

The Fraser Institute

Hospital Report Card

British Columbia 2008



by Nadeem Esmail and Maureen Hazel

1 Overview and Observations



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The Fraser Institute

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The authors, of course, take full and complete responsibility for any remaining errors or omissions. As they have worked independently, the views expressed in this study are their own and do not necessarily reflect those of the trustees, supporters, or other staff of The Fraser Institute.

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Overview and Observations

Overview

The Fraser Institute's *Hospital Report Card: British Columbia 2008* 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 British Columbia. All of the information in this report, which is laid out in 12 documents, is available at <www.fraserinstitute.org>.

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 British Columbia.

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 British Columbia. Demographic, administrative, and clinical data are extracted from the Discharge Abstract Database for inpatient hospital stays from all acute care hospitals in British Columbia.

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, 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 British Columbia's 95 acute-care hospitals granted us authorization to identify them by name in this report. This contrasts with the Fraser Institute's forthcoming *Hospital Report Card: Ontario 2008*, for which 29 hospitals agreed to be identified. The non-participation of British Columbia's hospitals is a setback to the empowerment of patients in British Columbia regarding the health care they receive and for the ongoing commitment of hospitals to quality improvement through accountability and transparency.

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

The Fraser Institute's *Hospital Report Card: British Columbia 2008* consists of 39 of AHRQ's indicators of 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 British Columbia from 2001 to 2006, comprising almost two million patient records. We have also calculated the indicators for all municipalities in British Columbia, based on patient location. This constitutes the most comprehensive and detailed publicly available measure of acute-care hospital performance and accountability 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 100 is the best. The institutions were then ranked based on their scores, where 1 is the best.

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.

A Hospital Mortality Index (HMI) has been constructed to examine the overall performance of a hospital or municipality across indicators that measure death rates. It consists of nine indicators including:

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

The final HMI is an average of the scores of these indicators, where 100 is the best. All institutions and municipalities were ranked based on their HMI score, where 1 is the best. 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 assessing the overall performance of any given hospital.

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 to choose a hospital based solely on statistics and descriptions such as those given in this report.

That said, 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. These data have been used extensively in previous reports on health care performance, and form the basis for many journal articles.

As the *Ontario Hospital Report*, [2] which uses the same DAD data set underlying this report card, notes, “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” (p. 6).

There are a number of publications that have addressed 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, [4] 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. 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 [5] 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” (p. 11). Further, a recently released report by the Manitoba Center for Health Policy that used the AHRQ Patient Safety Indicators [6] 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 just under two million patient records, shown across 39 quality and safety indicators for 95 hospitals and 50 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 understand the variation of hospital care across the entire system. It is for that reason that we have rates, scores, and ranks for each separate indicator. All documents are available at <www.fraserinstitute.org>.

However, we have created one summary measure of mortality, based on the most important and reliable data in this study, the Hospital Mortality Index. 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 relatively few hospitals with data. The resulting HMI has scores and rankings for 25 hospitals and 42 municipalities in the latest year.

[2] A joint initiative of the Ontario Hospital Association and the Government of Ontario. Hospital Report 2006: Acute care. Report available at <<[http://www.oha.com/client/OHA/OHA_LP4W_LND_WebStation.nsf/resources/Hospital+Reports/\\$file/acute_report_2006.pdf](http://www.oha.com/client/OHA/OHA_LP4W_LND_WebStation.nsf/resources/Hospital+Reports/$file/acute_report_2006.pdf)>>.

[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.

[4] Data Quality of the Discharge Abstract Database Following the First-year Implementation of ICD-10-CA/CCI. CIHI, 2004.

[5] Selecting Indicators for Patient Safety at the Health Systems Level in OECD Countries. John Millar, Soeren Mattke and the Members of the OECD Patient Safety Panel. Report available at: <http://www.oecd.org/dataoecd/53/26/33878001.pdf>

[6] Bruce, S., et al., *Application of Patient Safety Indicators in Manitoba: A First Look*. Winnipeg, Manitoba Centre for Health Policy, June 2006.

Tables 1 (page 6) and 2 (page 8) show scores and rankings for the Hospital Mortality Index for the average score over the latest two years, 2004/05 and 2005/06. This is compared to the average score in the first three years of our survey from 2001/02 to 2003/04. The change column shows the improvement or deterioration in score between the two periods. Only scores and rankings for hospitals with data for all years are presented.

