Hospital Report Card: British Columbia 2011

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Introduction and overview

The Fraser Institute's *Hospital Report Card: British Columbia 2011* is constructed in order to contribute to the improvement of inpatient care in British Columbia by providing hospital-specific information about quality of service directly to patients and to the general public. It aims to promote greater accountability within hospitals, thereby stimulating improved performance through independent and objective measurement. This is an interactive web-based report card, and all results and accompanying information are available at <http://www.hospitalreportcards.ca/bc>.

The Institute set out to create a hospital report card that is easy to understand and accessible by the public, where individuals are able to look up a given condition or procedure and compare death rates, volumes of procedures, rates of adverse events, and utilization rates for their hospital to those of other hospitals in British Columbia.

The report card uses the Discharge Abstract Database (DAD) of the Canadian Institute for Health Information (CIHI) as its primary information source, employs the 3M™ APR™-DRG Classification System[1] to risk-adjust the data (ie., adjust rates for patients with the same condition but a different health status), and consists of 39 indicators of inpatient quality (such as death due to a stroke) and patient safety (such as a foreign body left inside a patient during a procedure) developed by the US Agency for Healthcare Research and Quality (AHRQ)[2] in conjunction with Stanford University. This latest edition of the *Hospital Report Card: British Columbia* also includes two experimental indicators[3] adapted by the Fraser Institute that attempt to capture the potentially distinct circumstances of care provision in British Columbia.

The Fraser Institute spent two years developing the methods, databases, and computer programs required to adapt the AHRQ measures to Canadian circumstances. This work has been internally and externally peer-reviewed (Mullins, Menaker, and Esmail, 2006) and is supported by an extensive body of research based on the AHRQ approach.

1 3M and APR are trademarks of 3M, used under licence in Canada.

2 AHRQ's indicators are presently used to measure provider quality in more than a dozen US states including New York, Texas, Florida, and California.

3 IQI EXP 6: Percutaneous Transluminal Coronary Angioplasty volume (Experimental) and IQI EXP 30: Percutaneous Transluminal Coronary Angioplasty mortality rate (Experimental), adapted from AHRQ's IQI 6 and IQI 30 (see "Experimental indicators," p. 6, and "A note on experimental indicators," p. 50.)

The indicators are shown for all acute-care hospitals and municipalities (based on patient residence postal codes) in British Columbia from 2001/02 to 2008/09, comprising over three million patient records. This constitutes the most comprehensive and detailed publicly available measure of acute-care hospital performance in Canada at the present time.

Indicators are expressed as observed rates (such as deaths due to hip replacement surgery) and risk-adjusted rates (the same rate adjusted for patient health status). Each institution is given a score from 0 to 100 based on its risk-adjusted rate where available or on its observed rate (where 100 is the best), and is then ranked based on its score (where 1 is the best).[4] A further analysis, based on statistical upper and lower bounds of the 95% confidence intervals for the risk-adjusted rates, is also conducted and is discussed below. The 39 indicators and two experimental indicators used in the report card are classified into three groups: those related to medical conditions, hospital procedures, and child birth. The indicators are further classified by type: death rates, volumes of procedures, utilization rates, and adverse events (see table 1).

This is the second time British Columbia's provincial government has allowed the identification of all acute-care hospitals in the Fraser Institute's independently produced hospital report card. Indeed, British Columbia can be considered a leader in providing transparency and accountability with respect to the publicly funded care being delivered in the province's hospitals.

The *Hospital Report Card*'s interactive website

A report based on over three million patient records, shown across 39 quality and safety indicators developed by the AHRQ as well as two additional experimental indicators adapted by the Fraser Institute, for 95 hospitals and 50 municipalities, over eight years, is not something that can be summarized in a few words. In order to provide patients with access to information on specific medical procedures and conditions, and to give British Columbians a better understanding of the variation in hospital care across the entire system,

4 Some adverse events tend to be rare and smaller municipalities and hospitals will not always see these consequences of patient care. It cannot be imputed that a high score on these types of indicators is necessarily due to fewer adverse events for those places with relatively low numbers of cases as their volume of activity may be inadequate to produce the inevitable adverse event. Therefore, results for some indicators must be interpreted with caution in the case of smaller institutions and municipalities. At the same time, these institutions and municipalities may appear to have higher mortality rates in a particular year due to a small denominator accompanied by death or complications that would have occurred even when all standards of care had been met. The authors recommend viewing rates across several years in such circumstances.

Table 1: Indicators of Inpatient Quality and Patient Safety used in the Fraser Institute Hospital Report Card: British Columbia 2011

A. Conditions

Death rates

- Acute myocardial infarction (AMI) mortality rate
- Acute myocardial infarction (AMI) mortality rate (without transfers)
- Congestive heart failure (CHF) mortality rate
- Acute stroke mortality rate
- Gastrointestinal hemorrhage mortality rate
- Hip fracture mortality rate
- Pneumonia mortality rate
- Death in low mortality DRG
- Failure to Rescue

Adverse events

- Decubitus ulcer
- Iatrogenic pneumothorax
- Selected infections due to medical care
- Transfusion reaction

B. Procedures

Death rates

- Esophageal resection surgery mortality rate
- Pancreatic resection surgery mortality rate
- Coronary artery bypass graft (CABG) mortality rate
- Craniotomy mortality rate
- Hip replacement mortality rate
- Percutaneous transluminal coronary angioplasty (PTCA) mortality rate
- *Percutaneous transluminal coronary angioplasty (PTCA) mortality rate (Experimental)*
- Carotid endarterectomy mortality rate

Volume of procedures

- Esophageal resection surgery volume
- Pancreatic resection surgery volume
- Coronary artery bypass graft (CABG) volume
- Percutaneous transluminal coronary angioplasty (PTCA) volume
- *Percutaneous transluminal coronary angioplasty (PTCA) volume (Experimental)*
- Carotid endarterectomy volume

Utilization rates

- Laparoscopic cholecystectomy

Adverse events

- Foreign body left during procedure
- Post-operative physiologic and metabolic derangements
- Post-operative respiratory failure
- Post-operative sepsis
- Accidental puncture or laceration

C. Obstetric (birth-related)

Utilization rates

- Cesarean delivery
- Vaginal birth after cesarean (VBAC), uncomplicated
- Primary cesarean delivery
- Vaginal birth after cesarean (VBAC), all

Adverse events

- Birth trauma
- Obstetric trauma-—vaginal with instrument
- Obstetric trauma—vaginal without instrument
- Obstetric trauma—cesarean section

For definitions, see Appendix E.

all documents and results are available at our interactive website <http://www.hospitalreportcards.ca/bc> as well as at <http://www.fraserinstitute.org/report-cards/hospital-performance/overview.aspx>.

How to use the interactive website

While observed rates are provided, the report card focuses on statistical comparisons of risk-adjusted results (where available) for the sake of hospital performance measurement. Where risk-adjusted rates are available, the results are presented as follows:

- those hospitals and municipalities that have performed better on an indicator than the British Columbia average for a selected year are indicated by *blue* cells or bars;
- those hospitals and municipalities that have performed worse on an indicator than the British Columbia average for a selected year are indicated by *red* cells or bars;
- those hospitals and municipalities that have performed no differently from the British Columbia average for a selected year are indicated by *white* cells or bars.[5]

While ranks and scores are calculated for all indicators, it is recommended that these be viewed alongside the performance of all other institutions and municipalities rather than in isolation. Inpatient Quality Indicator (IQI) rates are expressed as rates per 100 patients while Patient Safety Indicator (PSI) rates are expressed per 1,000.

