

The Fraser Institute

Hospital Report Card

British Columbia 2008



by Nadeem Esmail and Maureen Hazel

11 Methodological Appendices



The Fraser Institute

Hospital Report Card: British Columbia 2008

by Nadeem Esmail and Maureen Hazel

11 Methodological Appendices

Contents

Appendix A: Discharge Abstract Database (DAD) / 2

Appendix B: The Centers for Medicare and Medicaid Services (CMS) Diagnosis Related Groups (DRG) Grouper & 3M™ All Patient Refined Diagnosis Related Groups (APR™ DRG Classification System) Software / 5

Appendix C: Agency for Healthcare Research and Quality's (AHRQ) Inpatient Quality Indicators (IQI) and Patient Safety Indicator (PSI) modules / 7

Appendix D: Hospital Identification / 11

Appendix E: List of the Agency for Healthcare Research and Quality's Inpatient Quality and Patient Safety Indicators used in The Fraser Institute's Hospital Report Card / 14

Appendix F: Calculating the Score, Rank, Hospital Mortality Index, and Rank of Hospital Mortality Index / 19

Appendix G: Indicators Omitted from This Report / 22

Appendix H: Municipalities and Corresponding Patient Forward Sortation Areas (FSAs) / 24

Appendix I: Codes for Age / 26

Appendix J: International Classification of Diseases (ICD) conversion tables / 28

Appendix K: Hospitals and Health Authorities / 32

The Fraser Institute

Our vision is a free and prosperous world where individuals benefit from greater choice, competitive markets, and personal responsibility. Our mission is to measure, study, and communicate the impact of competitive markets and government interventions on the welfare of individuals.

Founded in 1974, we are an independent research and educational organization with locations throughout North America and international partners in over 70 countries. Our work is financed by tax-deductible contributions from thousands of individuals, organizations, and foundations. In order to protect its independence, the Institute does not accept grants from government or contracts for research.

For media enquiries, please contact our Communications Department via 604.714.4582 or communications@fraserinstitute.ca.

Copyright© 2008 The Fraser Institute. All rights reserved.

Editing, design and typesetting: Kristin McCahon and Lindsey Thomas Martin

Cover: Bill Ray

Image for covers: © 2008 atbaei, iStockphoto

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

ISSN 1916-5161 The Fraser Institute Hospital Report Card. British Columbia.

Date of issue: February 2008

Acknowledgments

The authors thank all those involved in the production and release of this study including Melissa Holoday, Kristin McCahon, Wendy Mills, and Dean Pelkey. Additionally, we want to thank Mark Mullins, Rena Menaker, and Ian Vaculik for developing and contributing to the base of knowledge that is incorporated into this publication and Mark Mullins and Rena Menaker for their work in producing the first version of the Fraser Institute's *Hospital Report Card* for Ontario and, indeed, Canada.

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.

CIHI Acknowledgment and Disclaimer

Parts of this material are based on data and information provided by the Canadian Institute for Health Information. The Canadian Institute for Health Information does not endorse or support the methodology used by the Fraser Institute and, therefore, the analyses, conclusions, opinions, and statements expressed herein are those of the authors and not those of the Canadian Institute for Health Information

Appendix A: Discharge Abstract Database (DAD)

In the first stage of data processing, records for all hospitals and municipalities were drawn from the DAD data extracts (from CIHI) for use in the *Hospital Report Card*. The following DAD fields were used in our analysis.

Province Province of the patient.

Institution number Numeric value corresponding to each acute care facility. The institution numbers corresponding to those institutions that did not agree to be identified in this report were received from CIHI in an encrypted format.

Postal Code To protect patient confidentiality, all postal codes were truncated to the first 3 characters (representing the Forward Sortation Area) and grouped into corresponding municipalities as described by Canada Post. Please refer to Appendix H for further details.

Age code A unit value to denote how the patient's age was recorded. Please refer to Appendix I for further details.

Age units Age of patient at the time of admission, which must be evaluated using the age code. Please refer to Appendix I for further details.

Gender Gender of the patient.

Admission date Date the patient was admitted to the facility.

Discharge Date Date the patient was separated from the facility.

Institution from type A code identifying the level of care provided by the facility from which the patient was transferred to the acute care institution, where

- 1= acute care
- 2= general rehabilitation facility
- 3= chronic care facility
- 4= nursing home
- 5= psychiatric facility
- 6= unclassified or other type of facility
- 7= special rehabilitation facility
- 8= home care
- 9= home for the aged
- A= day surgery
- E= emergency room
- O= organized outpatient department of reporting facility
- N= ambulatory care facility (added in FY2003).

Admission category Type of admission to the facility, where

- E = elective admissions
- U = emergent/urgent
- N = newborn
- S = stillbirth
- R = cadaver.

Discharge disposition Disposition of Patient, i.e. whether the patient died while in the facility, where

- 1 = transferred to another facility providing inpatient hospital care
- 2 = transferred to a long term care facility
- 3 = transferred to other (palliative care/hospice, etc.)
- 4 = discharged to a home setting with support services
- 5 = discharged home
- 6 = signed out (against medical advice)
- 7 = died
- 8 = cadaver
- 9 = stillbirth.

Acute Transfer Indicator A code that identifies the acute transfer status of a patient on discharge from the reporting facility where

- 0 = no transfer to or from an acute care facility
- 1 = patient transferred to the reporting facility from another acute care facility
- 2 = patient transferred from the reporting facility to another acute care facility
- 3 = patient transferred to the reporting facility from another acute care facility and then transferred to another acute care facility upon discharge from the reporting facility

Blank = for all day surgery records.

Entry Code Method of admission to the facility. This field was used in conjunction with “Age code” to exclude all “Stillbirths” from analysis where

- E = emergency department from the reporting hospital
- D = direct
- N = newborn
- S = stillborn (in reporting hospital)
- C = clinic from the reporting hospital
- P = day surgery from the reporting hospital.

Diagnosis codes International Classification of Disease codes (ICD-10) [1] identifying the condition considered to be the most responsible for the patient’s condition treated during hospitalization.

[1] Please see the following link for further details on ICD-10-CA: <http://secure.cihi.ca/cihiweb/dispPage.jsp?cw_page=codingclass_icd10_e>.

Procedure and/or Intervention codes CCI procedure codes that indicate the procedure performed on the patient during the hospitalization.

Procedure dates Date the procedure was performed on the patient.