Hospital Mortality Index: Hospitals

Top-Ranked Hospitals

- The top hospital in British Columbia is Anonymous Hospital 11 with a high HMI score of 83.5 out of 100 in the latest years. It has performed consistently and was the top-ranked hospital in the previous period also.
- Anonymous Hospital 26 is the second ranked hospital. It held a similar position in the early 2000s, where it ranked fourth with a score of 83.1 as compared to 82.7 in the more recent period.
- Among the hospitals ranked in the top ten in 2004/05 and 2005/06, half saw an improvement in their scores and half saw a deterioration. All but one hospital in the top 10 for 2004/05 and 2005/06 were also in the top 15 for the period from 2001/02 to 2003/04.
- Anonymous Hospital 66, ranked seventh, has had the largest improvement in its HMI score of any hospital (up 5.6 points) since the early 2000s.

Bottom-Ranked Hospitals

- Anonymous Hospital 28 is the lowest-ranked hospital with a score of 68.8. It also saw a deterioration of its score over time and was ranked second to last from 2001/02 to 2003/04.
- Anonymous Hospital 52 is the second lowest-ranked hospital, with a score of 72.5, but saw an improvement in its score (up 2.1 points) from 2001/02 to 2003/04. Anonymous Hospital 41 is third lowest, with a score of 72.8 and a drop of almost 5 points from the earlier period.
- The hospital with the sharpest decline is anonymous Hospital 5 with a 7.2 point fall and drop from eighth position in the period from 2001/02 to 2003/04 to 21st in the period from 2004/05 to 2005/06.

Consistency

- There is a high level of consistency in the performance of both top-ranked and bottom-ranked hospitals.
- Five of the top ten hospitals, Anonymous Hospitals 11, 12, 26, 93 and 42, have sustained top-ten performances over the entire time period.
- All of the bottom ten hospitals ranked among the bottom ten in 2001/02–2003/04 except for Anonymous Hospitals 5, 13, and 8.

Table 1: Hospital Mortality Index—Hospitals

	2004/05–2005/06		2001/02–2003/04		Change	
	Score	Rank	Score	Rank	Score	Rank
Hospital 11	83.5	1	85.0	1	-1.5	14
Hospital 26	82.7	2	83.1	4	-0.4	11
Hospital 25	82.6	3	80.6	12	2.0	6
Hospital 24	82.3	4	80.7	11	1.6	8
Hospital 89	81.7	5	80.3	13	1.4	9
Hospital 22	81.5	6	79.8	14	1.7	7
Hospital 66	81.5	7	75.9	20	5.6	1
Hospital 42	81.2	8	82.7	6	-1.4	13
Hospital 12	81.1	9	83.6	3	-2.5	19
Hospital 93	80.5	10	82.9	5	-2.3	17
Hospital 67	80.4	11	78.3	16	2.1	5
Hospital 14	80.0	12	75.0	22	5.0	2
Hospital 17	79.6	13	82.0	9	-2.4	18
Hospital 39	78.6	14	83.7	2	-5.1	23
Hospital 13	77.7	15	82.4	7	-4.7	21
Hospital 38	77.0	16	78.0	17	-1.0	12
Hospital 19	76.5	17	75.9	21	0.6	10
Hospital 8	76.3	18	81.6	10	-5.3	24
Hospital 59	75.7	19	72.5	23	3.2	3
Hospital 15	75.0	20	78.8	15	-3.7	20
Hospital 5	74.9	21	82.1	8	-7.2	25
Hospital 53	74.2	22	76.3	19	-2.1	16
Hospital 41	72.8	23	77.7	18	-4.9	22
Hospital 52	72.5	24	70.4	25	2.1	4
Hospital 28	68.8	25	70.6	24	-1.8	15

Hospital Mortality Index: Municipalities

Top-Ranked Municipalities

- The top municipality is Nelson with a high HMI score of 78.6 out of 100. However, this municipality and second-ranked Port Moody had inadequate data to show a score in fiscal years 2001 to 2003.
- The third-ranked municipality is Penticton, which also ranked among the top 10 in the earlier years.
- Municipalities are less consistent over time than hospitals. Only three municipalities among the top 10 in 2004/05 were also among the top 10 in 2001/03. On the other hand, half of the bottom ten municipalities in 2004/05–2005/06 were also in the bottom 10 in the earlier years.