Volume indicators represent counts of admissions in which procedures were performed for which there is evidence that a higher volume is associated with lower mortality. These indicators are not risk-adjusted, and scores are based on providers achieving evidence-supported thresholds. For these indicators, it is recommended that readers focus on the scores presented for both individual hospital or municipality assessments and comparisons of facilities or municipalities (for more information, see Appendix F).

Performances on indicators for which the AHRQ methodology does not provide risk-adjustment (death in low-mortality DRGs, foreign body left during procedure, transfusion reaction, obstetric trauma-cesarean delivery) may be examined by comparing the provider's observed rate to the average for British Columbia.[6] Ranks and scores are provided for these indicators and it is recommended that these be viewed alongside the performance of all other institutions or municipalities rather than in isolation.

5 These comparisons are made using 95% confidence intervals for risk-adjusted mortality rates (for further explanation, see Appendix F).

6 An analysis of the statistical significance of these results has not been provided in this report.

Changes to the Fraser Institute's *Hospital Report Card: British Columbia*

Experimental indicators

In order to provide an alternative measure that may more accurately represent the volume of procedures and mortality rates experienced at institutions for Percutaneous Transluminal Coronary Angioplasties, the report card includes two new experimental indicators this year. IQI EXP 6—Percutaneous Transluminal Coronary Angioplasty volume (Experimental)—and IQI EXP 30—Percutaneous Transluminal Coronary Angioplasty mortality rate (Experimental)—were adapted by the Fraser Institute to include *out-of-hospital* procedures, and attribute rates to the hospitals at which the procedure was performed rather than the acute-care facility at which the patient is registered. For an explanation of the rationale behind this, as well as an examination of how these indicators were calculated, please see "A note on experimental indicators," page 50.

Interventions performed in other facilities during a patient's hospitalization

The Fraser Institute's *Hospital Report Card: British Columbia 2009* refined the method employed to exclude interventions performed outside the hospital.[7] Hence, results before 2006/07 are not strictly comparable to results after.

Limitations, caveats and notes of caution

Since this report is based on administrative data, the results have limitations. Coding varies from hospital to hospital and codes do not always provide specific details about a patient's condition at the time of admission or capture all that occurs during hospitalization. For these reasons, individual judgment is often required while reviewing the results from this report.

Further, hospital deaths or complications will occur even when all standards of care are followed. Deciding on treatment options and choosing a hospital are decisions that should be made in consultation with a physician. It is not recommended that anyone choose a hospital based solely on statistics and descriptions such as those given in this report.

7 Its predecessor, the *Hospital Report Card: British Columbia 2008* removed all "cases" where an "intervention" was found to be accompanied by an "Out of Hospital Indicator = Y" (this applies to results from 2001/02–2005/06). The *Hospital Report Card: British Columbia 2009* introduced a change such that only the "intervention" accompanied by an "Out of Hospital Indicator = Y" was removed. The patient case (including all other relevant interventions performed) was retained in the database for further processing (this applies to results from 2006/07–2008/09).

While outcomes report cards (see "The four primary types of hospital report cards") provide objective measures of differences in the quality of care, they are susceptible to being "gamed" by either doctors or hospitals. For example, the doctor or hospital may avoid exceptionally sick patients (that is, patients who are qualitatively more ill with a listed condition and who will consequently drag average results down) in favour of healthier patients, to skew results upward. This unintended effect can, however, be mitigated through the appropriate application of risk-adjustment in the measures.

Data Quality

The CIHI's Discharge Abstract Database (DAD) contains information on hospital stays in Canada. Various CIHI publications note that the DAD is used extensively by a variety of stakeholder groups to monitor the use of acute-care health services, conduct analyses of health conditions and injuries, and increasingly to track patient outcomes. The DAD is a major data source used to produce various CIHI reports, including annual reports on the performance of hospitals and the health care system, as well as health indicators adopted by the federal, provincial, and territorial governments (CIHI, 2002). These data have been used extensively in previous reports on health care performance and form the basis for many journal articles (see, e.g., Canadian Institute for Health Information et al., 2007; Aubrey-Bassler et al., 2007).

As the *Hospital Report 2006: Acute Care* notes, using the same DAD data set underlying this report card, "the data are collected under consistent guidelines, by trained abstractors, in all acute care hospitals in Ontario. The data undergo extensive edit checks to improve accuracy, but all errors cannot be eliminated" (Choy et al., 2006: 6). However, in order to produce good information about data quality, the CIHI established a comprehensive and systematic data-quality program whose evaluation tool involves 19 characteristics relating to the five data-quality dimensions of accuracy, timeliness, relevance, comparability, and usability (CIHI, 2005a).

A number of publications have addressed data-quality issues in the DAD. Notable among these are the following studies.

1 *The CIHI's data quality studies (2002, 2004b)* These summarize the findings of the CIHI's reabstraction studies that go back to the original patient charts and recode the information using a different set of expert coders.[8] The CIHI's

8 Reabstractors participating in the study were required to have several years of coding experience, experience coding in ICD-10-CA and CCI in particular, experience coding at a tertiary care centre, and attendance at specific CIHI educational workshops. They were also required to attend a one-week training session and to receive a passing score on the inter-rater test.

reabstraction studies note the following rates of agreement between what was initially coded and what was coded on reabstraction:

a non-medical data: 96%–100%

b selection of intervention codes (procedure codes): 90%–95%

c selection of diagnosis codes: 83%–94%

d selection of most responsible diagnosis: 89%–92%

e typing of co-morbidities: pre-admit: 47%–69%; post-admit: 51%–69%

f diagnosis typing (which indicates the relationship of the diagnosis to the patient's stay in hospital) continues to present a problem; discrepancy rates have not diminished with adoption of ICD-10-CA.

Source: CIHI, 2004b.

The coding issues in points (e) and (f) do not affect our results since the most responsible diagnosis is coded with a high degree of agreement and the AHRQ indicators do not discriminate among diagnosis types. Overall, when the rates of agreement in the third year of this reabstraction study (performed on data coded in ICD-10-CA) were compared to the rates of agreement of the previous years' data (coded in ICD-9-CCP), the rates were as good as, or better than, previous rates.

However, with regard to the coding of pneumonia, a potential issue with data quality exists because some coders selected pneumonia instead of chronic obstructive pulmonary disease (COPD) as the most responsible diagnosis (CIHI, 2004b). This could potentially create false positive results for Pneumonia mortality rate (IQI 20) since this indicator counts deaths due to pneumonia in situations where the primary diagnosis is a pneumonia diagnosis code.