Intervention out of hospital indicator = Y Denotes a procedure that was performed in another facility during the patient's hospitalization.

Note: All procedures denoted as "Intervention out of hospital indicator" = Y were removed from analysis.

Intervention status attribute = A A code denoting a cancelled procedure.

Note: All procedures denoted as "Intervention status attribute" = A were removed from analysis.

Acute length of stay The total number of days the patient was in the acute care facility.

Weight in grams Captured for newborns and neonates (age \leq 28 days) inclusively.

Appendix B: The Centers for Medicare and Medicaid Services (CMS) Diagnosis Related Groups (DRG) Grouper & 3M™ All Patient Refined Diagnosis Related Groups (APR™ DRG Classification System) Software

In order to use the CMS and 3M™ APR™ DRG Classification System software, the DAD dataset received from CIHI required several standard modifications to account for differences in the Canadian and US coding methodologies. In other cases, no modifications were required. The table below lists all fields imported from the DAD and specifies what modifications, if any, were required.

Data Elements required by the CMS- and 3M™ APR™ DRG Classification System software

Variable name	Description	Value description	DAD Data Element or Comment
Key	Unique case identifier	<i>Numeric</i>	Each record was given a unique case identifier number
Adate	Date of admission Used for length of stay (LOS) calculation	<i>Numeric</i> dd.mm.yyyy	Date of Admission was taken directly from DAD. No changes were made.
Ddate	Date of discharge Used for LOS calculation	<i>Numeric</i> dd.mm.yyyy	Date of Discharge was taken directly from DAD. No changes were made.
Alos	Calculated LOS overrides entered LOS	<i>Numeric</i> (Days)	Acute length of stay information was taken directly from DAD. No changes were made.
Bdate	Date of birth	<i>Numeric</i> dd.mm.yyyy	CIHI encrypts all patient identifiers in the DAD prior to cutting the dataset, including "date of birth" information. Since this field is required for all patients ≤ 28 days, it was calculated by subtracting the patient's age (in days) from the admission date. "Birth date" for all other patients remained as a "blank" in order to run the software.
Agey	Age in years at admission	<i>Numeric</i> Age in years	See Appendix I for details
Aged	Age in days (coded only when the age in years is less than 1)	<i>Numeric</i> Age in days	See Appendix I for details
Sex	Sex of patient	<i>Numeric</i> Male = 1 Female = 2	The DAD codes Male = M, Female = F. These values were recoded to Male = 1 & Female = 2. All other values of "Other" and "Undifferentiated" were omitted from analysis.

Variable name	Description	Value description	DAD Data Element or Comment
DSTAT	Discharge Status	<i>Numeric</i> Discharged to short term hospital = 2 Discharged to other facility = 5 Patient died = 20	Two DAD fields were combined to create the "dstat" field. Patients discharged to a short term hospital were extracted from DAD field "Acute transfer indicator" = "2" (patient transferred from the reporting facility to another acute care facility, please see Appendix A for further details). NB: All patients that died in-hospital were extracted from DAD field "Discharge Disposition" = 7 (patient died). All records not classified as being discharged to a short term hospital or that died in-hospital were classified as "other".
BWT	Weight at time of admission in metric values. Mandatory for newborns and neonates less than 29 days at admission.	<i>Numeric</i> (grams)	Weight at birth (grams) was taken directly from DAD. No changes were made.
Diagnosis Codes	ICD-9-CM diagnosis codes. DX1 is the principal diagnosis, DX2-DX30 are secondary diagnoses.	<i>String</i>	All Diagnosis codes contained in the DAD were converted to ICD-9-CM. NB: Please refer to Appendix J for further explanation on classification conversions.
Procedure Codes	ICD-9-CM procedure codes. PR1 is the principal diagnosis, PR2-PR30 are secondary procedures.	<i>String</i>	All Procedure codes contained in the DAD were converted to ICD-9-CM. NB: Please refer to Appendix J for further explanation on classification conversions.

Appendix C: Agency for Healthcare Research and Quality's (AHRQ) Inpatient Quality Indicators (IQI) and Patient Safety Indicator (PSI) modules

1. Modifications to DAD dataset received from CIHI

In order to use AHRQ's QI and PSI modules, the original DAD dataset received from CIHI required several standard modifications to account for differences in the Canadian and US coding methodologies. Other fields required no modifications. The table below lists all relevant fields for AHRQ software and what modifications, if any, were performed.

Required AHRQ Data Element and Description

Variable name	Description	Value description	DAD Data Element or Comment
Key	Unique case identifier.	<i>Numeric</i>	Each record analyzed was given a unique case identifier number.
Age	Patient's age in years at admission.	<i>Numeric</i> Age in years.	See Appendix I for details.
Ageday	Patient's age in days at admission (coded only when the age in years is less than 1).	<i>Numeric</i> Age in days.	See Appendix I for details.
Race	Patient's race.	<i>Numeric</i> White = 1. Black = 2. Hispanic = 3. Asian/Pacific Island = 4. Native American = 5. Other = 6.	Race information is not captured in the DAD. Accordingly, all patient records were set to "6" (Other).
Sex	Patient's gender.	<i>Numeric</i> Male = 1. Female = 2.	DAD codes Male = M, Female = F. These values were recoded to Male = 1 & Female = 2. All other values of "Other" and "Undifferentiated" were omitted from all analysis.
Pay1	Expected primary payer.	<i>Numeric</i> Medicare = 1. Medicaid = 2. Private, incl. HMO = 3. Self-pay = 4. No charge = 5. Other = 6.	Due to differences in the Canadian healthcare system, the DAD does not contain this information. Accordingly, all patient records were set to "6" (Other).