Note: The Hospital Mortality Index (HMI) is calculated for municipalities using the residence of patients treated in British Columbia's acute-care hospitals.

- Municipalities with larger populations that had high rankings are: Victoria, ranked 11th; Vancouver, ranked 12th; Surrey, ranked 13th; Kelowna, ranked 14th; and Delta, ranked 15th. It is notable that none of British Columbia's largest municipalities are ranked among the top 10.

Bottom-Ranked Municipalities

- The lowest-ranked municipality in British Columbia is Salmon Arm, with a low HMI score of 57.1 for the most recent period, which comes after a sizable decline of 10.2 points from its score during the period from 2001/02 to 2003/04.
- Most of the bottom-ranked municipalities are consistently of low rank over the two time periods, except for Burnaby, which fell from 8th to 31st with a 13.9 point decline in its HMI score, and Central Saanich, which fell from 1st place to 29th with a 17.4 point decline in its HMI score.
- Abbotsford, ranked 36th, is the lowest-ranked, larger-population municipality in British Columbia.

Five Largest Municipalities

- The five largest municipalities in British Columbia by number of inpatient stays are: Vancouver, ranked 12th on the Hospital Mortality Index with a score of 71.8; Surrey, ranked 13th with a score of 71.7; Victoria, ranked 11th with a score of 72.0; Kelowna, ranked 14th with a score of 71.3 and Abbotsford, ranked 36th with a score of 59.4.

Conclusion

The Fraser Institute's *Hospital Report Card: British Columbia 2008* provides a comprehensive measure of inpatient acute-care conditions in British Columbia's hospitals. This is the first edition of an annual report card for patients in British Columbia. A report for Ontario is already available 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>.

Table 2: Hospital Mortality Index—Municipalities

	2004/05 & 2005/06		2001/02 - 2003/04		Change	
	Score	Rank	Score	Rank	Score	Rank
Nelson	78.6	1				
Port Moody	77.5	2				
Penticton	76.7	3	76.6	6	0.0	6
Trail	75.6	4	75.9	7	-0.3	8
Parksville	74.8	5	73.9	14	1.0	4
Sidney	74.3	6	73.8	16	0.5	5
Other	73.6	7	74.0	12	-0.4	9
Rural	73.4	8	73.4	18	0.0	7
Langley	73.3	9	69.5	26	3.9	1
Campbell River	72.8	10	75.1	9	-2.3	17
Victoria	72.0	11	73.1	19	-1.1	12
Vancouver	71.8	12	74.8	10	-3.0	19
Surrey	71.7	13	68.3	27	3.4	2
Kelowna	71.3	14	73.8	15	-2.5	18
Delta	71.1	15	76.8	5	-5.7	22
Qualicum	69.5	16	67.1	31	2.4	3
Coquitlam	69.0	17	78.2	2	-9.1	28
Vernon	69.0	18	78.1	3	-9.1	29
Nanaimo	68.8	19	69.6	25	-0.8	11
New Westminster	68.3	20	70.5	22	-2.3	16
Prince George	67.7	21	77.1	4	-9.4	30
Kamloops	67.0	22	74.4	11	-7.4	23
Port Coquitlam	66.5	23	73.9	13	-7.4	24
Cranbrook	66.5	24	68.2	28	-1.7	14
Port Alberni	66.4	25	67.0	32	-0.5	10
Duncan	66.0	26	70.3	24	-4.3	20
Mission	65.1	27				
Chilliwack	64.5	28	73.1	20	-8.5	26
Central Saanich	64.1	29	81.5	1	-17.4	34
Richmond	63.6	30	72.5	21	-8.9	27
Burnaby	61.5	31	75.3	8	-13.9	33
Courtenay	60.9	32	62.3	34	-1.4	13
Salt Spring	60.5	33				
Dawson	60.3	34	65.3	33	-5.1	21
White Rock	59.7	35	67.6	29	-7.9	25
Abbotsford	59.4	36	70.4	23	-11.0	32
Maple Ridge	58.8	37	60.9	35	-2.1	15
Salmon Arm	57.1	38	67.3	30	-10.2	31
Powell River			73.5	17		

Introduction and background

The goal of the Fraser Institute's *Hospital Report Card: British Columbia 2008* is 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. 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 clearly identified indicators. The Fraser Institute's *Hospital Report Card: British Columbia 2008* has been published to promote accountability within hospitals, thereby stimulating improved performance through an independent and objective measurement of performance.