With respect to specific conditions related to the health indicators examined, those that are procedure-driven (i.e. Cesarean section, coronary artery bypass graft, and total knee replacement) were coded well with low discrepancy rates. The following had less than a 5% rate of discrepancy: Cesarean section, coronary artery bypass graft, hysterectomy, total knee replacement, vaginal birth after Cesarean, and total hip replacement. The following had greater than a 5% discrepancy: acute myocardial infarction (AMI) (8.9%), hip fracture (6.0%), hospitalization due to pneumonia and influenza (6.9%), and injury hospitalization (5.3%) (CIHI, 2002). Similarly, the CIHI's 2004 study also noted discrepancy rates related to chart counts, selection of diagnosis typing and code selection in conditions that are diagnosis driven: AMI, stroke, pneumonia, and chronic obstructive pulmonary disorder COPD (CIHI, 2004b).

Overall, according to the CIHI, findings from their three-year DAD reabstraction studies "have confirmed the strengths of the database, while

identifying limitations in certain areas resulting from inconsistencies in the coding of some data elements" (CIHI, 2004b: 41). In addition, the findings from the inter-rater data (that is, comparison between reabstractors) were generally similar to the findings from the main study data (that is, comparison between original coder and reabstractor). This suggests that the database is coded as well as can be expected using existing approaches in the hospital system.

2 *The CIHI's data quality study (2010a)* This summarizes the results of a reabstraction study the CIHI carried out on the data from 2007 to 2008 that was submitted to the DAD. The study notes the following rates of agreement between what was initially coded and what was coded on reabstraction:

- **a** non-clinical data: 92%–100%
- **b** selection of intervention codes (procedure codes): 91%–95%
- **c** selection of significant diagnosis codes: 85%–88%
- **d** selection of most responsible diagnosis: 72%–78%
- **e** typing of co-morbidities: pre-admit: 70%–75%; post-admit: 64%–73%
- **f** diagnosis typing: 79%–82%

Source: CIHI, 2010a.

The report also focused on evaluating the "coding quality of palliative care, strokes, fractures of the hip and femur, acute renal failure in cardiac cases, acute myocardial infarction, obstetrical trauma, birth trauma and pulmonary embolism or deep vein thrombosis" (CIHI, 2010a: 3), and found that "hospitalizations for these health conditions were generally well represented in DAD, though there was a tendency for these health conditions to be under-reported to DAD. The following specific conditions were found to have lower coding quality: unspecified stroke, ST-elevation myocardial infarction (STEMI), non–ST elevation myocardial infarction (NSTEMI), post-admission acute myocardial infarction, birth trauma and post-admission pulmonary embolisms or deep vein thrombosis." (CIHI, 2010a: 54). However, "[t]here were several areas where the coding quality of diagnoses and interventions in DAD improved for the data submitted in 2007–2008, compared to the data submitted in 2005–2006" (CIHI, 2010a: 76). In general, while making note of coding issues, the findings of the CIHI's data quality study of the 2007–2008 discharge abstract database supported the notion that "the DAD data is fit for use with respect to the health conditions studied" (CIHI, 2010a: xi).

The authors of this edition of the Fraser Institute's *Hospital Report Card: British Columbia* also recommend exercising caution when interpreting IQI 15 (Acute Myocardial Infarction Mortality Rate) since they have observed significant variation in the number of patients aged 18 and over

diagnosed with AMI over the years at particular hospitals.[9] Though the variation found in IQI 32 (Acute Myocardial Infarction [without transfers]) was less when compared to IQI 15, the authors also advise caution when interpreting this indicator, especially when trending across years.

Conclusion

The Fraser Institute's *Hospital Report Card: British Columbia 2011* provides a detailed and comprehensive measure of inpatient acute-care conditions in British Columbia's hospitals. This is the third edition of the report card for patients in British Columbia. Three reports for Ontario, and one for Alberta, are already available. We welcome comments on the content and format of this report via: <http://comments@hospitalreportcards.ca>.

9 In addition, one may note that CIHI's data quality study reported that "[e]ighty-three percent of hospitalizations where acute myocardial infarction was documented in the patient chart had the infarction included on the DAD abstract" (2010a: 49).

Background

Hospital report cards are used to measure practices in hospitals such as the application of a specific drug or technology to certain events; or performance with respect to access to care or consumer satisfaction; or to measure the likelihood of a positive or negative outcome provided by health facilities in a specific jurisdiction.[1] They are published in order to provide data that can both improve the quality of care in hospitals and inform patients' health care decision-making. This allows for a fact-based discussion of relative levels of quality and eliminates measurement based on anecdotal information.

The four primary types of hospital report cards

1 Process report cards

This type of report card describes the inputs used by hospitals, health plans, or individual physicians in the course of treating their patients. An example of these types of report cards can be found in those commissioned by The Leapfrog Group <http://www.leapfroggroup.org/>. The primary strength of a process report card is that it can be developed from existing medical administrative databases with relative ease. The process report card, however, does not necessarily measure the appropriateness, quality, or importance of the inputs employed in ensuring good health, although these factors can be captured to some extent by the inclusion or exclusion of specific inputs.

2 Survey report cards

This type of report card is composed of patients' evaluations of the quality of care and customer service they received. An example of this type of report card is found in the California HealthCare Foundation's ratings <http://www.calhospitalcompare.org/>. Although survey-based report cards do provide valuable information on subjective areas of patient care, they cannot measure how treatment decisions by a doctor or hospital lead to objective improvements in patient care.

3 Outcomes report cards

These report cards present average levels of adverse health outcomes based on mortality or complication rates experienced by patients as part of a health plan, as treated by a specific doctor, or in a specific hospital. An example

1 See Kessler, 2003 for a helpful delineation of the field.

of this type of report card can be found in the Pennsylvania CABG surgery reports <http://www.phc4.org/reports/cabg/>. These report cards provide objective measures of differences in the quality of care but are susceptible to being "gamed" by either doctors or hospitals. For example, the doctor or hospital may avoid exceptionally sick patients (that is, patients who are qualitatively more ill with a listed condition and who will consequently drag average results down) in favour of healthier patients (to skew results upward). This unintended effect can, however, be mitigated through the appropriate application of risk-adjustment in the measures. These report cards generally provide an empirically sound basis for analysing the quality of care. The Fraser Institute's *Hospital Report Card* is an outcomes-based report card.

4 Balanced scorecards

The balanced scorecard was developed in the early 1990s by Robert Kaplan and David Norton (1992) to examine a business beyond the financial bottom line. Translated into the health care field, this results in four quadrants. In the case of the *Ontario Hospital Reports* series, a prime example of the use of a balanced scorecard, these are [1] financial performance and conditions; [2] patient/client satisfaction; [3] clinical utilization and outcomes; and, [4] system integration and change. While this variant of report card is useful in determining the broadest view of a hospital's operations and functions, specific and relevant indicators about hospital performance may be overlooked.

Hospital report cards in the United States

The United States was one of the first nations to begin measuring, comparing, and publishing measurements of hospital performance. Hospital report cards were first undertaken by the federal government, with state governments following its lead. Private-sector information providers offering several competing reports on the quality of health care providers have refined the reporting of information. In 1987, the first US hospital report cards were published by the Health Care Financing Administration (HCFA), the federal agency that administers Medicare and Medicaid. These reports gave detailed annual mortality rates that were measured from the records of hospitalized Medicare patients. However, because of extensive criticism of the accuracy, usefulness, and interpretability of the HCFA's mortality data, this initiative was withdrawn in 1993 (Berwick and Wald, 1990).