Variable name	Description	Value description	DAD Data Element or Comment
Hospstco	Hospital location (FIPSt State/county code).	<i>Numeric</i> Modified Federal Information Processing Standards State/County code.	To protect patient confidentiality postal codes were truncated to FSAs by CIHI before the dataset was cut. Once received, FSAs were grouped into municipalities as described by Canada Post. Please see Appendix H for details.
Hospid	Data source hospital number.	<i>Numeric</i> Hospital identification number.	Institution Number as described by CIHI. No changes were made to this field.
Disp	Patient's disposition.	<i>Numeric</i> Routine = 1. Short-term hospital = 2. Skilled nursing facility = 3. Intermediate care = 4. Another type of facility = 5. Home health care = 6. Against medical advice = 7. Died in the hospital = 20.	Two DAD fields were combined to create the "Disp" field. Patients discharged to a short term hospital were extracted from DAD field "Acute transfer indicator" = "2" (patient transferred from the reporting facility to another acute care facility, please see Appendix A for further details). NB: All patients that died in-hospital were extracted from DAD field "Discharge Disposition" = 7 (patient died). All records not classified as being discharged to a short term hospital or that died in-hospital were classified as "other".
Atype	Admission Type.	<i>Numeric</i> Emergency = 1. Urgent = 2. Elective = 3. Newborn = 4. Delivery = 5. Other = 6.	Please see Appendix C, 2B for further details.
Asource	Admission Source.	<i>Numeric</i> 1 = ER. 2 = Another Hospital. 3 = Another facility. 4 = Court/law enforcement. 5 = Routine/birth/other.	Please see Appendix C, 2B for further details.
Los	Length of Stay.	<i>Numeric</i>	Information taken from DAD field "acute length of stay".
APR_DRG	3M™ APR™ DRG Classification System category	<i>Numeric</i>	APR-DRG from the 3M™ APR™ DRG Classification System software built into the AHRQ software.
DRG	Diagnosis Related Group.	<i>Numeric</i> DRG from CMS DRG Grouper.	Produced by 3M™ CMS Grouper with Medicare Code Editor software. Groups patients' records based on the primary diagnosis.
MDC	Major Diagnostic Category.	<i>Numeric</i> MDC from CMS DRG Grouper.	Produced by 3M™ AHRQ Quality Indicators software. Groups patient records based on the primary diagnosis.

Variable name	Description	Value description	DAD Data Element or Comment
DX1 – DX25	ICD-9-CM diagnoses codes. DX1 is the principal diagnosis, DX2-DX30 are secondary diagnoses.	<i>String, 5 characters</i>	All Diagnosis codes contained in the DAD were converted to ICD-9-CM. NB: See Appendix J for further explanation on classification conversions.
PR1 – PR20	ICD-9-CM procedure codes. PR1 is the principal diagnosis, PR2-PR30 are secondary procedures.	<i>String, 4 characters</i>	All Diagnosis codes contained in the DAD were converted to ICD-9-CM. NB: See Appendix J for further explanation on classification conversions.
PRDAY1- PRDAY20	Days from admission to procedure. PR1 is the principal procedure, PR2-PR20 are secondary procedures.	<i>Numeric</i>	Some PSIs require this field for calculating a given indicator.
Year	Year of discharge. The patient's year of discharge. For example, a patient discharged on July 7, 2004 would have a discharge year of "2004."	<i>Numeric</i> YYYY	ICD-9-CM diagnosis code for acute ill-defined cerebrovascular disease (436) (required in the denominator of stroke mortality rate/IQI 17) is used only for patients discharged before or on September 30, 2004. In order to be consistent throughout this study (from 2001/02 to 2005/06), this optional data field was created to exclude this code from all years of data analysed for IQI 17.
DQTR	Quarter of discharge. The calendar quarter of patient's discharge. For example, a patient discharged on July 7, 2004 would have a discharge quarter of "3."	<i>Numeric</i> 1 = January to March. 2 = April to June. 3 = July to September. 4 = October to December.	Used to exclude cases with ICD-9-CM code 436 that were discharged after Sept. 30, 2004 from the denominator population of IQI 17. See explanation for "Year" above.

2. Other DAD Data Elements Translated for Calculation of AHRQ's IQIs and PSIs

A. Admission type (Atype)

All information used for this field was taken from the DAD field "Admission Category" and converted into the required numeric value for AHRQ's IQI and PSI modules. The following translations were performed. [1]

Admission Category (DAD)	Atype (AHRQ)
E = Elective Admissions	3 = Elective
N = Newborn	4 = Newborn

[1] The "Admission type" variable is only used in calculating PSI indicators (i.e. not for calculating IQI indicators). The values "3" and "4" are referenced by the PSI code to identify elective surgeries and newborn admissions.

B. Admission source (Asource)

All information used for this field was taken from the DAD field “Admission Category.” The following translations were performed. [2]

[2] The value “2” is referenced by the IQR code to identify transfers from another short-term hospital. The values “2” and “3” are referenced by the PSI code to identify transfers from another hospital or facility.

Institution from type (DAD)	Asource (AHRQ)
1 = Acute Care	2 = Another Hospital
2 = General Rehabilitation Facility	3 = Another Facility including Long Term Care (LTC)
3 = Chronic Care Facility	3 = Another Facility including LTC
4 = Nursing Home	3 = Another Facility including LTC
5 = Psychiatric Facility	3 = Another Facility including LTC
6 = Unclassified or other type of Facility	3 = Another Facility including LTC
7 = Special Rehabilitation Facility	3 = Another Facility including LTC
8 = Home Care	3 = Another Facility including LTC
9 = Home for the Aged	3 = Another Facility including LTC
A = Day Surgery	3 = Another Facility including LTC
O = Organized Outpatient Department of Reporting Facility	3 = Another Facility including LTC

Appendix D: Hospital Identification

A. Participating Hospitals

None of BC's 95 acute-care hospitals granted us authorization to identify them by name in this report.

B. Non-Participating Hospitals

The institution numbers from all those that did not agree to be identified in this report were encrypted by CIHI prior to delivery and assigned an arbitrary number. The following table describes whether and how each unidentified hospital submitted DAD data in a given year, where:

Y = Hospital submitted DAD data.

— = no data submitted.

Unknown hospital	2001/02	2002/03	2003/04	2004/05	2005/06
Hospital 1	Y	Y	—	—	—
Hospital 2	Y	Y	Y	—	—
Hospital 3	Y	Y	Y	Y	Y
Hospital 4	Y	Y	Y	Y	Y
Hospital 5	Y	Y	Y	Y	Y
Hospital 6	Y	Y	Y	Y	Y
Hospital 7	Y	Y	Y	Y	Y
Hospital 8	Y	Y	Y	Y	Y
Hospital 9	Y	Y	Y	Y	Y
Hospital 10	Y	Y	Y	Y	Y
Hospital 11	Y	Y	Y	Y	Y
Hospital 12	Y	Y	Y	Y	Y
Hospital 13	Y	Y	Y	Y	Y
Hospital 14	Y	Y	Y	Y	Y
Hospital 15	Y	Y	Y	Y	Y
Hospital 16	Y	Y	Y	Y	Y
Hospital 17	Y	Y	Y	Y	Y
Hospital 18	Y	Y	Y	Y	Y
Hospital 19	Y	Y	Y	Y	Y
Hospital 20	Y	—	—	—	—
Hospital 21	Y	Y	—	—	—
Hospital 22	Y	Y	Y	Y	Y
Hospital 23	Y	Y	Y	Y	Y
Hospital 24	Y	Y	Y	Y	Y
Hospital 25	Y	Y	Y	Y	Y
Hospital 26	Y	Y	Y	Y	Y
Hospital 27	Y	Y	Y	Y	Y