Introduction

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? [1]

Hospital report cards provide a set of consistent performance measurements to rank the products in question and help inform consumer choice. In some cases, these indicators may be subjective, or 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 friendliness; or to measure the likelihood of a positive outcome provided by health facilities in a specific jurisdiction.

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 (Leapfrog Group, 2005). [2] The primary strength of a Process Report Card is that it can be developed from existing medical

[1] Daniel P. Kessler, Stanford University, Hoover Institution, and the National Bureau of Economic Research. provide a helpful delineation of the field in a PowerPoint® slideshow entitled "Health Care Quality Report Cards."

[2] Further information available at <<http://www.leapfroggroup.org/>>.

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 These types of report cards are 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 Pacific Business Group on Health's (PBGH) *Healthscope* reports. 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 (Pennsylvania Health Care Cost Containment Council, 2006). [3] 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 healthy 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 Card*) provide the most empirically sound basis for analyzing the quality of care.

[3] Further information available at <http://www.phc4.org/reports/cabg/>.

4 Balanced Scorecards The balanced scorecard was developed in the early 1990s by Drs. 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?

The publication of hospital report cards is based on the concept that publishing outcomes data 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 of service provision and eliminates measurement based on anecdotal information, which can be misleading and ultimately harmful.

Where Are Hospital Report Cards Published?

The 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 provider quality have refined the reporting of information.

In 1987, the first US hospital report cards were published by the Health Care Financing Administration (HCFA). These reports detailed annual mortality rates that were measured from the records of hospitalized Medicare patients. However, due to extensive criticism regarding 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, *New York Newsday* was able to publish the information on physician 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). [4]

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 of authors that ranged from the news media, coalitions of large employers, consumer advocacy organizations, and state governments (Marshall et al., 2003). Many different development paths have been taken so that there is currently no "standardized" hospital report card or agreement on the indicators to measure.

[4] Links to the entire series of reports can be found at <http://www.health.state.ny.us/nysdoh/heart/heart_disease.htm>.

Furthermore, these different 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.” [5] 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.

[5] Document available at <www.medscope.com/viewarticle/452953_3>.

Examples of American Private and Public Information Providers

- [1] America’s Best Hospitals—USNEWS & World Report <<http://www.usnews.com>>.
- [2] Healthgrades <<http://www.healthgrades.com>>
- [3] Leapfrog Group <<http://www.leapfroggroup.org>>
- [4] National Committee for Quality Assurance (NCQA) <<http://www.ncqa.org>>
- [5] National Quality Forum <<http://www.qualityforum.org>>
- [6] Quality Check <<http://www.jointcommission.org/PerformanceMeasurement/PerformanceMeasurement/>>
- [7] Cardiac Surgery in New Jersey <<http://www.state.nj.us/health/reportcards.htm>>
- [8] Cardiac Surgery Reports <<http://www.health.state.ny.us/nysdoh/healthinfo/index.htm>>
- [9] Pennsylvania Hospital Performance Reports <<http://www.phc4.org>>
- [10] Indicators of Inpatient Care in New York Hospitals <<http://www.myhealthfinder.com/newyork>>
- [11] Indicators of Inpatient Care in Texas Hospitals <<http://www.thcic.state.tx.us>>
- [12] Maryland Hospital Performance Evaluation Guide <<http://www.hospitalguide.mhcc.metro-data.com>>
- [13] Pacific Business Group on Health (PBGH) <<http://www.healthscope.org>>.

The United Kingdom

The hospital reporting universe in the United Kingdom is a fraction of the US market’s size. League tables [6] 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 Labour 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), [7] which focused on waiting times as opposed to clinical quality.

[6] A league table ranks the performance of a range of institutions.

[7] Further information can be found at <<http://www.pfc.org.uk/medical/pchrt-e1.htm#foreword>>.