In the late 1980s, the state of New York began the Cardiac Surgery Reporting System (CSRS), which collected data from patients' medical histories and recorded whether they died in hospital following surgery. From these data, New York was able to report detailed physician-specific statistics.

While the information contained in the CSRS was not originally intended to provide the public with information about the performance of their provider, the news media understood the public's desire for such data and saw the benefit in publishing the information. In December of 1990, the *New York Times* used this information to publish a list of local hospitals, which ranked facilities according to their mortality rates for Coronary Artery Bypass Surgery (CABG). Invoking the Freedom of Information Act, the New York *Newsday* sued the New York State Department of Health to obtain access to its database on bypass surgery and on cardiac surgeons. The goal was to publish physician-specific death rates for patients. The Supreme Court of New York ruled that it was in the public's best interests to have access to these mortality data in order to make informed decisions about their health care (Zinman, 1991). As a result, *Newsday* was able to publish the information on physicians' performance for citizens to assess where the best care was available. Driven by this development, the New York State Department of Health began publishing annual editions of the *Coronary Artery Bypass Surgery Report* in 1996 (New York State, Department of Health, 2005).

Following the precedent set by this pioneering case, a wide variety of hospital performance reports began to be produced in the 1990s by a disparate group that includes the news media, coalitions of large employers, consumer advocacy organizations, and state governments (Marshall et al., 2003). More recently, the US Centers for Medicare and Medicaid Services released mortality-rate estimates for heart attack, heart failure, and pneumonia for more than 4,100 hospitals over three years alongside other measures of hospital performance (Couch et al, 2010). Development of reports in the United States has taken many different paths so there is currently no "standardized" hospital report card or agreement on the indicators to measure. Furthermore, reports range widely in terms of both quality and comprehensiveness. Indeed, as Marshall and colleagues cheekily note: "Public reporting in the United States is now much like health care delivery in that country: It is diverse, is primarily market-based, and lacks an overarching organizational structure or strategic plan. Public reporting systems vary in what they measure, how they measure it and how (and to whom) it is reported" (2003: 136). Of course, for patients who are the beneficiaries of such competition between information providers, each of whom strives to deliver a product in some way superior to his competitors, this is no bad thing.

Examples of American private and public information providers

- Hospital Compare
  <http://hospitalcompare.hhs.gov>
- America's Best Hospitals—*USNEWS & World Report*
  <http://health.usnews.com/best-hospitals>

- Healthgrades
  <http://www.healthgrades.com>
- The Leapfrog Group
  <http://www.leapfroggroup.org>
- National Committee for Quality Assurance (NCQA)
  <http://www.ncqa.org>
- National Quality Forum
  <http://www.qualityforum.org/Home.aspx>
- Quality Check
  <http://www.jointcommission.org/performance_measurement.aspx>
- *Cardiac Surgery in New Jersey*
  <http://www.state.nj.us/health/reportcards.shtml>
- *Cardiac Surgery Reports*
  <http://www.health.state.ny.us/nysdoh/healthinfo/index.htm>
- *Pennsylvania Hospital Performance Reports*
  <http://www.phc4.org>
- *Indicators of Inpatient Care in New York Hospitals*
  <http://www.myhealthfinder.com>
- *Indicators of Inpatient Care in Texas Hospitals*
  <http://www.dshs.state.tx.us/thcic>
- *Maryland Hospital Performance Evaluation Guide*
  <http://mhcc.maryland.gov/consumerinfo/hospitalguide/index.htm>
- California HealthCare Foundation
  <http://www.calhospitalcompare.org>.

Hospital report cards in the United Kingdom

The hospital reporting market in the United Kingdom is a fraction of that in the United States. League tables[2] of death rates for English hospitals were available from 1992 to 1996 (Leyland and Boddy, 1998) and mortality statistics for English hospitals were published by the national government in 1998. Although publicly released, these were intended for managerial use and had little discernible impact (Street, 2002). The first initiative designed for public consumption was the *Patient's Charter* (National Health Service, 1991), which focused on waiting times as opposed to clinical quality.

2 A league table ranks the performance of a range of institutions.

In 1998, the National Health Service (NHS, Britain's tax-funded, universal program of medical insurance) adopted a new Performance Assessment Framework (PAF) to report clinical outcomes at the hospital level (London Department of Health, 1998). It focused on health gain, fair access, effective delivery of services, efficient delivery of services, health outcomes, and patient/career experience. This initiative received prominence in 2001 as the NHS became the first government plan in the developed world to deal explicitly with report cards. Beginning in September 2001, the UK Department of Health began to publish a new rating system for all NHS non-specialist hospitals in England. The performance of hospitals included in this survey was classified into one of four categories, ranging from zero to three stars based on the hospital's performance on a range of indicators and the outcome of their clinical governance review by the Commission for Health Improvement (CHI). As an additional incentive for improvement, beyond that assumed to come with public reporting of performance, the Department of Health mandated that hospitals scoring at the high end of the scale would receive greater funding and autonomy, while those at the bottom of the scale would be subject to greater government oversight and intervention. For example, those receiving zero stars were subject to investigations and underwent changes in management where necessary.

Although the lion's share of reporting in Britain has been by and at the direction of government, an independent initiative entered the arena in the latter half of 2000 when Tim Kelsey and Jake Arnold-Forster, a pair of journalists at the *Sunday Times*, founded Dr. Foster to generate authoritative independent information about local health services on the web at <http://www.drfosterintelligence.co.uk/>. The partnership is in the form of a 50/50 joint venture involving the new Health and Social Care Information Centre (a special health authority of the NHS) and Dr. Foster, a commercial provider of healthcare information. Numerous publications have emerged from this initiative including the *Good Birth Guide* and the annual *Good Hospital Guide*, which was first published in 2001 and continues to be published annually. These guides contain information about hospital-specific mortality rates; the total number of staff; wait times; numbers of complaints; as well as, uniquely, private hospitals' prices for services.

Hospital report cards in Canada

In Canada, as in the United States and the United Kingdom, hospital reporting initiatives have emerged only recently. In 1998, the Ontario Hospital Association produced a report card comparing the hospitals covered by its organization. Undertaken by a research group at the University of Toronto, the publication focused upon inpatient acute care and reported results at both

peer group and regional levels of aggregation, but not for individual facilities. *Hospital Report '99*, published the following year, saw the first reporting of hospital-specific acute-care hospital performance indicators in Canada. In 2001, the Ontario Ministry of Health and Long Term Care joined as a sponsor and the scope of the report was expanded to include such areas as complex continuing care, mental health, rehabilitation, and emergency department care. In addition, specific reports dealing with women's health, the health of the population as a whole, and nursing care were also produced. These publications have since appeared annually. With the addition of investigators over the years, the Hospital Report Research Collaborative was formed (in January 2008 the research activities of the Hospital Report Research Collaborative were assumed by the Health System Performance Research Network), though overall management of the project continues to be based at the University of Toronto. The *Hospital Report* series appears in a "balanced scorecard" format and assesses the performance of hospitals in four quadrants including: [1] financial performance and conditions; [2] patient/client satisfaction; [3] clinical utilization and outcomes; and [4] system integration and change. The report is available online at <http://www.hospitalreport.ca>. More recently, in April 2009, the Ontario Hospital Association launched an interactive web site <http://www.myhospitalcare.ca> designed to make performance information about Ontario's hospitals more accessible and useful to the public (OHA, 2009).

