional Hospital
- Magrath Hospital
- Picture Butte Health Centre
- Pincher Creek Hospital
- Raymond Hospital
- Taber Hospital

Notes:

95% CI 95 percent confidence interval
PC Palliative care

Alberta
Palliser Health Region

Hospital Standardized Mortality Ratio, Excluding Palliative Care, 2004–2005, 2005–2006 and 2006–2007



	HSMR Excluding PC	HSMR Excluding PC 95% CI	HSMR All Cases	HSMR All Cases 95% CI
2004–2005	92	79–106	102	90–116
2005–2006	115	99–133	117	102–134
2006–2007	89	75–105	101	87–115
Overall	**98**	**90–107**	**106**	**98–114**

Hospitals included in the regional result:

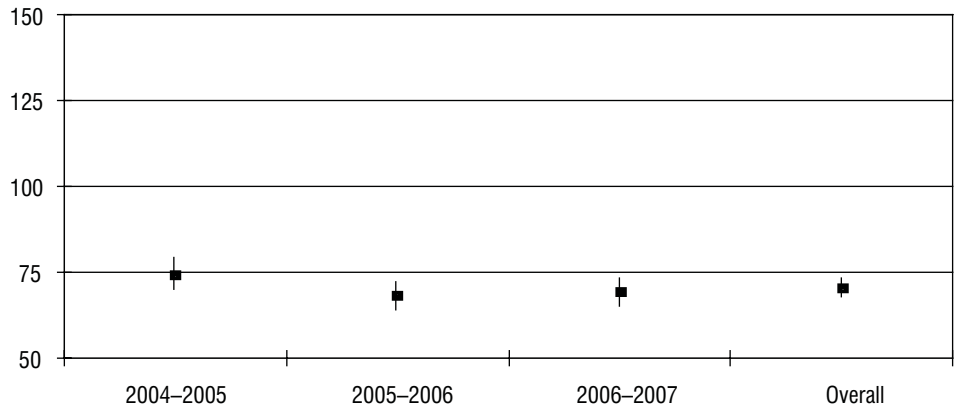
- Bassano Health Centre
- Big Country Hospital
- Bow Island Health Centre
- Brooks Health Centre
- Medicine Hat Regional Hospital

Notes:

95% CI 95 percent confidence interval
PC Palliative care

Alberta
Calgary Health Region

Hospital Standardized Mortality Ratio, Excluding Palliative Care, 2004–2005, 2005–2006 and 2006–2007



	HSMR Excluding PC	HSMR Excluding PC 95% CI	HSMR All Cases	HSMR All Cases 95% CI
2004–2005	74	70–79	87	83–91
2005–2006	68	64–72	85	81–89
2006–2007	69	65–73	88	84–92
Overall	**70**	**68–73**	**87**	**84–89**

Hospitals included in the regional result:

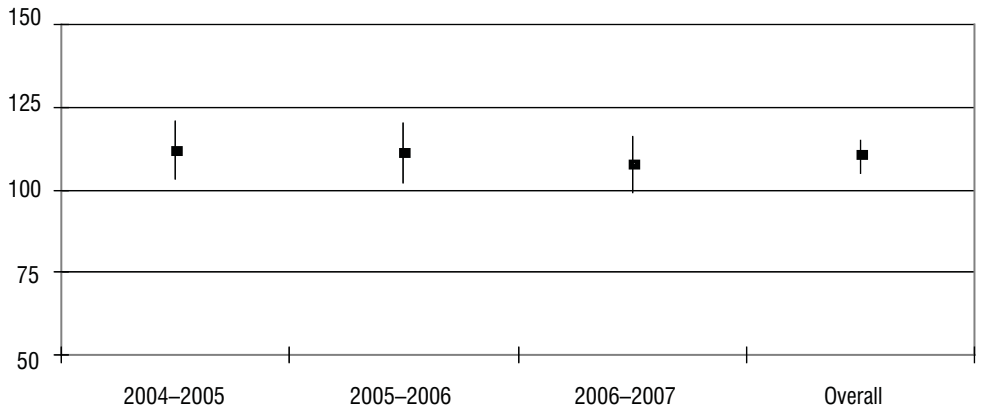
- Canmore General Hospital
- Claresholm General Hospital
- Didsbury District Health Services
- Foothills Medical Centre
- High River General Hospital
- Mineral Springs Hospital
- Oilfields General Hospital
- Peter Lougheed Centre
- Rockyview General Hospital
- Strathmore District Health Services
- Vulcan Community Health Centre

Notes:

95% CI 95 percent confidence interval
PC Palliative care

Alberta
David Thompson Regional Health Authority

Hospital Standardized Mortality Ratio, Excluding Palliative Care, 2004–2005, 2005–2006 and 2006–2007



	HSMR Excluding PC	HSMR Excluding PC 95% CI	HSMR All Cases	HSMR All Cases 95% CI
2004–2005	111	103–121	104	96–113
2005–2006	111	102–120	104	97–113
2006–2007	107	99–116	103	95–111
Overall	**110**	**105–115**	**104**	**99–109**

Hospitals included in the regional result:

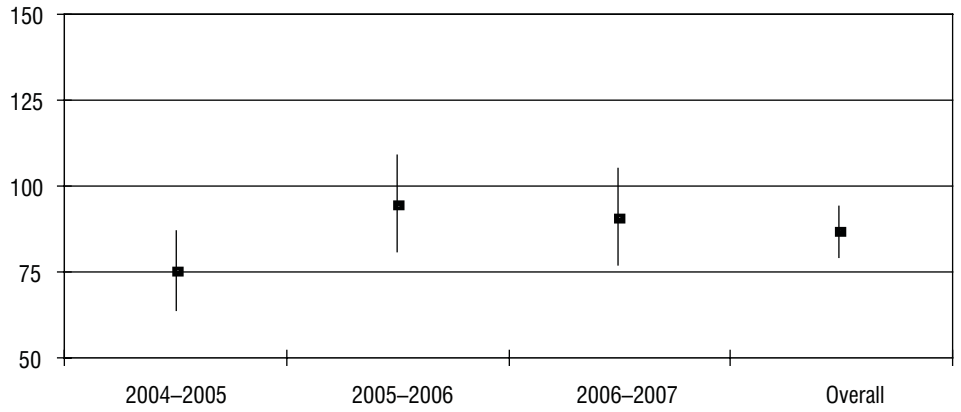
- Consort Hospital and Care Centre
- Coronation Health Centre
- Drayton Valley Hospital and Care Centre
- Drumheller Health Centre
- Hanna Health Centre
- Innisfail Health Centre
- Lacombe Hospital and Care Centre
- Olds Hospital and Care Centre
- Our Lady of the Rosary Hospital
- Ponoka Hospital and Care Centre
- Red Deer Regional Hospital Centre
- Rimbey Hospital and Care Centre
- Rocky Mountain House Health Centre
- Stettler Hospital and Care Centre
- Sundre Hospital and Care Centre
- Three Hills Health Centre
- Wetaskiwin Hospital and Care Centre

Notes:

95% CI 95 percent confidence interval
PC Palliative care

Alberta
East Central Health

Hospital Standardized Mortality Ratio, Excluding Palliative Care, 2004–2005, 2005–2006 and 2006–2007



	HSMR Excluding PC	HSMR Excluding PC 95% CI	HSMR All Cases	HSMR All Cases 95% CI
2004–2005	75	64–87	80	69–92
2005–2006	94	81–109	100	88–114
2006–2007	90	77–105	96	83–110
Overall	**86**	**79–94**	**92**	**85–99**

Hospitals included in the regional result:

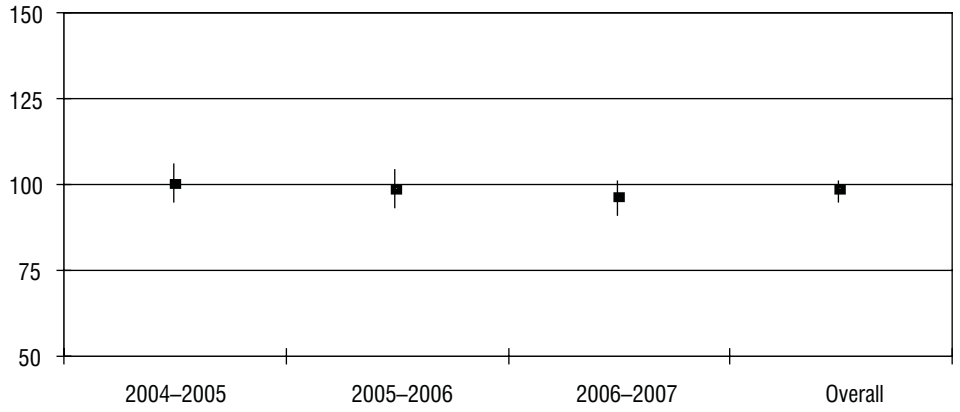
- Daysland Health Centre
- Hardisty Health Centre
- Killam Health Care Centre
- Lamont Health Care Centre
- Provost Health Centre
- St. Joseph's General Hospital
- St. Mary's Hospital
- Tofield Health Centre
- Two Hills Health Centre
- Vermilion Health Centre
- Viking Health Centre
- Wainwright Health Centre

Notes:

95% CI 95 percent confidence interval
PC Palliative care

Alberta
Capital Health

Hospital Standardized Mortality Ratio, Excluding Palliative Care, 2004–2005, 2005–2006 and 2006–2007



	HSMR Excluding PC	HSMR Excluding PC 95% CI	HSMR All Cases	HSMR All Cases 95% CI
2004–2005	100	95–106	92	87–97
2005–2006	98	93–104	91	86–95
2006–2007	96	91–101	89	84–94
Overall	**98**	**95–101**	**90**	**88–93**

Hospitals included in the regional result:

- Devon General Hospital
- Fort Saskatchewan Health Centre
- Leduc Community Hospital
- Redwater Health Centre
- Royal Alexandra Hospital
- Sturgeon Community Hospital
- University of Alberta Hospital
- Westview Health Centre Stony Plain

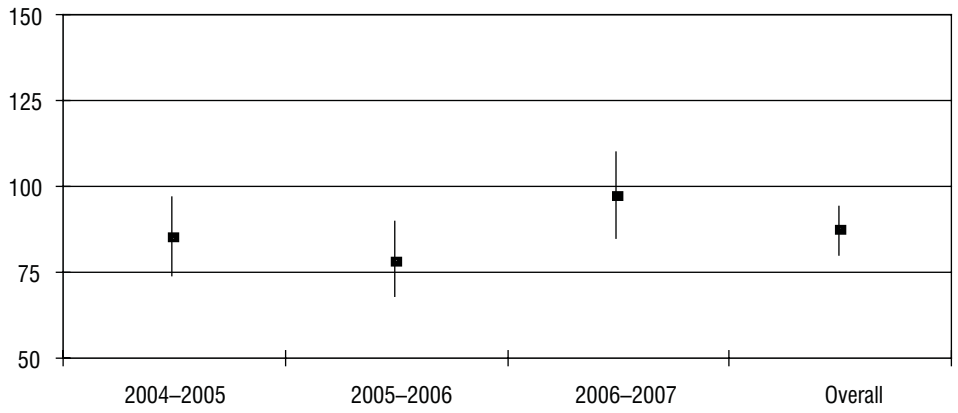
Notes:

Misericordia Community Hospital and Grey Nuns Community Hospital and Health Centre are located within this region but identified significant data-related issues with respect to the data submitted for their HSMR cases. Accordingly, the data for these facilities are not included in the above calculations for HSMR.

95% CI 95 percent confidence interval
PC Palliative care

Alberta
Aspen Regional Health Authority

Hospital Standardized Mortality Ratio, Excluding Palliative Care, 2004–2005, 2005–2006 and 2006–2007



	HSMR Excluding PC	HSMR Excluding PC 95% CI	HSMR All Cases	HSMR All Cases 95% CI
2004–2005	85	74–97	92	81–103
2005–2006	78	68–90	79	69–90
2006–2007	97	85–110	98	87–110
Overall	**87**	**80–94**	**89**	**83–96**

Hospitals included in the regional result:

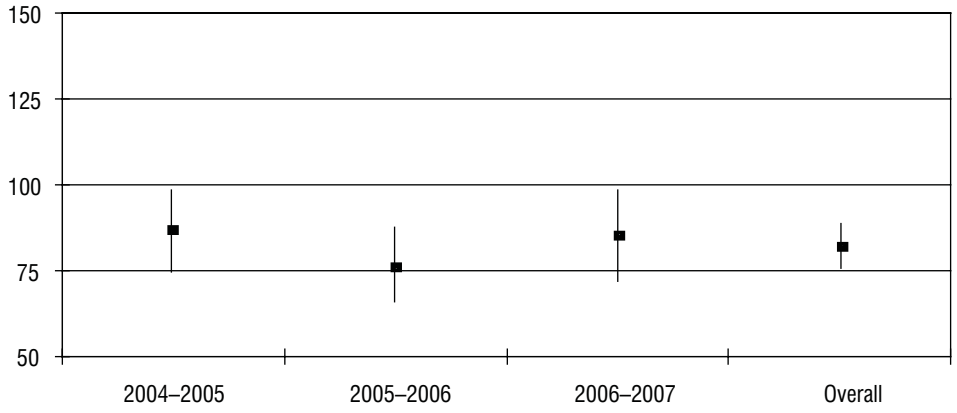
- Athabasca Healthcare Centre
- Barrhead Healthcare Centre
- Bonnyville Health Centre
- Boyle Healthcare Centre
- Cold Lake Health Centre
- Edson Healthcare Centre
- Elk Point Healthcare Centre
- George McDougall Memorial Health Centre Smoky Lake
- Hinton General Hospital
- Mayerthorpe Healthcare Centre
- Seton Jasper Healthcare Centre
- Slave Lake Health Complex
- St. Therese St. Paul Healthcare Centre
- Swan Hills Health Care Centre
- Wabasca/Desmarais General Hospital
- Westlock Healthcare Centre
- Whitecourt Healthcare Centre
- William J. Cadzow Health Centre

Notes:

95% CI 95 percent confidence interval
PC Palliative care

Alberta
Peace Country Health

Hospital Standardized Mortality Ratio, Excluding Palliative Care, 2004–2005, 2005–2006 and 2006–2007



	HSMR Excluding PC	HSMR Excluding PC 95% CI	HSMR All Cases	HSMR All Cases 95% CI
2004–2005	86	74–98	78	68–89
2005–2006	75	65–87	76	66–86
2006–2007	84	71–98	82	71–95
Overall	**81**	**75–88**	**78**	**72–85**

Hospitals included in the regional result:

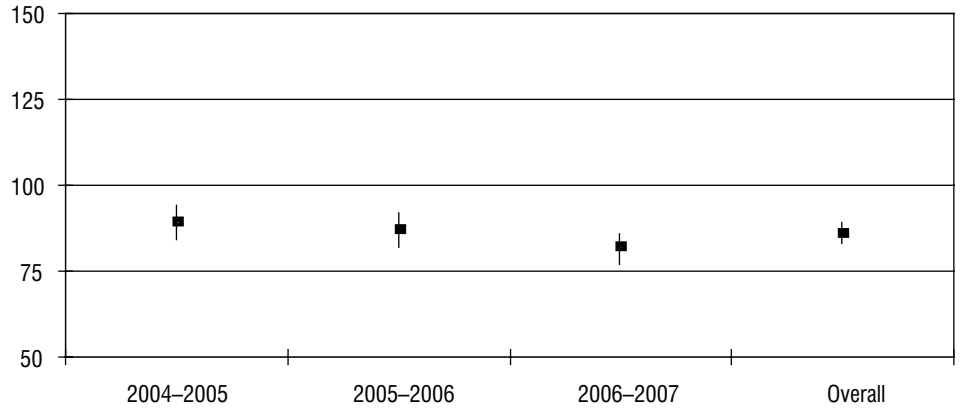
- Beaverlodge Municipal Hospital
- Central Peace Health Complex
- Fairview Health Complex
- Fox Creek Health Care Centre
- Grande Cache General Hospital
- High Prairie Health Complex
- Manning Community Health Centre
- Peace River Community Health Centre
- Queen Elizabeth II Hospital
- Sacred Heart Community Health Centre
- Valleyview Health Centre