In 1998, the National Health Service (NHS, Britain's tax-funded and universal medical insurance program) 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 Plan 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 *Sunday Times* journalists, founded Dr. Foster to generate authoritative independent information about local health services on the web at <<http://www.drfooster.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 hospital prices for services.

Canada

Hospital reporting initiatives, like those in both the United States and the United Kingdom, have emerged in Canada 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 appears in a "balanced scorecard" format and assesses the performance of hospitals in four quadrants including: [a] financial performance and conditions; [b] patient/client satisfaction; [c] clinical utilization and outcomes; and [d] system integration and change.

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* (ICES, 2004) [8] and *The State of Hospital Care in the GTA/905* (GTA/905 Healthcare Alliance, 2005). [9] Additionally, two publications that have reported on patient safety and adverse events are *The Ottawa Hospital Patient Safety Study* (Forster et al., 2004) [10] and *The Canadian Adverse Events Study* (Baker et al., 2004), though neither reported institution-specific measures. [11] 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 Walker with Bank, 2007). [12] Another Fraser Institute initiative is *How Good is Canadian Health Care? An International Comparison of Health Care Systems* (Esmail and Walker, 2007) [13], which compares Canada's health policies and healthcare performance with other nations that guarantee their citizens access to healthcare insurance.

Other avenues of hospital performance reporting and monitoring in Canada have largely been in the form of private hospital assessments of performance by a contracted third party using a proprietary performance indicator 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).

Canadian Institute for Health Information's Hospital Standardized Mortality Ratio (HSMR)

The Canadian Institute for Health Information (CIHI) published its own measure of hospital and regional performances, the *Hospital Standardized Mortality Ratio* (HSMR), in 2007. While both the CIHI's measure and the *Hospital Report Card: British Columbia 2008* 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: British Columbia 2008* are measuring mortality 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

[8] Report available at <http://www.ices.on.ca/WebBuild/site/ices-internet-upload/file_collection/Ccort%5FFull%5FReport%2Epdf>.

[9] Further details available at <<http://www.gta905health.com/mediaroom/2005-may3.html>>. Report available at <<http://www.gta905health.com/whatsnew/gta905-hospitalreport.pdf>>.

[10] Article available at <<http://www.pubmedcentral.gov/articlerender.fcgi?tool=pubmed&pubmedid=15078845>>. Also, the Manitoba Center for Health Policy recently released an in-hospital patient safety report using the AHRQ Patient Safety Indicators (Bruce et al., 2006).

[11] Article available at <<http://www.cmaj.ca/cgi/content/full/170/11/1678>>.

[12] Report available at <http://www.fraserinstitute.org/commerce.web/publication_details.aspx?pubID=4962>.

[13] Report available at <http://www.fraserinstitute.org/commerce.web/publication_details.aspx?pubID=5035>.

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. These include:

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

By comparison, the measures published in the *Hospital Report Card: British Columbia 2008* allow for the examination of hospital performance in specific and detailed areas, thus providing patients with a greater level of information regarding their particular interest or diagnosis and allowing providers greater insight into the areas of care that are of particular concern in their facilities. In

the latest year of data, 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: British Columbia 2008*, 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 following nine measures:

- 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. 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. [14] Conversely, the 39 indicators published in the *Hospital Report Card* and the Hospital Mortality Index (HMI) composite measure give an absolute measure of patient safety or inpatient quality of care.

These significant differences in the approaches used by CIHI and the *Hospital Report Card: British Columbia 2008* lead to the conclusion that the two measures 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 HSMR and the various indicators of the *Hospital Report Card: British Columbia 2008* or the HMI composite measure, and because of the differences between an absolute and relative measure (i.e. for a given indicator, a hospital or region performing better than the Canadian average will not necessarily score highly if the Canadian average is low). In addition to these significant differences in approach is a difference in risk-adjustment methodologies: the indicators in the *Hospital Report Card: British Columbia 2008* 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: British Columbia 2008*. [15] 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 are unacceptably high or exceptionally low. [16] 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.

[14] The number of deaths is computed for the 65 diagnosis groups listed above, accounting for 80% of in-patient mortality.

[15] Note that the regional results published by CIHI are based on where patients were treated, while municipal measures published in the *Hospital Report Card: British Columbia 2008* are based on where patients lived.

