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Overview

The Fraser Institute's *Hospital Report Card: Alberta 2009* is constructed to help patients choose the best hospital for their inpatient care by providing them with information on the performance of acute-care hospitals in Alberta. All of the information in this report is available at our interactive website, <<http://www.hospitalreportcards.ca>>.

We 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 Alberta. This is accomplished by using state-of-the-art indicators developed by the US Agency for Healthcare Research and Quality (AHRQ) in conjunction with Stanford University that have been shown to reflect quality of care inside hospitals. These indicators are presently in use in more than a dozen US states, including several of the more populous ones, New York, Texas, Florida, and California.

We are using the Canadian Institute for Health Information's (CIHI) Discharge Abstract Database (DAD) as our primary information source. This information is derived from patient records provided to CIHI by all hospitals in Alberta. Demographic, administrative, and clinical data are extracted from the Discharge Abstract Database for inpatient hospital stays for all acute-care hospitals in Alberta. Since more specialized hospitals may treat more high-risk patients and some patients arrive at hospitals sicker than others, it is important to risk-adjust hospital death rates, adverse events rates, and utilization rates for patients with the same condition but a different health status. The international standard for risk adjustment, the the 3M™ APR™-DRG Classification System,¹ is employed to risk-adjust the data. 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.

None of Alberta's 102 acute-care hospitals are identified by name in this report. This contrasts with the Fraser Institute's recently released *Hospital Report Card: British Columbia 2009*, in which, resulting from a decision made by the Minister of Health, all of British Columbia's 95 hospitals were identified. By not allowing hospitals to be identified in the *Report*, Alberta Health Services has restricted the ability of patients in Alberta to assess the health care they receive.

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

What indicators are used?

The Fraser Institute's *Hospital Report Card: Alberta 2009* consists of 39 of AHRQ's 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). The indicators are shown for all acute-care hospitals in Alberta from 2002/03 to 2006/07, comprising more than 1.7 million patient records. We have also calculated the indicators for all municipalities in Alberta, based on patient residence postal codes. This constitutes the most comprehensive and detailed publicly available measure of acute-care hospital performance in Canada at the present time.

The indicators are expressed as observed rates (such as death due to hip replacement surgery) and risk-adjusted rates (the same rate adjusted for patient health status). Each institution was given a score from 0 to 100 for each indicator based on its risk-adjusted rate where available or on its observed rate, where 100 is the best. The institutions were then ranked based on their scores, where 1 is the best.² The indicators 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.

Hospital Mortality Index

The Hospital Mortality Index (HMI) shows the performance of a hospital (table 1, page 7) or municipality (table 2, page 9) across nine indicators that measure death rates:

- 1 deaths due to hip replacement surgery
- 2 deaths due to heart attacks
- 3 deaths due to heart failure
- 4 deaths due to acute strokes
- 5 deaths due to bleeding from the esophagus, stomach, small intestine or colon
- 6 deaths due to hip fractures
- 7 deaths due to pneumonia infection
- 8 deaths among patients that are considered unlikely to die in the hospital
- 9 deaths in patients that developed complications of care during hospitalization

The final score in the HMI for each hospital and municipality is an average of the scores of these indicators (100 is the best). All institutions and

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- 2 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.

municipalities were ranked based on their HMI score (1 is the top rank). It is important to note that the 39 indicators and the Hospital Mortality Index 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.

Limitations and caveats

Since this report is based on administrative data, the results have limitations related to coding variations and other factors. 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.

That said, the Discharge Abstract Database (DAD) is a major data source used to produce various of the reports published by the Canadian Institute for Health Information (CIHI), including annual reports on the performance of hospitals and the health care system. It is also a major data source for seven of the health indicators adopted by the federal, provincial, and territorial governments. These data have also been used extensively in previous reports on health care performance and form the basis for many journal articles. As is noted in the *Ontario Hospital Report*, which uses 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” (Ontario Hospital Association and the Government of Ontario, 2006: 6).

There are a number of publications that have addressed the data-quality issues that are discussed in our report. Of note are CIHI’s reabstraction studies that go back to the original patient charts and recode the information using a different set of expert coders.³ Overall, according to CIHI (2004), findings from their three-year DAD re-abstraction studies have confirmed the strengths of the database, while identifying limitations in certain areas resulting from inconsistencies in the coding of some data elements. 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.

3 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.

In addition to the aforementioned reabstraction studies, the OECD published a report that supports the AHRQ patient-safety indicator approach, 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 approach. The first advantage is the breadth of coverage offered by the indicators in studying in-hospital patient safety. The second is that the AHRQ patient safety indicators were developed to measure complications of hospital-based care among a group of patients for whom the complications seemed preventable or highly unlikely.