Unknown hospital	2001/02	2002/03	2003/04	2004/05	2005/06
Hospital 28	Y	Y	Y	Y	Y
Hospital 29	Y	Y	Y	Y	Y
Hospital 30	Y	Y	Y	Y	Y
Hospital 31	Y	Y	Y	Y	Y
Hospital 32	Y	Y	—	—	—
Hospital 33	Y	Y	Y	Y	Y
Hospital 34	Y	Y	Y	Y	Y
Hospital 35	Y	Y	Y	Y	Y
Hospital 36	Y	Y	Y	Y	Y
Hospital 37	Y	Y	Y	—	—
Hospital 38	Y	Y	Y	Y	Y
Hospital 39	Y	Y	Y	Y	Y
Hospital 40	Y	Y	Y	Y	Y
Hospital 41	Y	Y	Y	Y	Y
Hospital 42	Y	Y	Y	Y	Y
Hospital 43	Y	Y	Y	Y	Y
Hospital 44	Y	Y	Y	Y	Y
Hospital 45	Y	Y	Y	Y	Y
Hospital 46	Y	Y	—	—	—
Hospital 47	Y	Y	Y	Y	Y
Hospital 48	Y	Y	Y	Y	Y
Hospital 49	Y	Y	Y	Y	Y
Hospital 50	Y	Y	Y	Y	Y
Hospital 51	Y	Y	Y	Y	Y
Hospital 52	Y	Y	Y	Y	Y
Hospital 53	Y	Y	Y	Y	Y
Hospital 54	Y	Y	—	—	—
Hospital 55	Y	Y	Y	Y	Y
Hospital 56	Y	Y	Y	Y	Y
Hospital 57	Y	Y	Y	Y	Y
Hospital 58	Y	Y	Y	Y	Y
Hospital 59	Y	Y	Y	Y	Y
Hospital 60	Y	Y	Y	Y	Y
Hospital 61	Y	Y	Y	Y	Y
Hospital 62	Y	Y	Y	Y	Y
Hospital 63	Y	Y	—	—	—
Hospital 64	Y	Y	Y	Y	Y
Hospital 65	—	Y	Y	Y	Y
Hospital 66	Y	Y	Y	Y	Y
Hospital 67	Y	Y	Y	Y	Y
Hospital 68	Y	Y	Y	Y	Y
Hospital 69	Y	Y	Y	Y	Y
Hospital 70	Y	Y	Y	Y	Y
Hospital 71	Y	—	—	—	—
Hospital 72	Y	Y	Y	Y	Y

Unknown hospital	2001/02	2002/03	2003/04	2004/05	2005/06
Hospital 73	Y	Y	Y	Y	Y
Hospital 74	Y	Y	Y	Y	Y
Hospital 75	Y	Y	Y	Y	Y
Hospital 76	Y	Y	Y	Y	Y
Hospital 77	Y	Y	Y	Y	Y
Hospital 78	Y	Y	Y	Y	Y
Hospital 79	Y	Y	Y	Y	Y
Hospital 80	Y	Y	Y	Y	Y
Hospital 81	Y	Y	Y	Y	Y
Hospital 82	Y	Y	Y	Y	Y
Hospital 83	Y	Y	Y	Y	Y
Hospital 84	Y	Y	Y	Y	Y
Hospital 85	Y	Y	Y	Y	Y
Hospital 86	—	—	—	Y	Y
Hospital 87	Y	Y	—	—	—
Hospital 88	Y	Y	—	—	—
Hospital 89	Y	Y	Y	Y	Y
Hospital 90	Y	Y	Y	Y	Y
Hospital 91	Y	Y	—	—	—
Hospital 92	Y	Y	Y	Y	Y
Hospital 93	Y	Y	Y	Y	Y
Hospital 94	Y	Y	Y	Y	Y
Hospital 95	Y	Y	Y	Y	Y

Appendix E: List of the Agency for Healthcare Research and Quality's Inpatient Quality and Patient Safety Indicators used in The Fraser Institute *Hospital Report Card*

The indicators measured in the *Hospital Report Card* are classified into three groups: those related to medical conditions, hospital procedures, and child birth. The indicators are further classified by type: death rates, volumes of procedures, utilization rates and, adverse events. It should be noted that the indicators may vary in their computation according to the version of the AHRQ software used. Version 3.1 was used for the *Hospital Report Card: British Columbia 2008*. However, the *Hospital Report Card: Ontario 2006 (rev. Sept. 2007)* uses Version 2.1. Thus, indicators cannot necessarily be compared among the provinces in all years.

A. Conditions

Death Rates

- [1] **Acute myocardial infarction (AMI) mortality rate (QI 15)** Deaths from heart attacks. Lower rates are more desirable.
- [2] **Acute myocardial infarction (AMI) mortality rate (without transfers) (QI 32)** Deaths from heart attacks; excludes patients that were transferred from another short term hospital. Lower rates are more desirable.
- [3] **Congestive heart failure (CHF) mortality rate (QI 16)** Deaths due to heart failure. Lower rates are more desirable.
- [4] **Acute Stroke mortality rate (QI 17)** Deaths from acute strokes. Lower rates are more desirable.
- [5] **Gastrointestinal hemorrhage mortality rate (QI 18)** Deaths due to bleeding from the esophagus, stomach, small intestine or colon. Lower rates are more desirable.
- [6] **Hip fracture mortality rate (QI 19)** Deaths due to hip fractures. Lower rates are more desirable.
- [7] **Pneumonia mortality rate (QI 20)** Death due to a condition involving an infection in the lungs. Lower rates are more desirable.
- [8] **Death in low mortality DRG (PSI 2)** Deaths among patients that are considered unlikely to die in the hospital. Lower rates are more desirable.
- [9] **Failure to Rescue (PSI 4)** Deaths in patients that developed specified complications of care during hospitalization. Lower rates are more desirable.

Adverse Events

These indicators focus on preventable instances of harm to patients such as complications arising from surgery.