[16] 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 2008* was the first publicly available report in Canada that allowed the comparison of mortality rates in Canadian hospitals based on a standardized measure. A significant advantage of the CIHI's report over the *Hospital Report Card: British Columbia 2006* is that it names all hospitals for which data is published while many hospitals in Ontario elected to remain unnamed in the report produced by The Fraser Institute.

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. [17]

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” [18] 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). [19]

Though subject to a number of caveats regarding the design and structure, report cards have had a beneficial impact on the quality of healthcare delivery in those regions where they are published.

[17] For Pennsylvania data, see Cardiac Care: Pennsylvania’s Guide to Coronary Artery Bypass Graft Surgery 1994–1995, <<http://www.phc4.org/reports/cabg9495/default.htm>> (April 2, 2002). For New Jersey data, see Cardiac Surgery in New Jersey: Technical Report, <http://www.state.nj.us/health/hcsa/cabgs01/cabg_technical01.pdf> (April 2, 2002). For the northern New England initiative, see G.T. O’Connor et al., “A Regional Intervention to Improve the Hospital Mortality Associated with Coronary.”

[18] “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.

[19] <<http://papers.nber.org/papers/w10489>>.

The Fraser Institute’s Hospital Report Card

The primary focus of this project was the construction of a patient-friendly hospital and patient-care report card focused on clinical outcomes. The report itself includes information about all acute-care facilities treating patients in British Columbia, none of which (out of a total of 95) are identified in the report. [20] The report is built on a recognized hospital report card methodology from the Agency for Healthcare Research & Quality (AHRQ) in the United States and is used in more than 12 US States including New York, Texas, Colorado, [21] California, Florida, Kentucky, Maryland, Massachusetts, Minnesota, New Jersey, Oregon, Utah, Vermont, and parts of Wisconsin.

[20] Facilities in British Columbia either declined or offered no response to our requests for participation/identification.

[21] New York <<http://www.myhealthfinder.com/newyork05/glancechoose.htm>>; Texas <<http://www.dshs.state.tx.us/THCIC/Publications/Hospitals/IQIReport2003/IQIReport2003.shtm>>; Colorado <<http://www.hospitalquality.org>>.

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

The first stage of the research process 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. [22] The search also turned up methodologies that, though available, would be less effective in providing a patient-friendly clinical outcomes-focused hospital report card.

Further examination of these available methodologies led to the selection of the performance indicator framework developed by AHRQ in the United States. [23] 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, gender, 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. [24] 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 regarding 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 further 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.

AHRQ indicators Are Organized in Four Modules [25]

[1] **Prevention Quality Indicators (PQIs)** [26] Consisting of ambulatory care sensitive conditions, these indicators pertain to hospital admissions that could have been prevented via high-quality outpatient care.

[22] For a clear example of how individual report card methodologies are proprietary, please refer to Healthgrades user agreement at <<http://www.healthgrades.com/aboutus/index.cfm?function=modnw&modtype=content&modact=UserAgreement>>.

[23] An agency of the US federal government's Department of Health and Human Services.

[24] Further information regarding the HCUP Quality Indicators can be found at <http://www.qualityindicators.ahrq.gov/hcup_archive.htm>.

[25] The Fraser Institute's *Hospital Report Card: British Columbia 2008* is composed of 39 indicators from the quality and safety modules of the AHRQ system (see Appendix E for a list of all indicators used in this report).

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

[2] Inpatient Quality Indicators (IQIs) These indicators reflect the quality of care inside hospitals and include such items as inpatient mortality; the utilization of procedures where there are questions of misuse, overuse, or underuse; and volume of procedures from 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 [27] events.

[4] Pediatric Quality Indicators (PDIs) [28] 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. [29]

The Fraser Institute's *Hospital Report Card* uses the IQI and PSI indicators; it is made up of 39 of the 59 available indicators in these categories [30]. These two modules were chosen because of their widespread use and high quality record.

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, gender, and discharge status. The Canadian 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* analyze nearly two million patient records extracted from the DAD for the period of fiscal years 2001/02 to 2005/06. The data are also 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 [31]. The AHRQ IQIs were in fact designed to be used in conjunction with 3M™ All Patient Refined Diagnosis Related Groups™ (APR™-DRG) software, which risk adjusts the IQIs for patients' clinical conditions and severity of illness or risk of mortality. Indeed, the version of the APR-DRG software built in to the AHRQ software was used for this report.