Notes:

95% CI 95 percent confidence interval
PC Palliative care

British Columbia
Interior Health Authority

Hospital Standardized Mortality Ratio, Excluding Palliative Care, 2004–2005, 2005–2006 and 2006–2007



	HSMR Excluding PC	HSMR Excluding PC 95% CI	HSMR All Cases	HSMR All Cases 95% CI
2004–2005	89	84–94	91	86–95
2005–2006	87	82–92	90	86–95
2006–2007	82	77–86	92	88–97
Overall	**86**	**83–89**	**91**	**89–94**

Hospitals included in the regional result:

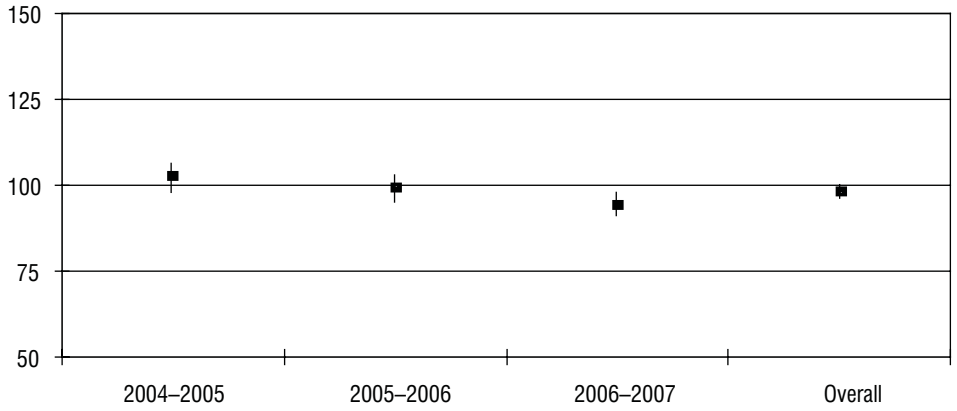
- 100 Mile District General Hospital
- Arrow Lakes Hospital
- Boundary Hospital
- Cariboo Memorial Hospital
- Creston Valley Hospital
- Dr. Helmcken Memorial Hospital
- East Kootenay Regional Hospital
- Elk Valley Hospital
- Golden Hospital
- Invermere and District Hospital
- Kelowna General Hospital
- Kootenay Boundary Regional Hospital
- Kootenay Lake Hospital
- Lillooet District Hospital
- Nicola Valley General Hospital
- Penticton Regional Hospital
- Princeton General Hospital
- Queen Victoria Hospital
- Royal Inland Hospital
- Shuswap Lake General Hospital
- South Okanagan General Hospital
- Vernon Jubilee Hospital

Notes:

95% CI 95 percent confidence interval
PC Palliative care

British Columbia
Fraser Health Authority

Hospital Standardized Mortality Ratio, Excluding Palliative Care, 2004–2005, 2005–2006 and 2006–2007



	HSMR Excluding PC	HSMR Excluding PC 95% CI	HSMR All Cases	HSMR All Cases 95% CI
2004–2005	102	98–106	106	102–110
2005–2006	99	95–103	101	97–104
2006–2007	94	91–98	98	95–102
Overall	**98**	**96–100**	**102**	**99–104**

Hospitals included in the regional result:

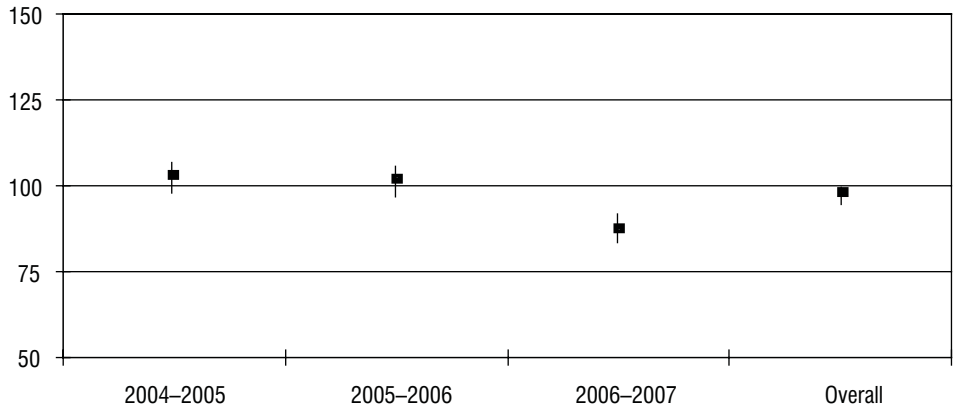
- Burnaby Hospital
- Chilliwack General Hospital
- Delta Hospital
- Eagle Ridge Hospital and Health Care Centre
- Fraser Canyon Hospital
- Langley Memorial Hospital
- Matsqui Sumas Abbotsford General Hospital
- Mission Memorial Hospital
- Peace Arch District Hospital
- Ridge Meadows Hospital and Health Care Centre
- Royal Columbian Hospital
- Surrey Memorial Hospital

Notes:

95% CI 95 percent confidence interval
PC Palliative care

British Columbia
Vancouver Coastal Health Authority

Hospital Standardized Mortality Ratio, Excluding Palliative Care, 2004–2005, 2005–2006 and 2006–2007



	HSMR Excluding PC	HSMR Excluding PC 95% CI	HSMR All Cases	HSMR All Cases 95% CI
2004–2005	102	97–106	98	94–102
2005–2006	101	96–105	96	92–100
2006–2007	87	83–91	92	88–96
Overall	**97**	**94–99**	**95**	**93–98**

Hospitals included in the regional result:

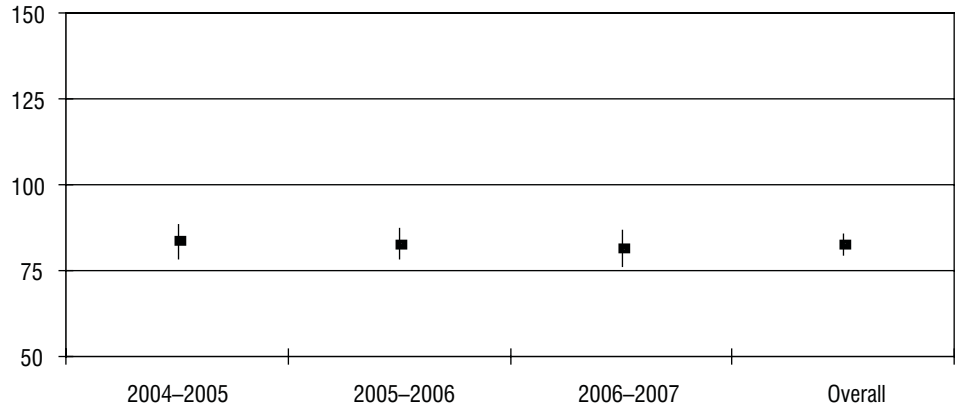
- Bella Coola General Hospital
- Lions Gate Hospital
- Mount Saint Joseph Hospital
- Powell River General Hospital
- R. W. Large Memorial Hospital
- Squamish General Hospital
- St. Mary's Hospital
- St. Paul's Hospital
- The Richmond Hospital
- UBC Hospital and Urgent Care Centre
- Vancouver General Hospital

Notes:

95% CI 95 percent confidence interval
PC Palliative care

British Columbia
Vancouver Island Health Authority

Hospital Standardized Mortality Ratio, Excluding Palliative Care, 2004–2005, 2005–2006 and 2006–2007



	HSMR Excluding PC	HSMR Excluding PC 95% CI	HSMR All Cases	HSMR All Cases 95% CI
2004–2005	83	78–88	95	90–99
2005–2006	82	78–87	92	87–96
2006–2007	81	76–86	94	90–99
Overall	**82**	**79–85**	**94**	**91–96**