Observations

A report based on more than 1.7 million patient records, shown across 39 inpatient quality and patient safety indicators, for 102 hospitals and 47 municipalities, over five years, is not something that can be summarized in a few words. In fact, the primary purpose of this research is to provide patients with access to information on specific medical procedures and conditions, and to give Albertans a better understanding of the variation in hospital care across the entire system. It is for that reason that we have rates (including both observed and risk-adjusted rates as well as statistical upper and lower bounds for the risk-adjusted rates), scores, and ranks for each separate indicator. All documents are available at <http://www.hospitalreportcards.ca> and <http://www.fraserinstitute.org/reportcards/hospitalperformance/>.

However, we have created one summary measure of mortality, based on the most important and reliable data in this study, the Hospital Mortality Index (HMI). The nine component indicators of the HMI were arrived at by a process of elimination. Starting with our complete group of 39 indicators, we eliminated indicators that had no data for several years or for which there were relatively few hospitals with data. The resulting HMI has scores and rankings for 10 hospitals and 21 municipalities in the latest years since not all hospitals and municipalities had data for all nine indicators in 2005/06 or 2006/07.

Tables 1 (page 7) and 2 (page 9) show scores and rankings for the Hospital Mortality Index for the average score over the latest two years, 2005/06 and 2006/07. This is compared to the average score in the first three years of our study from 2002/03 to 2004/05. The change column shows any improvement or deterioration in score that took place between the two periods. Tables 1 and 2 include only hospitals or municipalities with data in at least one year in both periods.

Hospital Mortality Index: Hospitals

Top-Ranked Hospitals

- The top-ranked hospital for 2005/06 and 2006/07 in Alberta is Anonymous Hospital 67 with an average HMI score of 88.2 out of 100. It experienced the second largest improvement in its score from the previous period.
- Hospital 65 is the second-ranked hospital for 2005/06 and 2006/07 with a score of 86.4. Hospital 45 ranks third with an average score of 86.3.
- Hospital 45, Hospital 67, and Hospital 98 were the three hospitals with the largest improvements in their averaged score since the earlier period (with improvements ranging from 2.4 to 5.1 points).

Bottom-Ranked Hospitals

- Anonymous Hospital 30 is the lowest-ranked hospital with an average score of 74.2 for 2005/06 and 2006/07. It saw a 1.2-point improvement of its averaged score since the earlier period.
- Anonymous Hospital 17 is the second lowest-ranked hospital for 2005/06 and 2006/07, with an average score of 78.6 (down 1.3 points since the earlier period). Hospital 10 is ranked third lowest for 2005/06 and 2006/07, with an average score of 78.9 (down 0.5 points from the earlier period).
- Hospital 84 with an average score of 82.7 experienced the largest deterioration in its average score (down 4.5 points) from the earlier period.

Hospital Mortality Index: Municipalities⁴

Top-Ranked Municipalities

- The top-ranked municipality is Ponoka with an HMI score of 86.9 out of 100, averaged for 2005/06 and 2006/07. The second-ranked municipality, Fort Saskatchewan, scored 85.2 for 2005/06 and 2006/07, after ranking poorly in the earlier years.
- The third-ranked municipality is St. Albert, with a score of 84.5.
- There is little consistency in municipal scores over time. Only five municipalities among the top 10 in 2005/06 and 2006/07 were also among the top 10 from 2002/03 to 2004/05.

4 The Hospital Mortality Index (HMI) is calculated for municipalities using the residence of patients treated in Alberta's acute-care hospitals. Due to patient mobility, municipal scores cannot be reliably used to infer the performance of hospitals.

Table 1: Hospital Mortality Index—Hospitals

	2005/06 & 2006/07		2002/03– 2004/05		Change 2002/05–2005/07	
	Score	Rank	Score	Rank	Score	Rank
Hospital 67	88.2	1	83.1	5	5.1	2
Hospital 65	86.4	2	86.2	2	0.2	6
Hospital 45	86.3	3	81.2	7	5.1	1
Hospital 34	86.1	4	84.9	4	1.2	5
Hospital 98	84.0	5	81.6	6	2.4	3
Hospital 4	83.6	6	86.1	3	–2.5	9
Hospital 84	82.7	7	87.1	1	–4.5	10
Hospital 10	78.9	8	79.4	9	–0.5	7
Hospital 17	78.6	9	79.9	8	–1.3	8
Hospital 30	74.2	10	73.0	10	1.2	4

Note: Ranking includes only those hospitals for which a score could be calculated in both periods.