Participation in the report card project was not mandatory for hospitals in British Columbia. In the end, none of British Columbia's acute-care facilities, agreed to have their institution identified.

Since this report is based on administrative data, the results have limitations. Coding variations exist among hospitals 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 quality and patient safety measures, 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

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

[28] The PDI module became available in February 2006 and was therefore not used in this first edition of the *Hospital Report Card* for British Columbia.

[29] For details, please see <http://www.qualityindicators.ahrq.gov/pdi_download.htm>.

[30] The 11 area indicators were not used. Out of the 48 provider indicators, 9 were dropped (see Appendix G for details).

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

options and choosing a hospital are decisions that should be made in consultation with a physician. It is not recommended to 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. [32] 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. [33] These data have been used extensively in previous reports on health-care performance and form the basis for many journal articles. [34]

As the *Hospital Report 2006: Acute Care* notes, [35] 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" (p. 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 five data quality dimensions of accuracy, timeliness, relevance, comparability, and usability. [36]

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 that go back to the original patient charts and recode the information using a different set of expert coders. [37]

The reabstraction studies note the following rates of agreement between what was initially coded compared to 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

[32] DAD Data Quality Reabstraction study. Combined findings for FY 1999/2000 and 2000/2001. Dec 2002.

[33] DAD Data Quality Reabstraction study. Combined findings for FY 1999/2000 and 2000/2001. Dec 2002.

[34] A joint initiative of the Ontario Hospital Association and the Government of Ontario. *Hospital Report 2007: Acute care*. <[http://www.oha.com/Client/OHA/OHA_LP4W_LND_WebStation.nsf/resources/2007+Hospital+Reports/\\$file/OHA_Acute07_EN_final.pdf](http://www.oha.com/Client/OHA/OHA_LP4W_LND_WebStation.nsf/resources/2007+Hospital+Reports/$file/OHA_Acute07_EN_final.pdf)>.

[35] A joint initiative of the Ontario Hospital Association and the Government of Ontario. *Hospital Report 2006: Acute care*. <[http://www.oha.com/client/OHA/OHA_LP4W_LND_WebStation.nsf/resources/Hospital+Reports/\\$file/acute_report_2006.pdf](http://www.oha.com/client/OHA/OHA_LP4W_LND_WebStation.nsf/resources/Hospital+Reports/$file/acute_report_2006.pdf)>.

[36] The CIHI Data Quality Framework. June 2005 Revision.

[37] 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 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 data quality issue exists because some reabstraction coders selected pneumonia instead of chronic obstructive pulmonary disease (COPD) as the most responsible diagnosis. [38] 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. We have noted this proviso in our report.

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%). [39]

Discrepancy rates were noted in conditions that are diagnosis driven: acute myocardial infarction (AMI) [40], stroke, pneumonia, and COPD [41] (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." [42] 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 [43] 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" (p. 11). Further, a recently released report by the Manitoba Center for Health Policy that used the AHRQ Patient Safety Indicators [44] 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.

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[40] DAD Data Quality, Reabstraction Study Combined finding for Fiscal Years 1999/2000 and 2000/2001. CIHI 2002, pg 8.

[41] Data Quality of the DAD following the First year implementation of ICD-10-CA/CCI. September 2004.

[42] Data Quality of the DAD following the First year implementation of ICD10CA/CCI. September 2004: p.41.

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Methodology Overview

All hospital data used in The Fraser Institute's *Hospital Report Card: British Columbia 2008* 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 in DAD data releases unless those institutions have explicitly granted permission to the researchers requesting the data. Unlike hospitals in Ontario, none of British Columbia's 95 acute-care hospitals granted The Fraser Institute authorization to identify their institution-specific discharge data in the DAD for the years from 2001/02 to 2005/06.