- [1] **Decubitus ulcer (PSI 3)** Pressure sores that develop when a patient lies on his or her back for extended periods. Lower rates are more desirable.
- [2] **Iatrogenic pneumothorax (PSI 6)** The collapse of a patient's lung inadvertently induced by a physician or medical treatment. Lower rates are more desirable.
- [3] **Selected infections due to medical care (PSI 7)** Cases of infection due to medical care, primarily those related to intravenous (IV) lines and catheters. Lower rates are more desirable.
- [4] **Transfusion reaction (PSI 16)** Patients with blood transfusion reactions. Lower rates are more desirable.

B. Procedures

Death Rates

- [1] **Esophageal resection surgery mortality rate (QI 8)** Deaths due to the surgical removal of the tube that connects the mouth to the stomach, often due to esophageal cancer. Lower rates are more desirable.
- [2] **Pancreatic resection surgery mortality rate (QI 9)** Deaths due to the surgical removal of the pancreas, an organ that secretes many important hormones such as insulin, in an attempt to cure pancreatic cancer. Lower rates are more desirable.
- [3] **Coronary Artery Bypass Graft (CABG) mortality rate (QI 12)** Deaths due to surgery performed to allow blood to bypass a clogged artery and allow it to carry oxygen to the heart. Lower rates are more desirable.
- [4] **Craniotomy mortality rate (QI 13)** Deaths due to the surgical opening of the skull that is performed to remove a brain tumor, repair an aneurysm (ballooning of blood vessels), perform a biopsy or to relieve pressure inside the skull. Lower rates are more desirable.
- [5] **Hip replacement mortality rate (QI 14)** Deaths due to hip replacement surgery. Lower rates are more desirable.
- [6] **Percutaneous Transluminal Coronary Angioplasty (PTCA) mortality rate (QI 30)** Deaths due to a non-surgical procedure performed to open blockages in the arteries that carry blood to the heart. Lower rates are more desirable.
- [7] **Carotid endarterectomy mortality rate (QI 31)** Deaths due to a procedure that removes blockages from arteries in the neck to reduce the chance of stroke and brain damage. Lower rates are more desirable.

Volume of Procedures

These indicators are calculated because they reflect procedures for which evidence shows that hospitals performing more of certain highly complex procedures may have better outcomes for those procedures. Providers exceeding these thresholds are considered high volume providers. Please see Appendix F for further details on Volume of Procedures and their Thresholds.

- [1] **Esophageal resection surgery volume (IQI 1)** Numbers of procedures involving the surgical removal of the tube that connects the mouth to the stomach, often due to esophageal cancer. Numbers above 6 are more desirable. Please see Appendix F for details on Threshold values.
- [2] **Pancreatic resection surgery volume (IQI 2)** Numbers of procedures involving the surgical removal of the pancreas in an attempt to cure pancreatic cancer. Numbers above 10 are more desirable. Please see Appendix F for details on Threshold values.
- [3] **Coronary Artery Bypass Graft (CABG) volume (IQI 5)** Numbers of surgeries performed to allow blood to bypass a clogged artery. Numbers above 100 are more desirable. Please see Appendix F for details on Threshold values.
- [4] **Percutaneous Transluminal Coronary Angioplasty volume (PTCA) (IQI 6)** Number of procedures performed to open blockages in the arteries that carry blood to the heart. Numbers above 200 are more desirable. Please see Appendix F for details on Threshold values.
- [5] **Carotid endarterectomy volume (IQI 7)** Number of procedures performed to remove blockages from arteries in the neck to reduce the chance of stroke and brain damage. Numbers above 50 are more desirable. Please see Appendix F for details on Threshold values.

Utilization Rates

These indicators are calculated because they examine procedures whose use varies significantly across hospitals and for which questions have been raised about overuse, underuse, or misuse. High or low rates for these indicators are likely to represent inappropriate or inefficient delivery of care.

- [1] **Laparoscopic cholecystectomy (QI 23)** Minimally invasive removal of the gall bladder, a small pear-shaped sac that stores and concentrates bile, which is needed for digestion. Higher rates are more desirable.

Adverse Events

These indicators focus on preventable instances of harm to patients such as complications arising from surgery.

- [1] **Foreign body left during procedure (PSI 5)** Foreign object left in a patient during a procedure. Lower rates are more desirable.

- [2] **Post-operative physiologic and metabolic derangements (PSI 10)** Development of disorders that interfere with biochemical processes within the body including kidney failure and diabetes occurring in patients after an elective surgery. Lower rates are more desirable.
- [3] **Post-operative respiratory failure (PSI 11)** Development of respiratory failure occurring in patients after undergoing elective surgery. Lower rates are more desirable.
- [4] **Post-operative sepsis (PSI 13)** Patients that undergo elective surgeries and subsequently develop a hospital-acquired infection. Lower rates are more desirable.
- [5] **Accidental puncture or laceration (PSI 15)** Accidental cut or wound during procedure. Lower rates are more desirable.

C. Obstetric (Birth-Related)

Utilization Rates

These indicators examine procedures whose use varies significantly across hospitals and for which questions have been raised about overuse, underuse, or misuse. High or low rates for these indicators are likely to represent inappropriate or inefficient delivery of care.

- [1] **Cesarean delivery (QI 21)** Surgical removal of a baby through the mother's abdomen. Lower rates are more desirable.
- [2] **Vaginal birth after cesarean (VBAC), uncomplicated (QI 22)** Rate of vaginal births that occurred for mothers who had delivered previously by Cesarean section. Higher rates are more desirable.
- [3] **Primary cesarean delivery (QI 33)** Surgical removal of a baby through the mother's abdomen during the first birth inclusively. Lower rates are more desirable.
- [4] **Vaginal birth after cesarean (VBAC), all (QI 34)** Rate of vaginal births that occurred to mothers who had delivered previously by Cesarean section. Higher rates are more desirable.

Adverse Events

These indicators focus on preventable instances of harm to patients such as complications arising from surgery.

- [1] **Birth trauma (PSI 17)** Birth trauma for infants born alive in a hospital. Lower rates are more desirable.
- [2] **Obstetric trauma—vaginal with instrument (PSI 18)** Cases of potentially preventable trauma (4th degree lacerations, other obstetric lacerations) during vaginal delivery with an instrument. Lower rates are more desirable.