Hospitals included in the regional result:

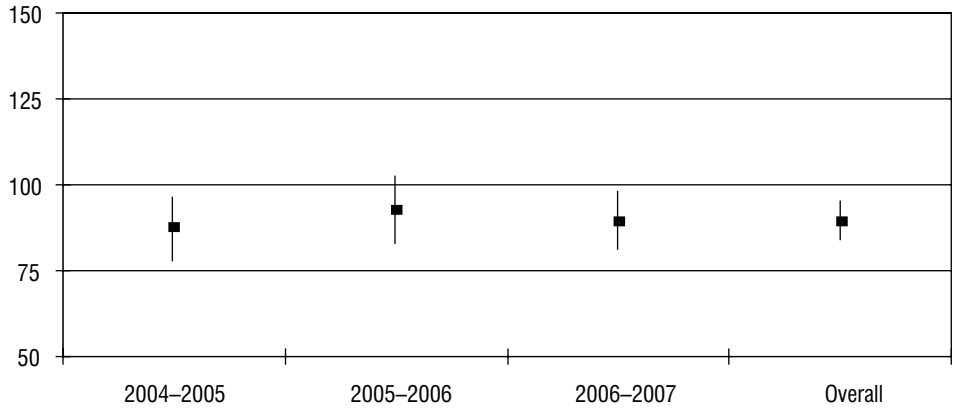
- Campbell River and District General Hospital
- Cormorant Island Community Health Centre
- Cowichan District Hospital
- Lady Minto Gulf Islands Hospital
- Ladysmith and District General Hospital
- Nanaimo Regional General Hospital
- Port Hardy Hospital
- Port McNeill and District Hospital
- Saanich Peninsula Hospital
- St. Joseph's General Hospital
- Tofino General Hospital
- Victoria General and Royal Jubilee Hospitals
- West Coast General Hospital

Notes:

95% CI 95 percent confidence interval
PC Palliative care

British Columbia
Northern Health Authority

Hospital Standardized Mortality Ratio, Excluding Palliative Care, 2004–2005, 2005–2006 and 2006–2007



	HSMR Excluding PC	HSMR Excluding PC 95% CI	HSMR All Cases	HSMR All Cases 95% CI
2004–2005	87	78–96	96	88–105
2005–2006	92	83–102	99	90–108
2006–2007	89	81–98	98	90–107
Overall	**89**	**84–95**	**98**	**93–103**

Hospitals included in the regional result:

- Bulkley Valley District Hospital
- Chetwynd General Hospital
- Dawson Creek and District Hospital
- Fort Nelson General Hospital
- Fort St. John Hospital and Health Centre
- G. R. Baker Memorial Hospital
- Kitimat General Hospital
- Lakes District Hospital and Health Centre
- Mackenzie and District Hospital
- Masset Hospital
- McBride and District Hospital
- Mills Memorial Hospital
- Prince George Regional Hospital
- Prince Rupert Regional Hospital
- Queen Charlotte Islands General Hospital
- St. John Hospital
- Stewart General Hospital
- Stuart Lake Hospital
- Wrinch Memorial Hospital

Notes:

95% CI 95 percent confidence interval
PC Palliative care

Appendix II

HSMR Tables by Hospital/Site

	HSMR Excluding PC	HSMR Excluding PC 95% CI	HSMR All Cases	HSMR All Cases 95% CI
Bluewater Health Sarnia Site, Ontario Community Name: Sarnia				
2004–2005	93	80–107	98	86–111
2005–2006	100	86–115	110	97–124
2006–2007	102	89–118	114	101–129
Overall	**98**	**90–107**	**107**	**100–115**
Brantford Community Healthcare System, Brantford General Site, Ontario Community Name: Brantford				
2004–2005	105	92–119	98	86–111
2005–2006	108	95–123	100	88–113
2006–2007	104	91–118	94	83–107
Overall	**106**	**98–114**	**97**	**91–105**
Burnaby Hospital, British Columbia Community Name: Burnaby				
2004–2005	122	110–135	116	105–128
2005–2006	130	118–143	119	109–131
2006–2007	122	111–134	113	102–124
Overall	**125**	**118–132**	**116**	**110–122**
Cape Breton Healthcare Complex, Nova Scotia Community Name: Sydney				
2004–2005	*	*	143	131–155
2005–2006	*	*	138	126–152
2006–2007	*	*	129	117–142
Overall	*****	*****	**137**	**130–144**
Chatham Kent Health Alliance,† Ontario				
2004–2005	98	85–112	109	97–123
2005–2006	101	89–115	108	96–121
2006–2007	83	72– 96	101	89–113
Overall	**94**	**87–102**	**106**	**99–113**

Notes:

† Aggregate result for corporations with multiple acute care sites submitting data to CIHI under separate institution numbers. Note that results for individual sites within a corporation that meet the reporting threshold are also presented in this report. For a complete listing of sites within a corporation, as defined here, see Appendix II.

* The organization identified significant data-related issues with respect to the data submitted for its HSMR cases. Accordingly, results are not reported.

95% CI 95 percent confidence interval

PC Palliative care

	HSMR Excluding PC	HSMR Excluding PC 95% CI	HSMR All Cases	HSMR All Cases 95% CI
Credit Valley Hospital, Ontario Community Name: Mississauga				
2004–2005	105	93–118	102	91–114
2005–2006	101	90–114	98	87–109
2006–2007	99	89–110	98	88–108
Overall	**102**	**95–108**	**99**	**93–105**
Dr. Everett Chalmers Regional Hospital, New Brunswick Community Name: Fredericton				
2004–2005	89	78–102	92	82–104
2005–2006	99	87–113	99	87–111
2006–2007	100	89–113	100	89–112
Overall	**96**	**89–104**	**97**	**91–104**
Foothills Medical Centre, Alberta Community Name: Calgary				
2004–2005	59	53–65	81	76–87
2005–2006	62	57–68	85	79–91
2006–2007	63	58–69	85	79–91
Overall	**61**	**58–65**	**84**	**80–87**
Grand River Hospital K. W. Health Centre, Ontario Community Name: Kitchener				
2004–2005	158	142–174	142	129–156
2005–2006	130	116–146	116	103–129
2006–2007	136	121–152	133	120–147
Overall	**142**	**133–150**	**130**	**123–138**
Grey Bruce Health Services,† Ontario				
2004–2005	90	79–103	97	85–109
2005–2006	96	84–109	101	90–114
2006–2007	104	92–118	111	99–124
Overall	**97**	**90–104**	**103**	**96–110**

Notes:

† Aggregate result for corporations with multiple acute care sites submitting data to CIHI under separate institution numbers. Note that results for individual sites within a corporation that meet the reporting threshold are also presented in this report. For a complete listing of sites within a corporation, as defined here, see Appendix II.

95% CI 95 percent confidence interval

PC Palliative care

	HSMR Excluding PC	HSMR Excluding PC 95% CI	HSMR All Cases	HSMR All Cases 95% CI
Grey Nuns Community Hospital and Health Centre, Alberta Community Name: Edmonton				
2004–2005	*	*	*	*
2005–2006	*	*	*	*
2006–2007	*	*	*	*
Overall	*****	*****	*****	*****
Guelph General Hospital, Ontario Community Name: Guelph				
2004–2005	100	87–114	104	92–118
2005–2006	76	64–89	85	74–97
2006–2007	97	85–111	103	91–115
Overall	**91**	**84–99**	**97**	**91–105**
Halton Healthcare Services Corporation,† Ontario				
2004–2005	91	81–102	102	93–113
2005–2006	95	85–106	106	97–116
2006–2007	90	81–100	107	98–117
Overall	**92**	**86–98**	**105**	**100–111**
Halton Healthcare Services Oakville Trafalgar Site, Ontario Community Name: Oakville				
2004–2005	85	74–97	100	89–111
2005–2006	96	85–109	110	100–122
2006–2007	93	81–105	118	107–130
Overall	**91**	**85–98**	**109**	**103–116**
Hamilton Health Sciences Corporation,† Ontario				
2004–2005	94	88–100	96	91–102
2005–2006	95	89–101	99	93–104
2006–2007	88	83–94	94	88–99
Overall	**92**	**89–96**	**96**	**93–99**

Notes:

* The organization identified significant data-related issues with respect to the data submitted for its HSMR cases. Accordingly, results are not reported.