These records were then 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 that are expected to have similar hospital resource use. 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]

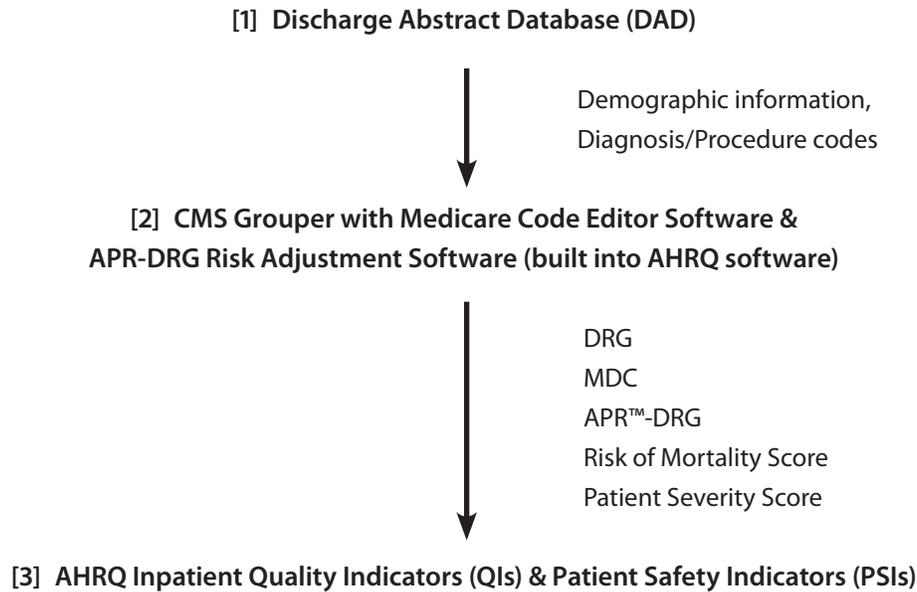
Since more specialized hospitals may treat more high-risk patients and some patients arrive at hospitals sicker than others, it is difficult to compare hospital mortality and utilization rates for patients with the same condition but a different health status. In order to compensate for this potential difference in hospital case mix, the international standard for risk adjustment, developed by 3M Corporation (for information, see <http://www.3m.com/us/healthcare/his/products/coding/refined_drg.jhtml>), 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 (see Appendix B for details).

The final step in the 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 [2] (for information, see <<http://www.qualityindicators.ahrq.gov/>>; see Appendix C for details). 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.

[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 ICD10CA/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. Please see Appendix J for details.

[2] 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, policymakers and researchers can use with easily accessible inpatient data to identify apparent variations in the quality of inpatient care.

Figure 1: Methodology Overview



The Fraser Institute's *Hospital Report Card: British Columbia 2008* 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 hundred patients while PSI rates are expressed per thousand. Each institution was also given a score from 0 to 100 for each indicator based on its risk-adjusted rate and was then ranked based on their scores (see Appendix F for details on calculating scores and ranks). [3]

A Hospital Mortality Index (HMI) was constructed to examine the overall 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), *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 separate indicators. For an indicator to be included in the HMI, hospitals representing at least 75% of the patient sample for that year

[3] 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 overall performance of a hospital across indicators. The HMI also has a fairly large number of hospitals so any bias is insignificant.

had to have measured data in order to ensure an adequate number of hospitals for comparison. For example, in 2005/06 an indicator had to contain at least 291,785 records in order to be included in the HMI. [4] 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).

[4] The total number of patient records in 2005/06 was 389,047..

Throughout the *Hospital Report Card*, several measures were taken in order to protect patient confidentiality. First, patient identifiers such as patients' names and addresses were removed prior to The Fraser Institute accessing 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, 5 in any institution and/or municipality.

Legend for Sample Table

Use the sample table (p. 27) 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). [5]

[5] Please see Appendix E for a complete list of the indicators used in the *Hospital Report Card*.

[B] All indicators were expressed as:

- [a] an Observed Rate (which are raw measures)
- [b] a Risk Adjusted Rate (incorporating patient severity and risk of mortality scores from 3M™ All Patient Refined Diagnosis Related Groups [APR™-DRG] Software) [6]
- [c] a Score [7]
- [d] a Rank

[6] Please see Appendix B for details.

[7] Please see Appendix F for details on calculating scores, ranks, HMI, and rank of the HMI.

Two additional measures were calculated to examine the overall 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. [8]

[8] Postal Codes were truncated to Forward Sortation Areas (FSAs) before The Fraser Institute accessed 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 2001 (April 1, 2001 to March 31, 2002) to Fiscal 2005 (April 1, 2005 to March 31, 2006).