Note: Scores are calculated to exact values and are rounded for inclusion in the table.

Bottom-Ranked Municipalities

- The lowest-ranked municipality in Alberta is Camrose, with an average HMI score of 68.1 for the most recent period, which comes after a decline of 0.1 points from its score during the period from 2002/03 to 2004/05.
- Sylvan Lake is the second-lowest-ranked municipality with an average HMI score of 70.0 for the most recent period. Cochrane is the third lowest-ranked municipality, with an average HMI score of 78.7.
- Many of the bottom-ranked municipalities are consistently of lower rank over the two time periods, with the notable exceptions of Sylvan Lake, which fell from 5th to 20th with a decline of 12.9 points in its averaged HMI score, and Wetaskiwin, which fell from 2nd place to 14th with a 6.7-point decline in its averaged HMI score.
- Sylvan Lake, Wetaskiwin, High River, rural areas, Edmonton, Calgary, Airdrie, Camrose, and Sherwood Park all experienced declines in their HMI scores from the earlier period.

Five Largest Municipalities

- The five largest municipalities in Alberta by number of inpatient stays are: Calgary, ranked 12th on the Hospital Mortality Index for 2005/06 and 2006/07 with an average score of 81.3; Edmonton, ranked 15th with an average score of 78.9; Red Deer, ranked 16th with an average score of 78.8; Lethbridge, ranked 17th with an average score of 78.7; and Medicine Hat, ranked 7th with an average score of 83.9.

Table 2: Hospital Mortality Index—Municipalities

	2005/06 & 2006/07		2002/03– 2004/05		Change 2002/05–2005/07	
	Score	Rank	Score	Rank	Score	Rank
Ponoka	86.9	1	58.7	21	28.2	1
other*	86.5	2	83.5	4	3.0	10
Fort Saskatchewan	85.2	3	71.8	18	13.5	2
St Albert	84.5	4	81.9	8	2.7	11
Sherwood Park	84.1	5	84.1	3	–0.0	13
Spruce Grove	84.1	6	82.9	6	1.2	12
Medicine Hat	83.9	7	75.3	15	8.7	4
High River	83.7	8	89.3	1	–5.6	19
Grande Prairie	83.1	9	76.3	14	6.8	5
Stony Plain	83.0	10	77.3	13	5.6	6
Lacombe	81.8	11	78.1	11	3.6	9
Calgary	81.3	12	82.3	7	–1.0	16
Airdrie	80.3	13	81.2	9	–0.9	15
Wetaskiwin	80.1	14	86.8	2	–6.7	20
Edmonton	78.9	15	80.3	10	–1.4	17
Red Deer	78.8	16	74.1	17	4.7	7
Lethbridge	78.7	17	74.8	16	3.9	8
Cochrane	78.7	18	68.9	19	9.8	3
rural*	76.4	19	77.8	12	–1.4	18
Sylvan Lake	70.0	20	82.9	5	–12.9	21
Camrose	68.1	21	68.2	20	–0.1	14

* Municipal patient populations are constructed from the Forward Sortation Areas (FSAs) of patient postal codes. All FSAs containing a “0” as their second character were grouped into a “rural” category (as described by Canada Post). All FSAs not described by Canada Post were placed in the residual group, “other.” For more information, see Appendix H.

Note: Scores are calculated to exact values and are rounded for inclusion in the table.

Conclusion

The Fraser Institute’s *Hospital Report Card: Alberta 2009* provides a detailed and comprehensive measure of inpatient acute-care conditions in Alberta’s hospitals. This is the first edition of the report card for patients in Alberta. Three reports for Ontario are already available, two have been published for British Columbia, and future editions of the Fraser Institute’s *Hospital Report Card* will include performance measurement of acute-care hospitals in other provinces. We welcome comments on the content and format of this report via comments@hospitalreportcards.ca.

Introduction and background

The goal of the Fraser Institute's *Hospital Report Card: Alberta 2009* is to contribute to the improvement of inpatient care in Alberta by providing hospital-specific information about quality of service directly to patients and to the general public. This series was the first in Canada to empower patients to make informed choices about their health care delivery options by providing comparable, hospital-specific, performance measurements on a range of clearly identified indicators. The Fraser Institute's *Hospital Report Card: Alberta 2009* has been published to promote accountability within hospitals, thereby stimulating improved performance through an independent and objective measurement of performance.