† Aggregate result for corporations with multiple acute care sites submitting data to CIHI under separate institution numbers. Note that results for individual sites within a corporation that meet the reporting threshold are also presented in this report. For a complete listing of sites within a corporation, as defined here, see Appendix II.

95% CI 95 percent confidence interval

PC Palliative care

	HSMR Excluding PC	HSMR Excluding PC 95% CI	HSMR All Cases	HSMR All Cases 95% CI
Hamilton Health Sciences Corporation Hamilton Division, Ontario Community Name: Hamilton				
2004–2005	80	72–88	82	74–90
2005–2006	92	84–102	96	88–105
2006–2007	79	71–88	81	73–89
Overall	**84**	**79–89**	**86**	**82–91**
Hamilton Health Sciences Corporation Henderson Division, Ontario Community Name: Hamilton				
2004–2005	108	97–120	110	99–120
2005–2006	106	94–119	109	98–120
2006–2007	111	99–123	115	105–126
Overall	**108**	**102–115**	**111**	**105–117**
Hamilton Health Sciences Corporation McMaster Division, Ontario Community Name: Hamilton				
2004–2005	103	91–116	105	93–116
2005–2006	85	73–98	90	79–102
2006–2007	77	67–89	87	77–98
Overall	**88**	**82–95**	**94**	**88–100**
Health Sciences Centre, Manitoba Community Name: Winnipeg				
2004–2005	**	**	115	105–126
2005–2006	**	**	118	108–129
2006–2007	**	**	96	87–106
Overall	****	****	**109**	**104–115**
Hotel Dieu Grace Hospital, Hotel Dieu Site, Ontario Community Name: Windsor				
2004–2005	107	97–118	96	87–106
2005–2006	105	95–117	96	87–106
2006–2007	116	105–128	105	95–116
Overall	**110**	**103–116**	**99**	**93–105**

Notes:

** With the introduction of new national guidelines to clarify palliative care coding in 2006, there were substantial breaks in the time series for this facility. Accordingly, comparable trends for hospital standardized mortality ratios excluding palliative care are not available.

95% CI 95 percent confidence interval

PC Palliative care

	HSMR Excluding PC	HSMR Excluding PC 95% CI	HSMR All Cases	HSMR All Cases 95% CI
Humber River Regional Hospital,† Ontario				
2004–2005	*	*	*	*
2005–2006	*	*	*	*
2006–2007	*	*	*	*
Overall	*	*	*	*
Humber River Regional Hospital Church Street Site, Ontario Community Name: Toronto				
2004–2005	*	*	*	*
2005–2006	*	*	*	*
2006–2007	*	*	*	*
Overall	*	*	*	*
Humber River Regional Hospital Finch Site, Ontario Community Name: Toronto				
2004–2005	*	*	*	*
2005–2006	*	*	*	*
2006–2007	*	*	*	*
Overall	*	*	*	*
Joseph Brant Memorial Hospital, Ontario Community Name: Burlington				
2004–2005	95	85–106	86	76–96
2005–2006	97	86–109	88	78–98
2006–2007	105	94–118	96	85–107
Overall	**99**	**93–106**	**89**	**84–95**
Kelowna General Hospital, British Columbia Community Name: Kelowna				
2004–2005	83	75–93	82	74–90
2005–2006	88	79–98	85	77–94
2006–2007	88	78–98	93	85–103
Overall	**86**	**81–92**	**87**	**82–92**

Notes:

* The organization identified significant data-related issues with respect to the data submitted for its HSMR cases. Accordingly, results are not reported.

† Aggregate result for corporations with multiple acute care sites submitting data to CIHI under separate institution numbers. Note that results for individual sites within a corporation that meet the reporting threshold are also presented in this report. For a complete listing of sites within a corporation, as defined here, see Appendix II.

95% CI 95 percent confidence interval

PC Palliative care

	HSMR Excluding PC	HSMR Excluding PC 95% CI	HSMR All Cases	HSMR All Cases 95% CI
Kingston General Hospital, Ontario Community Name: Kingston				
2004–2005	90	81–100	108	99–117
2005–2006	103	93–113	107	98–116
2006–2007	92	83–102	114	105–124
Overall	**95**	**90–101**	**109**	**104–115**
Lakeridge Hospital Corporation,† Ontario				
2004–2005	103	95–112	100	93–108
2005–2006	91	83–99	95	88–103
2006–2007	85	77–93	105	97–114
Overall	**93**	**89–98**	**100**	**96–105**
Lakeridge Health Oshawa Site, Ontario Community Name: Oshawa				
2004–2005	111	101–122	104	95–114
2005–2006	92	83–102	95	87–105
2006–2007	83	74–93	105	96–115
Overall	**96**	**91–102**	**102**	**96–107**
Langley Memorial Hospital, British Columbia Community Name: Langley				
2004–2005	113	100–127	113	101–126
2005–2006	102	90–115	98	87–111
2006–2007	92	81–104	86	76–97
Overall	**102**	**95–109**	**99**	**92–106**
Lethbridge Regional Hospital, Alberta Community Name: Lethbridge				
2004–2005	97	84–111	95	83–108
2005–2006	102	89–117	96	84–109
2006–2007	89	77–102	89	78–101
Overall	**96**	**88–104**	**93**	**86–100**

Notes:

† Aggregate result for corporations with multiple acute care sites submitting data to CIHI under separate institution numbers. Note that results for individual sites within a corporation that meet the reporting threshold are also presented in this report. For a complete listing of sites within a corporation, as defined here, see Appendix II.

95% CI 95 percent confidence interval

PC Palliative care

	HSMR Excluding PC	HSMR Excluding PC 95% CI	HSMR All Cases	HSMR All Cases 95% CI
Lions Gate Hospital, British Columbia Community Name: North Vancouver				
2004–2005	106	94–119	103	92–115
2005–2006	113	101–126	104	93–115
2006–2007	94	83–106	89	79–99
Overall	**104**	**98–111**	**98**	**92–105**
London Health Sciences Centre, Ontario Community Name: London				
2004–2005	109	102–117	109	102–115
2005–2006	113	106–120	114	107–120
2006–2007	115	108–122	118	112–125
Overall	**112**	**108–117**	**114**	**110–117**
Matsqui Sumas Abbotsford General Hospital, British Columbia Community Name: Abbotsford				
2004–2005	95	81–110	102	89–116
2005–2006	92	80–106	102	90–115
2006–2007	87	74–100	101	89–114
Overall	**91**	**84–99**	**102**	**95–109**
Misericordia Community Hospital, Alberta Community Name: Edmonton				
2004–2005	*	*	*	*
2005–2006	*	*	*	*
2006–2007	*	*	*	*
Overall	*	*	*	*
Mount Sinai Hospital, Ontario Community Name: Toronto				
2004–2005	*	*	106	96–118
2005–2006	*	*	114	102–126
2006–2007	*	*	113	101–125
Overall	*	*	**111**	**104–118**

Notes:
* The organization identified significant data-related issues with respect to the data submitted for its HSMR cases. Accordingly, results are not reported.
95% CI 95 percent confidence interval
PC Palliative care

	HSMR Excluding PC	HSMR Excluding PC 95% CI	HSMR All Cases	HSMR All Cases 95% CI
Nanaimo Regional General Hospital, British Columbia Community Name: Nanaimo				
2004–2005	71	61–82	92	81–103
2005–2006	78	68–89	98	87–109
2006–2007	87	76–99	108	97–121
Overall	**79**	**73–85**	**99**	**93–106**
Niagara Health System,†§ Ontario				
2004–2005	117	109–125	113	106–121
2005–2006	125	117–133	125	118–132
2006–2007	124	116–132	127	120–134
Overall	**122**	**117–126**	**122**	**118–126**
Niagara Health System St. Catharines General Site,§ Ontario Community Name: St. Catharines				
2004–2005	133	120–147	123	111–135
2005–2006	143	130–157	135	123–148
2006–2007	131	119–143	130	120–142
Overall	**135**	**128–143**	**129**	**123–136**
North York General Hospital, General Site, Ontario Community Name: Toronto				
2004–2005	104	95–113	95	87–103
2005–2006	95	88–104	90	82–97
2006–2007	98	90–107	96	88–104
Overall	**99**	**94–104**	**93**	**89–98**
Pasqua Hospital, Saskatchewan Community Name: Regina				
2004–2005	94	83–106	96	86–107
2005–2006	95	84–108	96	86–107
2006–2007	101	88–115	102	91–115
Overall	**97**	**90–104**	**98**	**92–105**

Notes:

† Aggregate result for corporations with multiple acute care sites submitting data to CIHI under separate institution numbers. Note that results for individual sites within a corporation that meet the reporting threshold are also presented in this report. For a complete listing of sites within a corporation, as defined here, see Appendix II.