Other notable reporting initiatives in Canada include the CIHI's *Hospital Standardized Mortality Ratio* (HSMR) (discussed below), *Healthcare Performance Measurement in Canada: Who's Doing What?* (Baker et al., 1998), *Quality of Cardiac Care in Ontario* (CCORT, 2004) and *The State of Hospital Care in the GTA/905* (GTA/905 Healthcare Alliance, 2005). Additionally, two publications that have reported on patient safety and adverse events are the *Ottawa Hospital Patient Safety Study* (Forster et al., 2004) and *The Canadian Adverse Events Study* (Baker et al., 2004), though neither reported institution-specific measures. Similarly, the Manitoba Center for Health Policy released an in-hospital patient safety report using the AHRQ Patient Safety Indicators (Bruce et al., 2006). Additionally, for the last 20 years, the Fraser Institute has published *Waiting Your Turn*, Canada's only national, comparable, and comprehensive measurement of wait times for medically necessary elective treatment (see, for example, Barua, Rovere and Skinner, 2010).

Other avenues for reporting and monitoring hospital performance in Canada have largely been in the form of private assessments of hospital performance by a contracted third party using a proprietary methodology. A prime example of this is the work done by the Hay Group in rating the performance of participating Canadian hospitals for a fixed fee per facility (Hay Group, 2011).

The CIHI's *Hospital Standardized Mortality Ratio*

The Canadian Institute for Health Information (CIHI) has published its own measure of hospital and regional performances, the *Hospital Standardized Mortality Ratio* (HSMR), since 2007. While both the CIHI's measure and the *Hospital Report Card: British Columbia 2011* use data from the CIHI's Discharge Abstract Database, there are several significant differences between the measures published by the CIHI and those published by the Fraser Institute. These differences make comparisons between the two reports difficult and lead to the conclusion that the CIHI and the *Hospital Report Card: British Columbia 2011* are measuring hospital performance in two, very different, ways.

The most significant difference between the measures published by the Fraser Institute and those published by the CIHI is the level of detail available. According to the CIHI's report, the *Hospital Standardized Mortality Ratio* is a "big-dot summary measure that is used to track a hospital's mortality over time" (CIHI, 2010b). More specifically, the HSMR is a composite measure of mortality in diagnosis groups that comprise 80% of all deaths in acute-care facilities (see table 2).

By comparison, the measures published in *Hospital Report Card: British Columbia 2011* allow for the examination of hospital performance in specific and detailed areas, thus providing patients with a greater level of information about their particular interest or diagnosis and allowing providers greater insight into the areas of care that may be of particular concern in their facilities. In all, 39 specific and well-defined indicators of quality of care as well as two additional experimental indicators are examined in the Fraser Institute's report.

Further, the *Hospital Standardized Mortality Ratio* is a relative measure, giving a measure of a hospital's or region's performance relative to Canada's performance as a whole in 2004/05. The indicator measures the ratio of the actual number of deaths for a hospital or region given its case mix (age, sex, length of stay, diagnosis group, etc. of its patients) to the number of deaths that would be expected according to national estimates in 2004.[3] Conversely, the 39 indicators published in the *Hospital Report Card* give absolute measures of indicators of patient safety or inpatient quality of care. (Scoring and ranking is constructed relative to each hospital/municipality. Further, an analysis of performance relative to the provincial average in the same year is also conducted.)

These significant differences in the approaches used by the CIHI's *Hospital Standardized Mortality Ratio* and the Fraser Institute's *Hospital*

3 The number of deaths is computed for the 65 diagnosis groups listed in table 2, accounting for 80% of in-patient mortality.

Table 2: Diagnosis groups used in the CIHI's *Hospital Standardized Mortality Ratio*

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

Source: CIHI 2010c.

Report Card: British Columbia 2011 lead to the conclusion that the two measurements cannot be compared with one another directly. Further, the relative rankings of hospitals are not necessarily comparable because of differences in what is being measured in the *Hospital Standardized Mortality Ratio* and the various indicators of *Hospital Report Card: British Columbia 2011*. In addition to these significant differences in approach is a difference in risk-adjustment methodologies: the indicators in *Hospital Report Card: British Columbia 2011* are risk-adjusted using the publicly available 3M™/AHRQ methodology/software and are not risk-adjusted in the manner developed and employed by the CIHI for the *Hospital Standardized Mortality Ratio*.

However, while the two sets of measures cannot be directly compared, it is nevertheless true that the *Hospital Standardized Mortality Ratio* provides a measure of hospital mortality that can be used in conjunction with the measures produced in *Hospital Report Card: British Columbia 2011*.[4] Both sets of measures are based on an internationally validated and commonly applied methodology, and both sets of measures can provide patients and providers with insight into where mortality rates may be unacceptably high or exceptionally low.[5] In this sense, the authors of this report welcome the CIHI's measure and hope that greater reporting of, and attention to, provider performances on mortality leads to improved outcomes from care for Canadians.

The measurable impacts of hospital report cards

In the United States, hospital report cards have had a number of measurable impacts on performance and the quality of patient care. The first and most notable example came from the *New York State Cardiac Surgery Report*. Hannen et al. (1994) reported an associated 41% decline in the risk-adjusted mortality rate of Coronary Artery Bypass Graft patients with the publication of these outcomes statistics and data. A similar overall trend was seen in Pennsylvania and New Jersey following the publication of their report cards.[6]

4 Note that the regional results published by the CIHI are based on where patients were treated, while municipal measures published in the *Hospital Report Card: British Columbia 2011* are based on where patients lived.

5 It is worth noting that the CIHI began working with the HSMR measure for Canada in 2005 while the Fraser Institute's research program on the *Hospital Report Card* began in 2004. Further, the Fraser Institute's *Hospital Report Card: Ontario 2006* was the first publicly available report in Canada that allowed the comparison of mortality rates in Canadian hospitals based on a standardized measure.

6 For Pennsylvania data, see PHC4, Pennsylvania Health Care Cost Containment Council, 1998. For New Jersey data, see New Jersey, Department of Health and Senior Services, 2001. For the northern New England initiative, see O'Connor et al., 1996.

The findings in New York have created controversy about the Cardiac Surgery Reporting System, the database used to create the *New York State Surgery Report*. Critics have raised pertinent questions regarding "up-coding"[7] and the possibility that hospitals have decided not to operate on some critically ill patients and have referred such complex cases to out-of-state jurisdictions (McKee and Healy, 2000). In contrast, using data from the Cardiac Surgery Reporting System Report (CSRS) for the period from 1991 to 1999, researchers at the National Bureau of Economic Research found that the reporting program had an impact on the volume of cases and the future quality at hospitals identified as poor performers. Those identified as weaker hospitals lost some relatively healthy patients to competing facilities with better records. Subsequently, these "weaker" hospitals experienced a decline of 10% in the number of patients during the first 12 months after an initial report and this decrease remained in place for three years. Consequently, patients choosing these hospitals demonstrated a decrease in their risk-adjusted mortality rate by approximately 1.2 percentage points (Cutler et al., 2004).