In Canada, individuals have access to data identifying problem areas in an automobile from information willingly supplied by consumers, the vehicle's manufacturer, and industry experts. They can find which CD player is the best on the market for their needs. They can compare restaurants before heading out for an evening meal. Yet when it comes to health care, which many will consider more important for an individual's well being, consumers are left with remarkably little information about where the best services are available. They cannot even tell which hospitals offer the worst care or have the highest mortality rates (Esmail, 2003).

What are hospital report cards?

Hospital report cards provide a set of consistent performance measurements to rank the services in question and give consumers the information they need to make a more informed choice.¹ In some cases, these indicators may be subjective, based on the opinions of survey respondents. In other cases, the indicators will be objective measures of performance or outcomes.

Hospital report cards are used to measure specific 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 See Kessler, 2003 for a helpful delineation of the field.

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, the quality, or the 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 their quality of care and/or customer service. 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 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 favor of healthier patients (to skew results upward). This unintended effect can, however, be mitigated through the appropriate application of risk-adjustment in the measures. Outcomes report cards (including the Fraser Institute's *Hospital Report Cards*) provide the most empirically sound basis for analyzing the quality of care.

4 *Balanced scorecards*

The balanced scorecard was developed in the early 1990s by Robert Kaplan and David Norton to examine a business above and beyond the financial bottom line. Translated into the healthcare 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 [a] financial performance and conditions;

[b] patient/client satisfaction; [c] clinical utilization and outcomes; and, [d] 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 regarding hospital performance may be overlooked.

Why are hospital report cards published?

Hospital report cards are published to provide outcomes data that can both improve the quality of care in hospitals and inform patients' healthcare decision-making. Armed with more information based on a set of repeatable measurements about the relative performance of caregivers, both patients and physicians are able to make a more informed choice about which facility or provider to select for a given condition. This allows for a rational discussion of relative levels of quality and eliminates measurement based on anecdotal information, which can be misleading and ultimately harmful.

Where are hospital report cards published?

United States of America

The United States was one of the first nations to begin measuring, comparing, and publishing measurements of hospital performance. Hospital report card initiatives 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 every US hospital over two years alongside other measures of hospital performance (Sternberg and DeBarros, 2008). 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 healthcare 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://www.usnews.com>>
- 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>>

- Quality Check <<http://www.jointcommission.org/PerformanceMeasurement/PerformanceMeasurement/>>
- Cardiac Surgery in New Jersey <<http://www.state.nj.us/health/reportcards.htm>>
- 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/newyork>>
- 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/>>.

United Kingdom

The hospital reporting universe in the United Kingdom is a fraction of the US market's size. League tables² 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.

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

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

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 Sunday Times journalists, founded Dr. Foster to generate authoritative independent information about local health services on the web at <http://www.drfoosterintelligence.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.

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 2000, the Government of Ontario joined as a partner in the enterprise 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. The *Hospital Report Series* (see, e.g., Ontario Hospital Association and the Government of Ontario: 2006, 2007) appears in a "balanced scorecard" format and assesses the performance of hospitals in four quadrants including (as noted above): [a] financial performance and conditions; [b] patient/client satisfaction; [c] clinical utilization and outcomes; and [d] system integration and change. 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 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 17 years, the Fraser Institute has published *Waiting Your Turn: Hospital Waiting lists in Canada*, a report that provides Canada's only national, comparable, and comprehensive measurement of waiting times for medically necessary treatment (Esmail and Hazel with Walker, 2008). Another Fraser Institute initiative is *How Good is Canadian Health Care? An International Comparison of Health Care Systems* (Esmail and Walker, 2008), which compares Canada's health policies and health care performance with other nations that guarantee their citizens access to healthcare insurance.

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 Ontario hospitals for a fixed fee per facility (Hay Group, 2005).

Hospital Standardized Mortality Ratio (HSMR)

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: Alberta 2009* use data from CIHI's Discharge Abstract Database, there are several significant differences between the measure published by CIHI and those published by the Fraser Institute. These differences make comparisons between the two reports difficult and lead to the conclusion that CIHI and the *Hospital Report Card: Alberta 2009* 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 CIHI is the level of detail available. According to the CIHI's report, the *Hospital Standardized Mortality Ratio* (HSMR) is a "big dot summary" measure (CIHI, 2007: 4), or a measure that "tracks progress on broad outcomes at a system level" (2007: vii). 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 3).

Table 3: Diagnosis groups used in the CIHI's Hospital Standardized Mortality Ratio (HSMR)

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

Source: CIHI, 2008.