§ On August 8, 2005, as a result of hospital restructuring in St. Catharines, the Hotel Dieu Health Sciences Hospital changed its mandate from acute care to complex continuing care and rehabilitation. A substantial proportion of acute care patients from the Hotel Dieu Health Sciences Hospital were transferred to the St. Catharines General Site for care. This influx of patients may affect the results for the St. Catharines General Site and the Niagara Health System.

95% CI 95 percent confidence interval

PC Palliative care

	HSMR Excluding PC	HSMR Excluding PC 95% CI	HSMR All Cases	HSMR All Cases 95% CI
Peace Arch District Hospital, British Columbia Community Name: White Rock				
2004–2005	106	92–120	114	101–127
2005–2006	101	88–115	107	94–120
2006–2007	80	69–93	91	80–103
Overall	**95**	**88–103**	**104**	**97–111**
Peter Lougheed Centre, Alberta Community Name: Calgary				
2004–2005	88	78–99	91	81–101
2005–2006	65	56–74	83	75–92
2006–2007	67	58–76	90	81–100
Overall	**73**	**68–79**	**88**	**83–93**
Peterborough Regional Health Centre, Ontario Community Name: Peterborough				
2004–2005	107	97–118	106	96–116
2005–2006	111	100–122	108	99–119
2006–2007	109	99–120	106	96–116
Overall	**109**	**103–115**	**106**	**101–112**
Providence Health Care,† British Columbia				
2004–2005	111	102–122	109	100–118
2005–2006	97	88–107	97	88–105
2006–2007	100	90–110	110	101–119
Overall	**103**	**97–109**	**105**	**100–110**
Queen Elizabeth II Health Sciences Centre, Nova Scotia Community Name: Halifax				
2004–2005	123	114–133	126	117–134
2005–2006	100	92–109	106	99–114
2006–2007	82	75–90	94	87–102
Overall	**102**	**97–107**	**109**	**104–113**

Notes:

† Aggregate result for corporations with multiple acute care sites submitting data to CIHI under separate institution numbers. Note that results for individual sites within a corporation that meet the reporting threshold are also presented in this report. For a complete listing of sites within a corporation, as defined here, see Appendix II.

95% CI 95 percent confidence interval

PC Palliative care

	HSMR Excluding PC	HSMR Excluding PC 95% CI	HSMR All Cases	HSMR All Cases 95% CI
Queensway Carleton Hospital, Ontario Community Name: Ottawa				
2004–2005	91	80–104	100	90–112
2005–2006	89	77–102	101	90–113
2006–2007	94	82–106	107	96–119
Overall	**91**	**85–98**	**103**	**96–109**
Quinte Healthcare Corporation,† Ontario				
2004–2005	81	72–91	86	77–95
2005–2006	98	88–109	97	87–107
2006–2007	96	85–108	105	94–116
Overall	**91**	**85–98**	**95**	**89–101**
Red Deer Regional Hospital Centre, Alberta Community Name: Red Deer				
2004–2005	132	116–149	118	104–133
2005–2006	127	112–143	117	104–132
2006–2007	118	104–132	112	100–125
Overall	**125**	**116–134**	**115**	**108–123**
Regina General Hospital, Saskatchewan Community Name: Regina				
2004–2005	72	64–81	72	64–80
2005–2006	72	64–81	73	65–80
2006–2007	68	60–76	68	61–76
Overall	**71**	**66–75**	**71**	**67–75**
Rockyview General Hospital, Alberta Community Name: Calgary				
2004–2005	91	81–101	96	88–106
2005–2006	78	70–88	90	81–98
2006–2007	82	73–92	95	86–104
Overall	**84**	**79–89**	**94**	**89–99**

Notes:

† Aggregate result for corporations with multiple acute care sites submitting data to CIHI under separate institution numbers. Note that results for individual sites within a corporation that meet the reporting threshold are also presented in this report. For a complete listing of sites within a corporation, as defined here, see Appendix II.

95% CI 95 percent confidence interval

PC Palliative care

	HSMR Excluding PC	HSMR Excluding PC 95% CI	HSMR All Cases	HSMR All Cases 95% CI
Rouge Valley Health System,† Ontario				
2004–2005	100	91–109	96	88–104
2005–2006	108	99–117	103	94–111
2006–2007	110	101–120	104	95–112
Overall	**106**	**101–111**	**101**	**96–105**
Rouge Valley Health System Centenary Site, Ontario Community Name: Toronto				
2004–2005	97	87–108	93	84–103
2005–2006	116	104–128	111	100–122
2006–2007	116	105–129	110	100–121
Overall	**109**	**103–116**	**104**	**98–110**
Royal Alexandra Hospital, Alberta Community Name: Edmonton				
2004–2005	103	95–111	93	86–101
2005–2006	108	99–117	97	90–105
2006–2007	101	93–110	93	85–100
Overall	**104**	**99–109**	**94**	**90–99**
Royal Columbian Hospital, British Columbia Community Name: New Westminster				
2004–2005	100	91–110	96	88–105
2005–2006	110	100–120	99	90–109
2006–2007	106	96–116	97	88–106
Overall	**105**	**100–111**	**97**	**92–102**
Royal Inland Hospital, British Columbia Community Name: Kamloops				
2004–2005	112	99–127	107	95–120
2005–2006	94	81–108	102	90–115
2006–2007	84	72–97	102	90–115
Overall	**97**	**89–105**	**104**	**97–111**

Notes:

† Aggregate result for corporations with multiple acute care sites submitting data to CIHI under separate institution numbers. Note that results for individual sites within a corporation that meet the reporting threshold are also presented in this report. For a complete listing of sites within a corporation, as defined here, see Appendix II.

95% CI 95 percent confidence interval

PC Palliative care

	HSMR Excluding PC	HSMR Excluding PC 95% CI	HSMR All Cases	HSMR All Cases 95% CI
Royal University Hospital, Saskatchewan Community Name: Saskatoon				
2004–2005	88	78–99	79	70–89
2005–2006	100	90–112	90	81–100
2006–2007	71	62–80	65	58–73
Overall	**86**	**80–91**	**78**	**73–83**
Royal Victoria Hospital of Barrie, Ontario Community Name: Barrie				
2004–2005	86	75–98	97	86–108
2005–2006	82	72–94	101	91–113
2006–2007	98	86–110	115	104–127
Overall	**89**	**82–95**	**104**	**98–111**
Saint John Regional Hospital, New Brunswick Community Name: Saint John				
2004–2005	84	75–94	95	87–104
2005–2006	73	65–82	83	75–92
2006–2007	65	58–73	85	77–93
Overall	**74**	**69–79**	**88**	**83–93**
Sarnia Bluewater Health,† Ontario				
2004–2005	95	83–108	99	88–112
2005–2006	105	92–119	113	101–126
2006–2007	105	92–120	115	102–129
Overall	**102**	**94–110**	**109**	**102–116**
Sault Area Hospitals, Ontario Community Name: Sault Ste. Marie				
2004–2005	85	74–97	95	84–106
2005–2006	85	74–98	103	92–115
2006–2007	89	77–101	100	89–111
Overall	**86**	**80–93**	**99**	**93–106**

Notes:

† Aggregate result for corporations with multiple acute care sites submitting data to CIHI under separate institution numbers. Note that results for individual sites within a corporation that meet the reporting threshold are also presented in this report. For a complete listing of sites within a corporation, as defined here, see Appendix II.