More recently, a 2010 NBER working paper (Wang et al., 2010) examined Pennsylvania data[8] from 1998 to 2005 and found that, while public reporting led to a decrease in volume for unrated and poor performing surgeons,[9] a statistically significant effect on hospital volume was not found (this contrasts with Cutler's finding above). Finally, in Canada, a paper examining the impact of the Enhanced Feedback for Effective Cardiac Treatment (EFFECT) report cards found that:

> a carefully designed publicly released report card based on high-quality clinical information did not result in a measurable greater [system wide] improvement in 2 composite AMI or CHF process-of-care indicators at the early feedback hospitals in Ontario. However, the EFFECT study data likely stimulated some important local, hospital-specific changes in delivery of care that may have contributed to the better outcomes observed at the early feedback hospitals. (Tu et al., 2009: 2,336)

Notably, a survey completed by CEO's and clinical contacts at each hospital suggested that "a majority of hospitals in the early feedback group undertook

7 "Up-coding" is a term used to describe the practice by a physician or hospital of falsely representing patients' medical conditions in order to increase payment received.

8 The study used Pennsylvania Inpatient Hospital Discharge Data collected by PHC4, Pennsylvania's *Guide to Coronary Artery Bypass Graft Surgery*, the web site of the Pennsylvania Department of State Bureau of Professional and Occupational Affairs, and the American Hospital Association's Annual Survey of Hospitals.

9 Interestingly, the volume of the high performing surgeons did not increase by an offsetting amount.

one or more quality improvement initiatives in response to the publicly released report card" (Tu et al., 2009: 2,336). Though subject to a number of caveats regarding their design and structure, report cards appear to have had a beneficial impact on the quality of health care delivery in those regions where they are published.

The Fraser Institute's *Hospital Report Cards*

The first stage of the research in producing this report was to acquire or create a methodology that was reliable, easily understood by the public and participants, and that produced an accurate measurement of provider performance. An initial period of examining performance-indicator frameworks from earlier literature on hospital report cards provided a number of different examples of accepted and proven methodologies that were not otherwise proprietary information and thus could be employed by the Fraser Institute. The search also turned up methodologies that, though available, would be less effective in providing a patient-friendly hospital report card focused on clinical outcomes.

Further examination of the methodologies available led to the selection of the performance-indicator framework developed by the US Agency for Healthcare Research & Quality (AHRQ), an agency of the US federal government's Department of Health and Human Services. AHRQ's indicator modules were chosen because they represent a comprehensive set of indictors that are widely used, highly regarded, and applicable to any hospital inpatient administrative data. They are readily available and relatively inexpensive to use. Importantly, they comprise an ideal set of indicators to allow a patient-friendly, clinical outcomes-focused, hospital-specific patient care report card.

The AHRQ indicators date from the mid-1990s when AHRQ developed a set of quality measures, or indicators, that required only the information found in routine hospital administrative data: diagnoses and procedures codes, patient age, sex, other basic demographic and personal information, source of admission, and discharge status. These indicators, 33 in all, made up the Healthcare Cost and Utilization Project (HCUP) Quality Indicators, designed to be used by hospitals to assess their inpatient quality of care as well as by the State and community to assess access to primary care.[10] Although they cannot be used to provide definitive measures of the quality of health care directly, they are used to provide indicators of health care quality and to serve as the basis for subsequent in-depth investigation of issues of quality and patient safety at the facility level.

10 More information about HCUP Quality Indicators can be found at <http://qualityindicators.ahrq.gov/Archive/Default.aspx>.

In the years following the release of the HCUP, both the knowledge base about quality indicators increased and newer risk-adjustment methods developed. Following input from then-current users, as well as advances in the specific indicators themselves, AHRQ underwrote a project to develop and refine the original Quality Indicators. This project was undertaken by the University of California San Francisco-Stanford Evidence-based Practice Centre. The results of this research were the AHRQ Quality Indicators, which are currently used to measure hospital performance in more than 12 US states including New York, Texas, Colorado, California, Florida, Kentucky, Maryland, Minnesota, New Jersey, Oregon, Utah, Vermont, and parts of Wisconsin.

The four modules of the AHRQ Quality Indicators

1 *Prevention Quality Indicators (PQIs)* Consisting of ambulatory care-sensitive conditions, PQIs report hospital admissions that could have been prevented by high-quality outpatient care.[11]

2 *Inpatient Quality Indicators (IQIs)* These indicators reflect the quality of care inside hospitals and include such items as inpatient mortality; misuse, overuse, or underuse of procedures; and the volume of procedures for which evidence shows that a higher volume of procedures is associated with a lower rate of mortality.

3 *Patient Safety Indicators (PSIs)* These indicators focus upon preventable instances of harm to patients such as complications arising from surgery and other iatrogenic events.[12]

4 *Pediatric Quality Indicators (PDIs)* These indicators examine the quality of pediatric inpatient care, as well as the quality of outpatient care that can be inferred from inpatient data, such as potentially preventable hospitalizations.[13]

The Fraser Institute's *Hospital Report Card* uses the IQI and PSI indicators; it is made up of 39 of the 59 indicators available in these categories (as well

11 Since Prevention Quality Indicators (PQIs) identify the quality of care for ambulatory care-sensitive conditions and are measures of the overall health care system, they were not used in the Fraser Institute's *Hospital Report Card*, which was designed to analyze the care inside acute-care hospitals.

12 An iatrogenic event is one that is caused by medical examination or treatment.

13 The PDI module became available in February 2006 and is not used in the *Hospital Report Card*. For details on the PDI module, see <http://www.qualityindicators.ahrq.gov/Modules/pdi_overview.aspx>.

as two additional experimental indicators adapted by the Fraser Institute).[14] These two modules were chosen because they are well respected and have seen widespread use.

The AHRQ indicator modules are designed to be used with data from administrative databases in the United States, which themselves are primarily used by hospitals for billing purposes. This type of record, referred to as "administrative data," consists of diagnoses and procedures codes along with information about a patient's age, sex, and discharge status. The Canadian counterpart is the Canadian Institute for Health Information's Discharge Abstract Database (DAD).

The data are risk-adjusted using the 3M™ All Patient Refined™ DRG (APR™-DRG) software, commonly recognized to be the gold-standard system for risk-adjusting hospital data.[15] Importantly, the AHRQ Quality Indicators were designed to be used in conjunction with 3M™ All Patient Refined™ Diagnosis Related Groups (APR™-DRG) software, which risk-adjusts the indicators for patients' clinical conditions and severity of illness or risk of mortality. Indeed, the version of the APR™-DRG software built into the AHRQ software was used for this report.