By comparison, the measures published in the *Hospital Report Card: Alberta 2009* 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 are examined in the Fraser Institute's report. The composite measure published in the *Hospital Report Card: Alberta 2009*, the Hospital Mortality Index (HMI), is also a more specific measure of mortality in acute-care hospitals than the CIHI's composite measure and includes only the nine measures shown in table 4.

Table 4: Inpatient Quality and Patient Safety Indicators used in the Hospital Mortality Index

-
- Hip replacement mortality (IQI 14)
 - Acute myocardial infarction mortality (IQI 15)
 - Congestive heart failure mortality (IQI 16)
 - Acute stroke mortality (IQI 17)
 - Gastrointestinal hemorrhage mortality (IQI 18)
 - Hip fracture mortality (IQI 19)
 - Pneumonia mortality (IQI 20)
 - Death in low mortality Diagnosis Related Groups (PSI 2)
 - Failure to rescue rates (PSI 4)
-

Further, the *Hospital Standardized Mortality Ratio* (HSMR) 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.

These significant differences in the approaches used by CIHI and the *Hospital Report Card: Alberta 2009* 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

³ The number of deaths is computed for the 65 diagnosis groups listed above, accounting for 80% of inpatient mortality.

differences in what is being measured in the HSMR and the various indicators of the *Hospital Report Card: Alberta 2009* or the HMI composite measure. In addition to these significant differences in approach is a difference in risk-adjustment methodologies: the indicators in the *Hospital Report Card: Alberta 2009* are risk-adjusted using the publicly available 3M™/AHRQ methodology/software and are not risk-adjusted in the manner developed and employed by CIHI for the HSMR.

However, while the two sets of measures cannot be directly compared, it is nevertheless true that the HSMR provides a measure of hospital mortality that can be used in conjunction with the HMI and the other measures produced in the *Hospital Report Card: Alberta 2009*.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.

What are the measurable impacts of patient safety and 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 experienced in Pennsylvania and New Jersey following the publication of their report cards.⁶

4 Note that the regional results published by CIHI are based on where patients were treated, while municipal measures published in the *Hospital Report Card: Alberta 2009* are based on where patients lived.

5 It is worth noting that 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.

These findings have also 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 complex and 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).

Though subject to a number of caveats regarding their design and structure, report cards 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 primary focus of this project is the construction of a patient-friendly report card on hospital and patient care that is focused on clinical outcomes. This report includes information about all acute-care facilities treating patients in Alberta. The report is built on a recognized methodology for constructing hospital report cards from the Agency for Healthcare Research & Quality (AHRQ), an agency of the US federal government’s Department of Health and Human Services.

1 What are the AHRQ Inpatient Quality and Patient Safety Indicators?

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

7 “Up-coding” is a term used to describe when financial incentives cause a physician or hospital to exaggerate or falsely represent patients’ medical conditions and services provided in order to increase payment received from the government.

examples of accepted and proven methodologies that were not otherwise proprietary information and thus could be employed by the Fraser Institute⁸ 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 Agency for Healthcare Research & Quality (AHRQ). AHRQ's indicator modules were chosen because they represent a comprehensive set of indicators 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.⁹ Although they could not be used to provide definitive measures of the quality of health care directly, they are used to provide indicators of healthcare quality. They serve as the basis for subsequent in-depth investigation of issues of quality and patient safety at the facility level.

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.

8 For an example of how some report-card methodologies are proprietary, please refer to the Healthgrades user agreement at <http://www.healthgrades.com/aboutus/index.cfm?fuseaction=modnw&modtype=content&modact=UserAgreement>.

9 Further information about HCUP Quality Indicators can be found at http://www.qualityindicators.ahrq.gov/hcup_archive.htm.

AHRQ indicators are organized in four modules¹⁰

- 1 *Prevention Quality Indicators (PQIs)* Consisting of ambulatory care-sensitive conditions, these indicators pertain to hospital admissions that could have been prevented via 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 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.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

10 The Fraser Institute's *Hospital Report Card: Alberta 2009* is composed of 39 indicators from the inpatient quality and patient safety modules of the AHRQ system (see Appendix E for a list of all indicators used in this report).

11 PQIs identify the quality of care for ambulatory care-sensitive conditions and are measures of the overall health care system. Since the *Hospital Report Card* was designed to analyze the care inside acute-care hospitals, PQIs were omitted from this report.

12 An iatrogenic event is one that is inadvertently caused by a physician, a medical/surgical treatment, or a diagnostic procedure.

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/pdi_download.htm>.