95% CI 95 percent confidence interval

PC Palliative care

	HSMR Excluding PC	HSMR Excluding PC 95% CI	HSMR All Cases	HSMR All Cases 95% CI
Southlake Regional Health Centre, Ontario Community Name: Newmarket				
2004–2005	103	94–113	99	90–108
2005–2006	98	88–108	95	86–104
2006–2007	100	91–110	97	88–106
Overall	**100**	**95–106**	**97**	**92–102**
St. Boniface General Hospital, Manitoba Community Name: Winnipeg				
2004–2005	112	102–124	108	98–118
2005–2006	101	90–112	103	93–113
2006–2007	95	85–106	107	97–117
Overall	**103**	**97–109**	**106**	**100–112**
St. John's Acute Care,‡ Newfoundland and Labrador Community Name: St. John's				
2004–2005	111	101–122	103	95–113
2005–2006	115	104–125	116	107–126
2006–2007	116	106–126	112	104–122
Overall	**114**	**108–120**	**111**	**105–116**
St. Joseph's Health Centre Toronto, Ontario Community Name: Toronto				
2004–2005	119	110–129	108	100–117
2005–2006	115	105–125	107	98–116
2006–2007	106	97–116	101	93–110
Overall	**114**	**108–119**	**105**	**100–110**
St. Joseph's Healthcare Hamilton, Ontario Community Name: Hamilton				
2004–2005	92	82–102	85	77–94
2005–2006	91	82–102	87	79–97
2006–2007	88	78–98	87	78–96
Overall	**90**	**85–96**	**86**	**81–92**

Notes:

‡ St. John's Acute Care designates care provided at the following facilities: General Hospital (Health Sciences Centre), St. Clare's Mercy Hospital, Waterford Hospital, Janeway Children's Health and Rehabilitation Centre (2006–2007 only) and the Dr. L. A. Miller Centre.

95% CI 95 percent confidence interval

PC Palliative care

	HSMR Excluding PC	HSMR Excluding PC 95% CI	HSMR All Cases	HSMR All Cases 95% CI
St. Mary's General Hospital, Ontario Community Name: Kitchener				
2004–2005	77	67–87	72	64–82
2005–2006	92	81–103	85	75–95
2006–2007	85	76–96	84	75–94
Overall	**85**	**79–91**	**81**	**75–86**
St. Michael's Hospital, Ontario Community Name: Toronto				
2004–2005	92	84–101	94	86–102
2005–2006	92	84–102	96	88–105
2006–2007	90	81–99	96	87–104
Overall	**91**	**86–97**	**95**	**90–100**
St. Paul's Hospital, British Columbia Community Name: Vancouver				
2004–2005	108	97–121	109	98–120
2005–2006	93	83–105	95	85–106
2006–2007	94	83–106	110	99–122
Overall	**99**	**92–106**	**105**	**98–111**
St. Paul's Hospital, Saskatchewan Community Name: Saskatoon				
2004–2005	87	76–99	79	69–89
2005–2006	85	74–97	80	70–90
2006–2007	92	80–104	84	74–96
Overall	**88**	**81–95**	**81**	**75–87**
Sudbury Regional Hospital Laurentian Site, Ontario Community Name: Sudbury				
2004–2005	92	84–101	108	100–117
2005–2006	89	80–98	108	99–117
2006–2007	82	74–90	104	96–113
Overall	**88**	**83–93**	**107**	**102–111**

Notes:
95% CI 95 percent confidence interval
PC Palliative care

	HSMR Excluding PC	HSMR Excluding PC 95% CI	HSMR All Cases	HSMR All Cases 95% CI
Sunnybrook Health Sciences Centre, Ontario Community Name: Toronto				
2004–2005	105	96–114	101	94–109
2005–2006	105	97–114	102	94–110
2006–2007	104	95–112	102	95–110
Overall	**104**	**99–109**	**102**	**97–106**
Surrey Memorial Hospital, British Columbia Community Name: Surrey				
2004–2005	106	95–117	123	113–134
2005–2006	93	83–103	108	99–118
2006–2007	87	78–97	107	98–117
Overall	**95**	**89–101**	**112**	**107–118**
The Moncton Hospital, New Brunswick Community Name: Moncton				
2004–2005	51	42–60	78	69–88
2005–2006	62	53–73	89	79–100
2006–2007	56	48–66	83	73–93
Overall	**56**	**51–62**	**83**	**78–89**
The Ottawa Hospital,† Ontario				
2004–2005	99	92–105	101	96–107
2005–2006	86	81–93	97	91–103
2006–2007	84	78–91	102	96–108
Overall	**90**	**86–94**	**100**	**97–103**
The Ottawa Hospital Civic Campus, Ontario Community Name: Ottawa				
2004–2005	92	83–102	98	89–107
2005–2006	87	78–97	95	86–104
2006–2007	82	74–92	103	94–112
Overall	**87**	**82–93**	**98**	**93–104**

Notes:

† Aggregate result for corporations with multiple acute care sites submitting data to CIHI under separate institution numbers. Note that results for individual sites within a corporation that meet the reporting threshold are also presented in this report. For a complete listing of sites within a corporation, as defined here, see Appendix II.

95% CI 95 percent confidence interval

PC Palliative care

	HSMR Excluding PC	HSMR Excluding PC 95% CI	HSMR All Cases	HSMR All Cases 95% CI
The Ottawa Hospital General Campus, Ontario Community Name: Ottawa				
2004–2005	104	95–113	104	96–112
2005–2006	86	78–94	98	91–106
2006–2007	86	78–95	101	93–109
Overall	**92**	**87–97**	**101**	**97–105**
The Scarborough Hospital,† Ontario				
2004–2005	127	118–136	126	118–134
2005–2006	127	119–136	125	117–133
2006–2007	121	112–129	122	114–130
Overall	**125**	**120–130**	**124**	**120–129**
The Scarborough Hospital General Site, Ontario Community Name: Toronto				
2004–2005	134	123–145	129	119–140
2005–2006	139	128–151	131	121–142
2006–2007	129	118–140	127	117–137
Overall	**134**	**127–140**	**129**	**123–135**
The Scarborough Hospital Grace Site, Ontario Community Name: Toronto				
2004–2005	116	103–130	120	108–133
2005–2006	108	95–121	114	102–127
2006–2007	107	95–121	114	102–127
Overall	**110**	**103–118**	**116**	**109–123**
Thunder Bay Regional Health Sciences Centre, Ontario Community Name: Thunder Bay				
2004–2005	93	84–104	85	77–94
2005–2006	95	85–106	88	79–97
2006–2007	78	69–87	71	64–79
Overall	**88**	**83–94**	**81**	**76–86**

Notes:

† Aggregate result for corporations with multiple acute care sites submitting data to CIHI under separate institution numbers. Note that results for individual sites within a corporation that meet the reporting threshold are also presented in this report. For a complete listing of sites within a corporation, as defined here, see Appendix II.