The OECD has also published a report in support of the AHRQ patient-safety indicator modules noting that "this set of measures represents an exciting development and their use should be tested in a variety of countries" (Millar, Mattke, et al., 2004: 12). Further, a report published by the Manitoba Center for Health Policy that used the AHRQ Patient Safety Indicators (Bruce et al., 2006) noted two important advantages to using the AHRQ module: the indicators offer broad coverage for studies of in-hospital patient safety and they were developed to measure complications of hospital-based care among a group of patients for whom the complications seemed preventable or highly unlikely.

The Fraser Institute spent two years developing the methods, databases, and computer programs required to adapt the measures to Canadian circumstances. This work has been internally and externally peer-reviewed (Mullins, Menaker, and Esmail, 2006) and is supported by an extensive body of research based on the AHRQ approach.

14 The 11 area indicators were not used. Out of the 48 provider indicators, nine could not be calculated using Canadian data (see Appendix G for details).

15 For further details, please refer to Appendix B and <http://solutions.3m.com/wps/portal/3M/en_US/3M_Health_Information_Systems/HIS/Products/APRDRG_Software/>.

Method

All hospital data used in the Fraser Institute's *Hospital Report Card: British Columbia 2011* are from the Discharge Abstract Database (DAD) that was purchased from the Canadian Institute for Health Information (CIHI). The DAD is an administrative database containing demographic, administrative, and clinical data for hospital discharges (inpatient acute, chronic, rehabilitation) and day surgeries.[1] Only inpatient acute records were used in this report (see Appendix A for the DAD data fields used).

The inpatient acute records were grouped into diagnosis-related groups (DRGs) using the Centers for Medicare and Medicaid Services (CMS) Grouper with Medicare Code Editor software.[2] The program sorts patients' records into groups of patients who are expected to make similar use of a hospital's resources. The groupings are based on information extracted from diagnosis and procedure codes as well as the patients' age, sex, and the presence of complications or co-morbidities (see Appendix B for details).[3]

Since more highly specialized hospitals may treat more high-risk patients and some patients arrive at hospitals sicker than others, it is difficult to compare hospital mortality and utilization rates for patients with the same condition but a different health status. In order to compensate for this possible difference in the mix of hospital cases, the international standard for risk adjustment, developed by 3M Corporation, was employed to risk-adjust the data. This was done to ensure that a hospital's final score reflected the performance grading that the hospital would have received if it had provided services to patients with the average mix of medical complications.[4]

1 CIHI is unable to release the identity of specific institutions whose data is included in the DAD unless those institutions have explicitly granted permission to the researchers requesting the data. As a result of a decision by British Columbia's Ministry of Health, all of British Columbia's acute-care hospitals are identified in this report.

2 Version 24 was used in order to ensure overall compatibility as later versions contained significant changes.

3 In order to use the Centers for Medicare and Medicaid Services (CMS) Grouper with Medicare Code Editor as well as the Inpatient Quality Indicators (IQI) and Patient Safety Indicators (PSI) modules of the Agency for Healthcare Research and Quality (AHRQ), the diagnosis and procedure codes had to be translated from ICD-10-CA/CCI to ICD-9-CM. ICD-10-CA is an enhanced version of ICD-10 developed by the CIHI for morbidity classification in Canada; the companion classification to ICD-10-CA for coding procedures in Canada is CCI. See Appendix J for details.

4 The version of the APR™-DRG software that is built into the AHRQ software was used for this report.

The final step in our methodology was to produce separate indicators for hospital performance based on the methodology[5] developed by the Agency for Healthcare Research and Quality's (AHRQ) Evidence-Based Practice Center (EPC) at the University of California San Francisco-Stanford.[6]

Figure 1 shows a graphical representation of the methodology. Inpatient Quality Indicators (IQIs) reflect the quality of care inside hospitals and include mortality rates, the use of procedures (where there are questions of misuse, overuse, or underuse), and volume of procedures (for which evidence shows that a higher volume of procedures is associated with a lower rate of mortality). Patient Safety Indicators (PSIs) focus on preventable complications acquired while in hospital, as well as adverse events following surgeries, procedures, and childbirth.

The indicators are expressed as observed rates (which are raw measures) and risk-adjusted rates (incorporating patient severity and risk of mortality scores from the 3M™ software described above). In addition, the web version of the report card presents an analysis (performed by the Fraser Institute) of statistically significant performance measures based on 95% confidence intervals. IQI rates are expressed as rates per 100 patients while PSI rates are expressed per 1,000. Each institution was also given a score from 0 to 100 for each indicator based either on its risk-adjusted rate, where available, or on its observed rate and was then ranked based on their score (see Appendix F for details on calculating scores, ranks, and statistical significance of results).[7]

It is important to note that the 39 indicators[8] are applicable only to acute-care conditions and procedures for inpatient care. The results cannot be generalized to assess the overall performance of any given hospital.

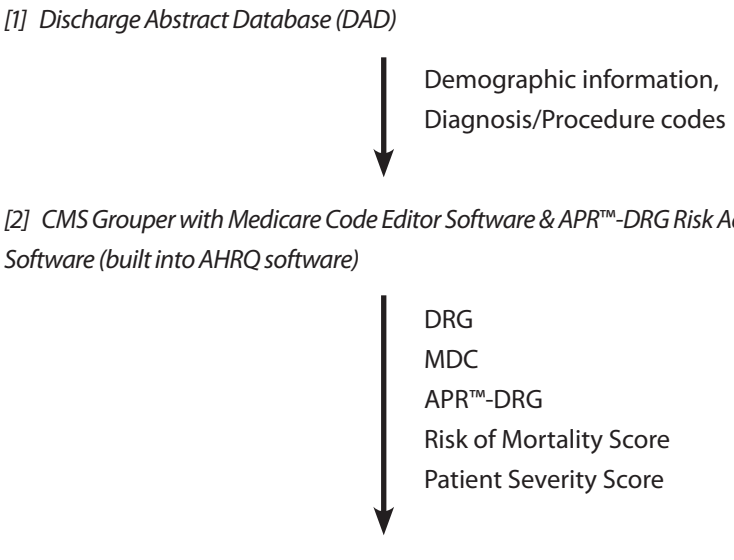
5 Version 3.1 b/apr of AHRQ's Quality Indicators software was used in order to ensure consistency across the *Hospital Report Cards* for British Columbia.

6 The AHRQ Quality Indicators were developed in response to the need for both multidimensional and accessible quality indicators. They include a family of measures that patients, providers, policy makers, and researchers can use with easily accessible inpatient data to identify apparent variations in the quality of inpatient care. For more information, see <http://www.qualityindicators.ahrq.gov/>.

7 Ranks are not used for comparisons of hospitals across indicators as they are based on a varying number of hospitals. Readers may rely on the scores to examine the performance of a hospital across indicators; and on the observed or risk-adjusted rates to examine the performance of hospitals on a given indicator. The authors advise that focus be paid primarily to the analysis of statistical significance based on 95% confidence intervals (represented by the blue/white/red coloring of relevant cells/bars) where available, or on the scores for volume of procedure indicators.

8 Two additional indicators, adapted by the Fraser Institute, are also included in this years report. See "A note on Experimental Indicators," page 50.