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).

counterpart is the Canadian Institute for Health Information's Discharge Abstract Database (DAD), which contains demographic, personal, administrative, and clinical data for hospital discharges (inpatient acute, chronic, rehabilitation) and day surgeries.

The indicators in the Fraser Institute's *Hospital Report Card: Alberta 2009* analyze more than 1.7 million patient records extracted from the DAD for the years 2002/03 to 2006/07. 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 The AHRQ QIs were designed to be used in conjunction with 3M™ All Patient Refined™ Diagnosis Related Groups (APR™-DRG) software, which risk adjusts the QIs 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.

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 often is required while reviewing the results from this report.

When reviewing mortality or other indicators of quality and patient safety, remember that medicine is not an exact science and death 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.

2 Data Quality

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 and for seven of the 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., Ontario Hospital Association and the Government of Ontario, 2007; Aubrey-Bassler et al., 2007).

15 For further details, please refer to Appendix B and http://www.3m.com/us/healthcare/his/products/coding/refined_drg.jhtml.

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” (Ontario Hospital Association and the Government of Ontario, 2006: 6). However, in order to produce good information about data quality, CIHI established a comprehensive and systematic data-quality program, whose framework involves 24 characteristics relating to the five data-quality dimensions of accuracy, timeliness, relevance, comparability, and usability (CIHI, 2005).

There are a number of publications that have addressed data-quality issues, which are discussed in our report. Of note are CIHI’s reabstraction studies (2002, 2004b) that go back to the original patient charts and recode the information using a different set of expert coders.¹⁶ The 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.

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

¹⁶ 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.

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: AMI (8.9%), hip fracture (6.0%), hospitalization due to pneumonia and influenza (6.9%), and injury hospitalization (5.3%) (CIHI, 2002).

Discrepancy rates were noted in conditions that are diagnosis driven: acute myocardial infarction (AMI) (CIHI, 2002: 8), stroke, pneumonia, and COPD (CIHI, 2004b) (as described above). Only the pneumonia codes are potentially affected in our report.

Overall, according to 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.

In addition to the aforementioned reabstraction studies, the OECD 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 first advantage is the breadth of coverage offered by the indicators in studying in-hospital patient safety. The second is that the AHRQ patient-safety indicators were developed to measure complications of hospital-based care among a group of patients for whom the complications seemed preventable or highly unlikely.

3 Participation and identification of hospitals

Participation in the report-card project was not mandatory for hospitals in Alberta. In the end, Alberta Health Services did not agree to have institutions identified. All of Alberta’s hospitals are identified in the report using a randomly assigned hospital number.

Overview of methodology used

All hospital data used in the Fraser Institute's *Hospital Report Card: Alberta 2009* 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. Only inpatient acute records were used in this report (see Appendix A for details on which DAD data fields were used).

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. Alberta Health Services did not grant the Fraser Institute authorization to identify institution-specific discharge data in the DAD for the years from 2002/03 to 2006/07. All hospitals in this report are identified using randomly assigned hospital numbers.

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. 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).¹

Since more 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

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

performance grading that the hospital would have received if it had provided services to patients with the average mix of medical complications.²

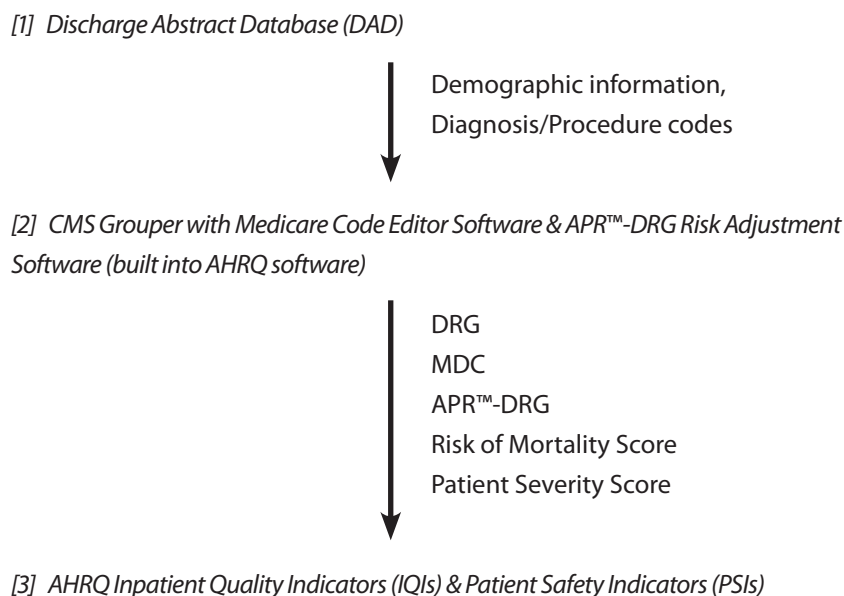
The final step in our methodology was to produce separate indicators for hospital performance based on the methodology developed by the Agency for Healthcare Research and Quality's (AHRQ) Evidence-Based Practice Center (EPC) at the University of California San Francisco-Stanford.³ AHRQ's indicator modules use readily available discharge data and were chosen because they have been demonstrated to be a concise and effective tool by which to inform patients' decision-making about their health care. They are currently used to measure hospital performance in more than 12 US states including New York, Texas, Colorado, California, Florida, Kentucky, Maryland, Massachusetts, Minnesota, New Jersey, Oregon, Utah, Vermont and parts of Wisconsin.