95% CI 95 percent confidence interval

PC Palliative care

	HSMR Excluding PC	HSMR Excluding PC 95% CI	HSMR All Cases	HSMR All Cases 95% CI
Toronto East General Hospital, Ontario Community Name: Toronto				
2004–2005	101	91–110	93	85–102
2005–2006	103	94–114	97	88–107
2006–2007	108	98–118	102	93–112
Overall	**104**	**98–110**	**98**	**92–103**
Trillium Health Centre Mississauga, Ontario Community Name: Mississauga				
2004–2005	99	92–107	102	96–109
2005–2006	95	88–103	97	91–104
2006–2007	102	94–109	105	98–112
Overall	**99**	**95–103**	**102**	**98–106**
University Health Network, Ontario Community Name: Toronto				
2004–2005	91	85–97	87	81–92
2005–2006	86	80–92	85	79–90
2006–2007	84	78–90	85	80–91
Overall	**87**	**83–91**	**85**	**82–89**
University of Alberta Hospital, Alberta Community Name: Edmonton				
2004–2005	104	96–112	95	88–102
2005–2006	96	88–104	90	83–97
2006–2007	96	89–105	90	83–97
Overall	**99**	**94–103**	**91**	**87–95**
Vancouver General Hospital, British Columbia Community Name: Vancouver				
2004–2005	95	88–102	88	82–95
2005–2006	96	89–103	89	83–96
2006–2007	77	71–83	81	75–87
Overall	**89**	**85–93**	**86**	**83–90**

Notes:
95% CI 95 percent confidence interval
PC Palliative care

	HSMR Excluding PC	HSMR Excluding PC 95% CI	HSMR All Cases	HSMR All Cases 95% CI
Victoria General and Royal Jubilee Hospitals, British Columbia Community Name: Victoria				
2004–2005	79	73–86	89	82–95
2005–2006	82	75–89	87	80–94
2006–2007	80	73–87	91	84–98
Overall	**80**	**76–84**	**89**	**85–93**
William Osler Health Centre,† Ontario				
2004–2005	93	86–100	86	80–93
2005–2006	84	78–91	78	72–84
2006–2007	88	82–96	81	75–88
Overall	**89**	**85–93**	**82**	**78–85**
William Osler Health Centre Etobicoke General Hospital, Ontario Community Name: Toronto				
2004–2005	110	99–122	99	89–110
2005–2006	92	82–103	83	74–93
2006–2007	93	83–104	86	77–96
Overall	**98**	**92–105**	**89**	**84–95**
William Osler Health Centre Peel Memorial Hospital, Ontario Community Name: Brampton				
2004–2005	79	70–89	74	66–83
2005–2006	81	71–91	74	66–83
2006–2007	84	74–94	77	68–86
Overall	**81**	**76–87**	**75**	**70–80**
Windsor Regional Hospital,† Ontario				
2004–2005	*	*	*	*
2005–2006	*	*	*	*
2006–2007	*	*	*	*
Overall	*	*	*	*

Notes:

† Aggregate result for corporations with multiple acute care sites submitting data to CIHI under separate institution numbers. Note that results for individual sites within a corporation that meet the reporting threshold are also presented in this report. For a complete listing of sites within a corporation, as defined here, see Appendix II.

* The organization identified significant data-related issues with respect to the data submitted for its HSMR cases. Accordingly, results are not reported.

95% CI 95 percent confidence interval

PC Palliative care

	HSMR Excluding PC	HSMR Excluding PC 95% CI	HSMR All Cases	HSMR All Cases 95% CI
Windsor Regional Hospital Metropolitan Campus, Ontario Community Name: Windsor				
2004–2005	*	*	*	*
2005–2006	*	*	*	*
2006–2007	*	*	*	*
Overall	*****	*****	*****	*****
York Central Hospital, Ontario Community Name: Richmond Hill				
2004–2005	101	90–112	91	82–101
2005–2006	98	87–109	88	79–99
2006–2007	104	94–115	94	85–104
Overall	**101**	**95–107**	**91**	**86–97**

Notes:
* The organization identified significant data-related issues with respect to the data submitted for its HSMR cases. Accordingly, results are not reported.
95% CI 95 percent confidence interval
PC Palliative care

Appendix III

List of Corporations

List of corporations presented in Appendix II of this report and the sites included in their aggregate result:

Chatham–Kent Health Alliance

Chatham Public General Hospital Society of Chatham
Chatham Kent Health Alliance St. Joseph's Hospital Campus
Sydenham District Hospital

Grey Bruce Health Services

Grey Bruce Health Services Lion's Head Hospital
Grey Bruce Health Services Owen Sound Site
Grey Bruce Health Services Markdale Site
Grey Bruce Health Services Meaford Site
Grey Bruce Health Services Southampton Site
Grey Bruce Health Services Wiarton Site

Halton Healthcare Services Corporation

Halton Healthcare Services Oakville Trafalgar Site
Halton Healthcare Services Milton Site
Halton Healthcare Services Georgetown Site (2006–2007 only)

Hamilton Health Sciences Corporation

Hamilton Health Sciences Corporation Hamilton Division
Hamilton Health Sciences Corporation Henderson Division
Hamilton Health Sciences Corporation McMaster Division

Humber River Regional Hospital

Humber River Regional Hospital Finch Site
Humber River Regional Hospital Church Street Site

Lakeridge Hospital Corporation

Lakeridge Health Oshawa Site
Lakeridge Health Port Perry Site
Lakeridge Health Bowmanville Memorial Site

Niagara Health System

Niagara Health System Fort Erie Site
Niagara Health System Greater Niagara Site
Niagara Health System Niagara on the Lake Site
Niagara Health System Port Colborne General Hospital Site
Niagara Health System St. Catharines General Site
Niagara Health System Welland County General Site
Niagara Health System Ontario Street Site

Ottawa Hospital

The Ottawa Hospital Civic Campus
The Ottawa Hospital General Campus

Providence Health Care

St. Paul's Hospital
Mount St. Joseph Hospital

Quinte Healthcare Corporation

Quinte Healthcare Corporation Belleville General Site
Quinte Healthcare Corporation North Hastings Site
Quinte Healthcare Corporation Prince Edward County Memorial Site
Quinte Healthcare Corporation Trenton Memorial Site

Rouge Valley Health System

Rouge Valley Health System Centenary Site
Rouge Valley Health System Ajax and Pickering Health Centre

Sarnia Bluewater Health

Bluewater Health Sarnia Site
Bluewater Health Charlotte Eleanor Englehart Site

The Scarborough Hospital

The Scarborough Hospital General Site
The Scarborough Hospital Grace Site

William Osler Health Centre

William Osler Health Centre Etobicoke General Hospital
William Osler Health Centre Peel Memorial Hospital

Appendix IV

HSMR Diagnosis Groups

A detailed technical briefing note is available at www.cihi.ca/hsmr.

The diagnosis groups included in the HSMR calculation are as follows:

Acute pancreatitis
Acute renal failure
Adult respiratory distress syndrome
Alcoholic liver disease
Alzheimer's disease
Acute myocardial infarction
Angina pectoris
Aortic aneurism and dissection
Atrial fibrillation and flutter
Cardiac arrest
Cerebral infarction
Chronic ischemic heart disease
Chronic obstructive pulmonary disease
Chronic renal failure
Complications of procedures, not elsewhere classified
Convalescence
Diabetes mellitus type 2
Diffuse non-Hodgkin's lymphoma
Diverticular disease of intestine
Fibrosis and cirrhosis of liver
Heart failure
Hepatic failure
Hip fracture
Intracerebral hemorrhage
Intracranial injury
Lymphoid leukemia
Malignant neoplasm of bladder
Malignant neoplasm of brain
Malignant neoplasm of breast
Malignant neoplasm of bronchus and lung
Malignant neoplasm of colon
Malignant neoplasm of liver and intrahepatic bile ducts
Malignant neoplasm of pancreas
Malignant neoplasm of prostate
Malignant neoplasm of stomach
Malignant neoplasm without specification of site
Multiple myeloma and malignant plasma cell neoplasms
Myeloid leukemia
Other and unspecified types of non-Hodgkin's lymphoma
Other bacterial intestinal infections
Other diseases of digestive system
Other diseases of intestine
Other disorders of brain
Other disorders of fluid, electrolyte and acid-base balance
Other disorders of urinary system
Other interstitial pulmonary diseases
Other non-traumatic intracranial hemorrhage
Paralytic ileus and intestinal obstruction without hernia
Peritonitis
Pleural effusion, not elsewhere classified
Pneumonia
Pneumonitis due to solids and liquids
Post-procedural respiratory disorders, not elsewhere classified
Pulmonary embolism
Respiratory failure
Secondary malignant neoplasm of other sites
Secondary malignant neoplasm of respiratory and digestive organs
Septicemia
Shock, not elsewhere classified
Stroke, not specified as hemorrhage or infarction
Subarachnoid hemorrhage
Unspecified dementia
Unspecified renal failure
Vascular disorders of intestine
Volume depletion