Figure 1: Overview of methodology used to construct the Fraser Institute's *Hospital Report Cards*



Throughout the *Hospital Report Card*, several measures were taken in order to protect patients' confidentiality. First, patient identifiers such as patients' names and addresses were removed before the Fraser Institute had access to the dataset. Also, postal codes were truncated to Forward Sortation Areas (FSAs) and grouped into municipalities in order to assess and compare care received by patients from those jurisdictions (please see Appendix H for details). Furthermore, results were not published if the patient population in any given indicator was five or less in any institution or municipality.

Legend for sample data table

Use the sample table (page 28) and the explanations below to help you understand how each indicator is displayed in the downloadable data tables of the *Hospital Report Card*. (Note that, unlike the web-version of the report card, the downloadable data tables do not contain the colour-coded analysis of the statistical significance of the risk-adjusted results. The upper and lower bounds of the intervals for these indicators are provided in separate data tables.)

A The name of the Inpatient Quality Indicator (IQI) or Patient Safety Indicator (PSI) from the Agency for Healthcare Research and Quality (AHRQ). See Appendix E for a complete list of the indicators used in the Hospital Report Card.

B All indicators were expressed as:

1. an observed rate (a raw measure) (file: 1_BC_Observed_Rates_11.xls);
2. a risk-adjusted rate (file: 2a_BC_Risk_Adjusted_Rates_11.xls) including upper (file: 2b_BC_Risk_Adjusted_Lower_Stat_CI_11.xls) and lower (file: 2c_BC_Risk_Adjusted_Upper_Stat_CI_11.xls) statistical confidence intervals (incorporating patient severity and risk of mortality scores from 3M™ All Patient Refined™ Diagnosis Related Groups [APR™-DRG] Software; see Appendix B for details);
3. a score (see Appendix F for details on calculating scores, ranks, and statistical significance of results) (file: 3_BC_Scores_11.xls);
4. a rank (file: 4_BC_Ranks_11.xls).

C Indicators are stratified by institution and by municipality. Postal Codes were truncated to Forward Sortation Areas (FSAs) before the Fraser Institute had access to the dataset. All patient FSAs were grouped into corresponding municipalities as described by Canada Post. Please see Appendix H for details.

D All IQIs are expressed as percentage. PSIs are expressed per thousand.

E All data used in the *Hospital Report Card* were extracted from the Discharge Abstract Database (DAD), which was purchased from the CIHI for the period from Fiscal 2001 (April 1, 2001 to March 31, 2002) to Fiscal 2008 (April 1, 2008 to March 31, 2009).

F "—" indicates that either no data were available for that hospital or municipality for that year, that the institution did not exist in that year, or that the data were censored to protect patient confidentiality (when the denominator for a given indicator is 5 or less).

G The average rate (observed or risk-adjusted) for all the acute-care hospitals in the province.

A B C D

Gastrointestinal Hemorrhage Mortality: Risk-Adjusted Rate by Institution (percent)

Hospital	2001-2002	2002-2003	2003-2004	2004-2005	2005-2006	2006-2007	2007-2008	2008-2009
Arrow Lakes Hospital	—	—	0.00	—	0.00	—	—	—
Ashcroft & District General Hospital	—	—	—	—	—	—	—	—
B.C. Cancer Agency	—	—	—	—	—	—	—	—
B.C. Children's Hospital	—	—	—	—	—	—	—	—
B.C. Women's Hospital	—	—	—	—	—	—	—	—
Bella Coola General Hospital	—	—	0.00	—	—	—	—	—
Boundary Hospital	16.57	0.00	0.00	0.00	0.00	0.00	0.00	—
Bulkley Valley District Hospital	0.00	0.00	9.79	0.00	13.25	7.48	0.00	0.00
Burnaby Hospital								
Burnaby Mental Health Services Psychiatric In-patient Ur								
Burns Lake and District Hospital								
Campbell River and District General Hospital	0.00	3.77	5.75	8.44	2.64	19.07	6.80	10.60
Cariboo Memorial Hospital	0.00	2.35	4.11	4.38	4.01	0.00	7.46	0.00
Castlegar & District Community Health Centre	0.00	0.00	—	—	—	—	—	—
Chetwynd General Hospital	0.00	—	—	0.00	0.00	—	—	—
Chilliwack General Hospital	10.55	5.95	1.20	1.33	2.79	7.74	7.72	2.08
Cormorant Island Health Centre	—	0.00	—	—	—	—	—	0.00
Cowichan District Hospital	10.01	8.69	5.01	5.28	4.77	2.37	4.92	11.37
Creston Valley Hospital	0.00	29.16	0.00	0.00	27.72	0.00	0.00	9.30
Dawson Creek and District Hospital	13.74	12.22	7.22	0.00	0.00	0.00	0.00	22.86
	5.56	7.15		0.00	0.00	15.64	0.00	
	4.49				4.35	3.67	3.97	
Care Centre	3.69					10.40		
						5.06		
Saint Mary's Hos								
Shuswap Lake General Hospital			14.42					13.93
Slocan Community Health Centre		—	—	—				—
South Okanagan General Hospital	0.00	18.30	0.00	7.62	19.1		0.00	15.72
Sparwood Health Centre	—	—	—	—	—		—	—
Squamish General Hospital	0.00	0.00	0.00	0.00	12.18	0.00	0.00	0.00
St. Bartholomew's Health and Healing Centre	—	—	—	—	—	—	—	—
St. John Hospital	0.00	0.00	0.00	0.00	36.21	0.00	0.00	0.00
St. Joseph's General Hospital	2.27	5.30	3.95	4.25	3.56	13.79	9.47	7.04
St. Mary's Hospital	0.00	0.00	4.95	0.00	10.42	0.00	0.00	0.00
St. Paul's Hospital	7.13	4.07	2.24	5.13	4.25	6.69	1.61	3.95
St. Vincent's Hospital	15.37	—	—	—	—	—	—	—
Stewart General Hospital	—	—	—	—	—	—	—	—
Stuart Lake Hospital	0.00	—	—	—	0.00	0.00	—	—
Summerland Health Centre	0.00	—	—	—	—	—	—	—
Surrey Memorial Hospital	10.28	3.63	3.86	3.88	2.32	5.47	5.49	5.79
Tofino General Hospital	83.96	—	0.00	—	—	—	—	—
UBC Health Sciences Centre	4.77	1.29	34.34	3.63	0.00	2.28	0.00	—
Vancouver General Hospital	3.35	5.92	4.08	5.74	4.96	3.29	4.91	5.46
Vernon Jubilee Hospital	6.15	5.17	2.96	4.03	5.75	1.18	2.43	3.97
Victoria General Hospital	3.55	4.77	3.39	2.34	3.73	5.61	4.93	4.53
Victorian Community Health Centre of Kaslo	—	—	—	—	—	—	—	—
West Coast General Hospital	0.00	9.36	2.90	7.36	4.23	43.60	0.00	4.16
Wrinch Memorial Hospital	0.00	0.00	0.00	23.62	0.00	0.00	27.01	14.23
British Columbia	**5.60**	**5.11**	**4.41**	**4.48**	**4.51**	**5.89**	**5.29**	**5.54**

E

F

G

"—" indicates either no data were available for that fac year, that the institution did not exist in that year, or that the data were censored to protect patient confidentiality (when the denominator for a given indicator ≤ 5)