Figure 1 shows a graphical representation of the methodology. The Fraser Institute's *Hospital Report Card: Alberta 2009* comprises 39 indicators of the quality of inpatient care and patient safety (for a list of all indicators used in the report, see Appendix E). Inpatient Quality Indicators (IQIs) reflect the quality of care inside hospitals and include mortality rates, the utilization 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). 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 scores (see Appendix F for details on calculating scores and ranks).⁴

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- 2 For information about 3M's standard for risk adjustment, see <http://www.3m.com/us/healthcare/his/products/coding/refined_drg.jhtml>. See Appendix B for details of its use in this report.
 - 3 The AHRQ Quality Indicators were developed in response to the need for both multi-dimensional 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/>>.
 - 4 Ranks are not used for comparisons of hospitals across indicators as they are based on a varying number of hospitals. It is advisable to rely on the scores (as in the HMI) 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 HMI also has a fairly large number of hospitals so any bias is insignificant.

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



A Hospital Mortality Index (HMI) was constructed to examine the performance of a hospital or municipality across mortality indicators. It consists of nine mortality indicators: *hip replacement mortality* (IQI 14), *acute myocardial infarction mortality* (IQI 15), *congestive heart failure mortality* (IQI 16), *acute stroke mortality* (IQI 17), *gastrointestinal hemorrhage mortality* (IQI 18), *hip fracture mortality* (IQI 19), *pneumonia mortality* (IQI 20), *death in low mortality DRGs* (PSI 2) and *failure to rescue rates* (PSI 4). The final HMI index score is based on an equal-weight construct of the scores for the separate indicators. For an indicator to be included in the HMI, hospitals representing at least 75% of the patient sample for that year had to have measured data in order to ensure an adequate number of hospitals for comparison. For example, in 2006/07 an indicator had to contain at least 263,162 records in order to be included in the HMI.⁵ All institutions were ranked based on their HMI score, where the highest rank (1) corresponds to the highest score out of 100 (for details on calculating scores, ranks, the HMI, and rank of the HMI, please see Appendix F).

It is important to note that the 39 indicators and the Hospital Mortality Index 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 The total number of patient records in 2006/07 was 350,883.

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 omitted from publication if the patient population in any given indicator was less than, or equal to, five in any institution and/or municipality.

Legend for sample table

Use the sample table (page 31) and the explanations below to help you understand how each indicator is displayed in the data tables of the *Hospital Report Card*.

- 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 (which is a raw measure);
 - 2 a risk-adjusted rate including upper and lower 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, HMI, and rank of the HMI);
 - 4 a rank.

Two additional measures were calculated to examine the performance of a hospital or municipality across mortality indicators: a Hospital Mortality Index (HMI) and a Rank of the Hospital Mortality Index.

- 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 percent. 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 CIHI for the period from Fiscal 2002 (April 1, 2002 to March 31, 2003) to Fiscal 2006 (April 1, 2006 to March 31, 2007).
- 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.