- [3] **Obstetric trauma—vaginal without instrument (PSI 19)** Cases of potentially preventable trauma (4th degree lacerations, other obstetric lacerations) during vaginal delivery without an instrument. Lower rates are more desirable.
- [4] **Obstetric trauma—cesarean section (PSI 20)** Cases of potentially preventable trauma (4th degree lacerations, other obstetric lacerations) during Cesarean delivery. Lower rates are more desirable.

Appendix F: Calculating the Score, Rank, Hospital Mortality Index, and Rank of Hospital Mortality Index

1. Score

Each institution was given a score from 0 to 100 for each indicator based on its risk adjusted rate. The basis for this scoring is described below, as it varied slightly between types of indicators

Volume Indicators

Each volume indicator is supported by evidence suggesting that providers performing more than a certain number of procedures have better patients' outcomes. The thresholds are listed below. Threshold 1 is the lowest reported threshold in the literature, while threshold 2 is the highest. Providers exceeding these thresholds are considered high volume providers.

Volume Indicator	Threshold 1	Threshold 2	Reference for Threshold 1	Reference for Threshold 2
Esophageal resection (IQI 1)	6	7	Patti MG, Corvera CU, Glasgow RE, et al. A hospital's annual rate of esophagectomy influences the operative mortality rate. <i>J Gastrointest Surg</i> 1998; 2 (2): 186–92.	Dudley RA, Johansen KL, Rand R, et al. Selective referral to high-volume hospitals: estimating potentially avoidable deaths. <i>JAMA</i> 2000; 283 (9): 1159–66.
Pancreatic resection (IQI 2)	10	11	Glasgow RD, Mulvihill SJ. Hospital volume influences outcome in patients undergoing pancreatic resection for cancer. <i>West J Med</i> 1996; 165 (5): 294–300.	Glasgow, Mulvihill, 1996.
Coronary Artery Bypass Surgery (CABG) (IQI 5)	100	200	Eagle KA, Guyton RA, Davidoff R, et al. ACC/AHA Guidelines for Coronary Artery Bypass Graft Surgery: A Report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines (Committee to Revise the 1991 Guidelines for Coronary Artery Bypass Graft Surgery). American College of Cardiology/American Heart Association. <i>J Am Coll Cardiol</i> 1999; 34 (4): 1262–347.	Hannan EL, Kilburn H, Jr., Bernard H, et al. Coronary artery bypass surgery: the relationship between inhospital mortality rate and surgical volume after controlling for clinical risk factors. <i>Med Care</i> 1991; 29 (11): 1094–107.

Volume Indicator	Threshold 1	Threshold 2	Reference for Threshold 1	Reference for Threshold 2
Percutaneous Transluminal Coronary Angioplasty (IQI 6)	200	400	Ryan TJ, Bauman WB, Kennedy JW, et al. Guidelines for percutaneous transluminal coronary angioplasty. A report of the American Heart Association/American College of Cardiology Task Force on Assessment of Diagnostic and Therapeutic Cardiovascular Procedures (Committee on Percutaneous Transluminal Coronary Angioplasty). <i>Circulation</i> 1993; 88 (6): 2987–3007.	Hannan EL, Racz M, Ryan TJ, et al. Coronary angioplasty volume-outcome relationships for hospitals and cardiologists. <i>JAMA</i> 1997; 277 (11): 892–98.
Carotid endarterectomy (IQI 7)	50	101	Manheim LM, Sohn MW, Feinglass J, et al. Hospital vascular surgery volume and procedure mortality rates in California, 1982-1994. <i>J Vasc Surg</i> 1998; 28 (1): 45–46.	Hannan EL, Popp AJ, Tranmer B, et al. Relationship between provider volume and mortality for carotid endarterectomies in New York state. <i>Stroke</i> 1998; 29 (11): 2292–97. Dudley RA, Johansen KL, Brand R, et al. Selective referral to high-volume hospitals: estimating potentially avoidable deaths. <i>JAMA</i> 2000; 283 (9): 1159–66.

Source: IQI SPSS Software documentation, version 2.1, version 4.

The scores for each volume indicator were calculated in the following manner. If the volume of procedures of a hospital did not exceed Threshold 1, a score of 0 was given. If the volume of procedures of a hospital exceeded Threshold 1 but did not exceed Threshold 2, a score of 75 was given. If the volume of procedures of a hospital exceeded Threshold 2, a score of 100 was given.

All Other Indicators

Institutions were given a score of 0 to 100 on all other indicators. The scores reflect the relative positions of their risk adjusted rates. For example, if the range of rates across hospitals for one of the indicators was from 1.0% to 4.0%, a score between 0 and 100 was created where 1.0% = 0 and 4.0% = 100. If an institution demonstrated a rate of 3.0% (the threshold of the top 1/3 of the range) then the score was 67. The following describes the calculation of the score.

Where the rate is better when it is higher, the score is the absolute difference between the rate and the minimum of the range, divided by the range. Where the rate is better when it is lower, the score is the absolute difference between the rate and the maximum of the range, divided by the range.

2. Rank

All institutions were ranked on each indicator based on their scores, where the highest rank of 1 corresponds to the highest score out of 100. [1]

[1] Volume indicators were not ranked since they have threshold requirements.

3. Hospital Mortality Index (HMI)

The HMI was created to allow examination of the overall performance of a hospital or municipality across several mortality indicators. The mortality indicators selected to create the HMI were those indicators that successfully passed through the following filters.

[1] Sample size Not all institutions contained DAD data required for all indicators since not all institutions perform all procedures or treat patients with all the medical conditions analyzed in the *Hospital Report Card*. 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. For example, in 2005/06 an indicator had to contain at least 291,785 records in order to be included in the HMI. **[2]** This ensured an adequate number of hospitals for comparison.

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

[2] Size bias PSIs measure very rare outcomes (i.e. 1 adverse event in 1000 or more discharges). Since smaller institutions perform fewer procedures, they are less likely to see these adverse events and may have artificially lower PSI rates. Therefore, only 2 PSIs were used in the HMI: Death in Low Mortality DRGs (PSI 2) and Failure to Rescue (PSI 4), neither of which appeared to be affected unduly by this size bias on careful examination of the data. **[3]**

[3] To further control for the size bias, an institution with a rate for Failure to Rescue = 0 was omitted from the HMI (since it is unlikely that an institution would have a rate = 0).

Only nine mortality indicators passed these filters from FY2001 to FY2005. The mortality indicators included in the HMI are: 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) **[4]** and failure to rescue rates (PSI 4). **[5]**

[4] PSI 2 is no longer risk-adjusted in version 3.1 of the AHRQ software. The observed rate, rather than the risk-adjusted rate, of this measure was used for computation of the HMI.

4. Rank of the Hospital Mortality Index (HMI)

All institutions were ranked based on their HMI value, where the highest rank of 1 corresponds to the highest score out of 100.

[5] The HMI is not a comprehensive rating of overall inpatient care in a hospital setting but is a broad measure of mortality rates, which are likely the most accurately recorded patient outcome.

Appendix G: Indicators Omitted from This Report

Difficulties in conversion to ICD-9-CM from ICD-10-CA/CCI led to the omission of some quality indicators from this report.

A. Inpatient Quality Indicator Rates Omitted

[1] AAA Volume/Mortality (IQI 4/11)

Numbers of procedures to repair the major artery carrying blood from the heart to the lower part of the body and deaths due to these procedures. Numbers above 10 and lower rates are more desirable. Conversion of the required ICD-10-CA/CCI diagnosis and procedure codes to ICD-9-CM for calculation of IQI 4 & 11 did not produce accurate results. This was caused by intrinsic differences between the classifications.

[2] Incidental Appendectomy among Elderly Utilization Rate (IQI 24)

Removal of the appendix at the time of another necessary abdominal surgery. This procedure is performed to eliminate the risk of future appendicitis (inflammation of the appendix). Incidental appendectomy is generally not recommended in the elderly because they have both a lower risk for developing appendicitis and a higher risk of complications after surgery (calculated for patients 65 years or older). Lower rates are more desirable. The numerator of IQI 24 is composed of incidental appendectomy procedure codes: Incidental appendectomy (471), Laparoscopic incidental appendectomy (4711), and Other incidental appendectomy (4719). No ICD-10-CA/CCI codes translate directly into the required ICD-9-CM procedure codes.

[3] Bilateral Cardiac Catheterization Utilization Rate (IQI 25)

A diagnostic test performed to see if the blood vessels to the heart are narrowed or blocked. Lower rates are more desirable. The numerator of IQI 25 is composed of the number of simultaneous right and left heart catheterizations: Right/Left heart cardiac catheterization (3723). No ICD-10-CA/CCI codes translate directly into the required ICD-9-CM procedure code.

B. Patient Safety Indicator Rates Omitted

[1] Complications of Anesthesia (PSI 1)

Adverse effects from the administration of therapeutic drugs. Lower rates are more desirable. Conversion of the required ICD-10-CA/CCI diagnosis codes to ICD-9-CM for PSI 1 did not produce accurate results. This was caused by intrinsic differences between the classifications.

[2] Post-operative Hip Fracture (PSI 8)

Hip fracture after surgery. Lower rates are more desirable. Conversion of the required ICD-10-CA/CCI diagnosis codes to ICD-9-CM for PSI 8 did not produce accurate results. This was caused by intrinsic differences between the classifications.

[3] Post-operative Hemorrhage or Hematoma (PSI 9)

Bleeding after surgery. Lower rates are more desirable. Conversion of the required ICD-10-CA/CCI diagnosis codes to ICD-9-CM did not produce accurate results. This was caused by intrinsic differences between the classifications.

[4] Post-operative Pulmonary Embolism or Deep Vein Thrombosis (PSI 12)

These conditions occur when a blood clot (usually formed in one of the leg veins) becomes detached and lodges in the lung artery or one of its branches (pulmonary embolism) or lodges in a another part of the body (usually the leg; deep vein thrombosis). This indicator is calculated for patients who develop these conditions after undergoing surgery. Lower rates are more desirable. Conversion of the required ICD-10-CA/CCI diagnosis codes to ICD-9-CM did not produce accurate results. This was caused by intrinsic differences between the classifications.

[5] Post-operative Wound Dehiscence (PSI 14)

Parting of the layers of a surgical wound. Either the surface layers separate or the whole wound splits open. Lower rates are more desirable. The numerator of PSI 14 is composed of the number of discharges with an ICD-9-CM code for reclosure of postoperative disruption of the abdominal wall (5461) in any secondary procedure field. No ICD-10-CA/CCI codes translate directly into the required ICD-9-CM procedure code.

Appendix H: Municipalities and Corresponding Patient Forward Sortation Areas (FSAs)

Postal Codes were truncated to Forward Sortation Areas (FSAs) prior to The Fraser Institute accessing the dataset. All patient FSAs were grouped into corresponding municipalities as described by Canada Post as follows for 2005/06. [1]

Municipality	FSA
ABBOTSFORD	V2S, V2T, V3G, V4X
BURNABY	V5A, V5B, V5C, V5G, V5H, V5J
CAMPBELL RIVER	V9H, V9W
CASTLEGAR	V1N
CENTRAL SAANICH	V8M
CHILLIWACK	V2P, V2R, V4Z
COQUITLAM	V3J, V3K
COURTENAY	V9J, V9M, V9N
CRANBROOK	V1C
DAWSON	V1G
DELTA	V4C, V4E, V4G, V4K, V4L, V4M
DUNCAN	V9L
FORT ST JOHN	V1J
KAMLOOPS	V1S, V2B, V2C, V2E, V2H
KELOWNA	V1P, V1V, V1W, V1X, V1Y, V1Z, V4T
KITIMAT	V8C
LADYSMITH	V9G
LAKE COUNTRY	V4V
LANGLEY	V2Y, V2Z, V2A, V4W
MAPLE RIDGE	V2W, V2X, V3Y, V4R
MERRITT	V1K
MISSION	V2V, V4S
NANAIMO	V9R, V9S, V9T, V9V, V9X
NELSON	V1L

[1] 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 a residual group (i.e. "Other").