Gastrointestinal Hemorrhage Mortality: Risk-Adjusted Rate by Institution (percent)					
Hospital	2002-2003	2003-2004	2004-2005	2005-2006	2006-2007
Hospital 1	—	—	—	—	—
Hospital 2	0.00	—	—	—	—
Hospital 3	—	11.09	0.00	0.00	0.00
Hospital 4	3.97	3.45	4.26	4.98	5.15
Hospital 5	0.00	3.07	4.00	3.01	8.87
Hospital 6	0.00	0.00	0.00	0.00	0.00
Hospital 7	4.46	4.93	0.00	0.00	0.00
Hospital 8	—	—	—	—	—
Hospital 9	—	—	—	—	—
Hospital 10	0.85	0.74	2.28	2.46	5.17
Hospital 11	0.00	0.00	0.00	0.00	52.75
Hospital 12	9.25	3.21	0.00	2.08	10.76
Hospital 13	—	—	—	—	—
Hospital 14	0.00	0.00	14.46	0.00	—
Hospital 15	0.00	—	0.00	—	—
Hospital 16	—	—	—	0.00	—
Hospital 17	—	—	1.92	4.80	—
Hospital 18	—	—	100.00	0.00	—
Hospital 19	—	—	—	—	—
Hospital 20	—	—	—	—	—
Hospital 21	—	—	—	—	—
Hospital 22	—	—	—	—	—
Hospital 23	—	—	—	—	—
Hospital 24	—	—	—	—	—
Hospital 25	—	—	—	—	—
Hospital 26	—	—	—	—	—
Hospital 27	—	—	—	—	—
Hospital 28	—	—	—	—	—
Hospital 29	—	—	—	—	—
Hospital 30	—	—	—	—	—
Hospital 31	—	—	—	—	—
Hospital 32	—	—	—	—	—
Hospital 33	—	—	—	—	—
Hospital 34	—	—	—	—	—
Hospital 35	—	—	—	—	—
Hospital 36	—	—	—	—	—
Hospital 37	—	—	—	—	—
Hospital 38	—	—	—	—	—
Hospital 39	—	—	—	—	—
Hospital 40	—	—	—	—	—
Hospital 41	—	—	—	—	—
Hospital 42	—	—	—	—	—
Hospital 43	—	—	—	—	—
Hospital 44	—	—	—	—	—
Hospital 45	—	—	—	—	—
Hospital 46	—	—	—	—	—
Hospital 47	—	—	—	—	—
Hospital 48	—	—	—	—	—
Hospital 49	—	—	—	—	—
Hospital 50	—	—	—	—	—
Hospital 51	—	—	—	—	—
Hospital 52	—	—	—	—	—
Hospital 53	—	—	—	—	—
Hospital 54	—	—	—	—	—
Hospital 55	—	—	—	—	—
Hospital 56	—	—	—	—	—
Hospital 57	—	—	—	—	—
Hospital 58	—	—	—	—	—
Hospital 59	—	—	—	—	—
Hospital 60	—	—	—	—	—
Hospital 61	—	—	—	—	—
Hospital 62	—	—	—	—	—
Hospital 63	—	—	—	—	—
Hospital 64	—	—	—	—	—
Hospital 65	—	—	—	—	—
Hospital 66	—	—	—	—	—
Hospital 67	—	—	—	—	—
Hospital 68	—	—	—	—	—
Hospital 69	—	—	—	—	—
Hospital 70	—	—	—	—	—
Hospital 71	—	—	—	—	—
Hospital 72	—	—	—	—	—
Hospital 73	—	—	—	—	—
Hospital 74	—	—	—	—	—
Hospital 75	—	—	—	—	—
Hospital 76	—	—	—	—	—
Hospital 77	—	—	—	—	—
Hospital 78	—	—	—	—	—
Hospital 79	—	—	—	—	—
Hospital 80	22.21	—	—	—	—
Hospital 81	6.22	—	—	—	—
Hospital 82	—	—	—	—	—
Hospital 83	0.00	10.39	0.00	0.00	0.00
Hospital 84	5.40	4.12	2.33	3.25	4.68
Hospital 85	—	—	—	—	—
Hospital 86	—	—	—	—	—
Hospital 87	0.00	3.92	0.00	28.18	5.90
Hospital 88	0.00	0.00	0.00	0.00	—
Hospital 89	0.00	46.92	0.00	13.74	0.00
Hospital 90	13.86	0.00	0.00	0.00	—
Hospital 91	—	—	—	9.36	—
Hospital 92	0.00	0.00	—	0.00	—
Hospital 93	0.00	0.00	0.00	0.00	0.00
Hospital 94	—	0.00	0.00	0.00	—
Hospital 95	0.00	16.58	16.18	0.00	0.00
Hospital 96	0.00	0.00	0.00	0.00	19.49
Hospital 97	66.50	0.00	—	—	—
Hospital 98	4.63	6.14	2.56	1.40	3.06
Hospital 99	0.00	0.00	13.73	0.00	0.00
Hospital 100	0.00	0.00	0.00	23.63	44.67
Hospital 101	0.00	0.00	0.00	0.00	—
Hospital 102	0.00	—	0.00	0.00	—
Alberta	4.32	3.64	3.54	4.05	5.47

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