Municipality	FSA
NEW WESTMINSTER	V3L, V3M, V3N, V5E
PARKSVILLE	V9P
PENTICTON	V2A
PORT ALBERNI	V9Y
PORT COQUITLAM	V3B, V3C, V3E
PORT MOODY	V3H
POWELL RIVER	V8A
PRINCE GEORGE	V2K, V2L, V2M, V2N
PRINCE RUPERT	V8J
QUALICUM	V9K
QUESNEL	V2G
RICHMOND	V6V, V6W, V6X, V6Y, V7A, V7B, V7C, V7E
SALMON ARM	V1E
SALT SPRING	V8K
SIDNEY	V8L
SQUAMISH	V8B
SURREY	V1M, V3R, V3S, V3T, V3V, V3W, V3X, V4N
TERRACE	V8G
TRAIL	V1R
VANCOUVER	V5K, V5L, V5M, V5N, V5P, V5R, V5S, V5T, V5V, V5W, V5X, V5Y, V5Z, V6A, V6B, V6C, V6E, V6G, V6H, V6J, V6K, V6L, V6M, V6N, V6P, V6R, V6S, V6T, V6Z, V7G, V7H, V7J, V7K, V7L, V7M, V7N, V7P, V7R, V7S, V7T, V7V, V7W, V7X, V7Y
VERNON	V1B, V1H, V1T
VICTORIA	V8N, V8P, V8R, V8S, V8T, V8V, V8W, V8X, V8Y, V8Z, V9A, V9B, V9C, V9E
WHITE ROCK	V4A, V4B, V4P
WHITEHORSE	Y1A
WILLIAMS LAKE	V2G
YELLOWKNIFE	X1A

Appendix I: Codes for Age

Age is coded somewhat differently in the DAD (Discharge Abstracts Database), CMS- and 3M™ APR™ DRG Classification System (Diagnosis Related Grouper) software, and AHRQ IQI (Inpatient Quality Indicator) and PSI (Patient Safety Indicator) modules.

A. Age in DAD

[1] Age code. Denotes how the patient's age is recorded

- [a] Y = age in years. Patient is 2 years or older.
- [b] E = age is estimated in years. Patient is 2 years or older.
- [c] M = age in months. Patient is less than 2 years.
- [d] D = age in days. Patient is less than 31 days.
- [e] B = age recorded for Newborns/Stillborns.
- [f] U = age unknown.

[2] Age units. Denotes the age of patient at time of admission.

- [a] If "Age Code" = "B", "Age Units" is:
 - [i] NB = Newborn
 - [ii] SB = Stillbirth
 - [iii] U = Unknown
- [b] All other values in "Age Units" correspond to the age of the patient expressed as a numeric value (000-999). This information was used in conjunction with the "Age Code" field as follows:
 - [i] If the age of the patient is less than 31 days, the value is expressed in days.
 - [ii] If the age of the patient is less than 2 years, the value is expressed in months.
 - [iii] If the age of the patient is 2 years or more the value is expressed in years.

Note: In order to separate stillbirths from newborns (all are coded as "Age Code" = "B"), patients with "Age Code" = "B" were cross-referenced with the DAD field "Entry code" = "S". Stillbirths were omitted from analysis.

B. Age Requirements for the CMS- and 3M™ APR™ DRG Classification System software

[1] AgeY. Age at admission in years (0–124)

- [a] Birth date must be \leq admit date

[2] AgeD. (1–365)

- [a] Used only when age in years = 0
- [b] If admit date = birth date, then the calculated age in days = 1

In order to accommodate the differences in how the age of a patient is captured in the DAD and that required by the CMS- and 3M™ APR™ DRG Classification

System software, the two DAD fields (“Age code” and “Age Units”) were split into the required “Age in years” and “Age in days” fields. Patients ≤ 31 days (corresponding to “D” in “Age code”) were separated into the “Age in days” field. The number of months from the DAD was multiplied by 30 days if a patient was 1 to 12 months old. Patients between 1 and 2 years were defined as “Age in years” = 1. Patients with “Age code = B” that were not stillbirths (denoted by “S” in the “Entry code” field) were defined as “Age in days” = 1.

C. Age Requirements for AHRQ IQI and PSI modules

The DAD data was translated as described above (for the CMS- and 3M™ APR™ DRG Classification System software) with the following exceptions.

- [1] Patients less than one year are placed in the “Ageday” category.
- [2] If admit date = birth date, then the calculated age in days = 0.

Appendix J: International Classification of Diseases (ICD) conversion tables

Note: The same methodological approach was applied to the Intervention codes (CCI).

In order to use the CMS- and 3M™ APR™ DRG Classification System software as well as the AHRQ IQI and PSI modules, all diagnoses and procedures were converted from ICD-10-CA/CCI to ICD-9-CM codes preceding analysis.

ICD-10-CA/CCI conversion methodology

The following modifications were made to our database.

[1] Conversion tables for ICD-10-CA/CCI to ICD-9-CM were purchased from CIHI and applied to the DAD database.

[2] The National Center for Health Statistics (NCHS) and the Centers for Medicare & Medicaid Services (CMS) have issued new diagnosis and procedure codes for the International Classification of Diseases, 9th Revision, Clinical Modification (ICD-9-CM) every year since 1986. New code assignments are the result of year-long efforts of the ICD-9-CM Coordination and Maintenance Committee, which is sponsored jointly by NCHS and CMS. The effective date for issuing new codes is the same every year, October 1. [1]

Until ICD-10-CA/CCI was adopted in Canada (in FY 2001 in British Columbia), many Canadian hospitals were using ICD-9-CM. As such, CIHI continually updated the ICD-9-CM codes produced by NCHS in Washington each year until 1999. Since the present study used data coded in ICD-10-CA/CCI, the corresponding ICD-9-CM codes were updated. This information was extracted from the National Center for Health Statistics (NCHS).

[1] Source: <http://www.cdc.gov/nchs/data/ICD-9/icd9cnv06.pdf>

[3] Since converting ICD-10-CA/CCI to ICD-9-CM is a necessarily imperfect process as a result of changes in the way many diseases/conditions are handled, CIHI assigns grades to describe the quality of each conversion, where: [2]

- 1 = Good to excellent match; both coding systems are either identical or the ICD-10-CA/CCI terms are indexed to the ICD-9-CM.
- 2 = Fair match; the ICD-10-CA/CCI code is not indexed in the same manner in ICD-9-CM. An inclusion term may be present, which has influenced the choice but generally some default decision was made, with the typical default to the “other specified” category.
- 3 = Poor match. There is no specific code available; for example, the ICD-10-CA/CCI code represents a new concept that was not available in the previous classification.

[2] Source: Conversion Tables Fiscal 2003/2004 and 2005/06 received from CIHI.

Only two ICD-10-CA/CCI codes analysed by the AHRQ IQI & PSI indicators are classified as a “3” conversion. They are:

- [1] S130 (Trauma ruptured cervical intervertebral disc) to 83900 (Cervical Vertebra Dislocation Unspecified). Required for calculating PSIs 2, 6, and 8.
- [2] G463 (Brain stem stroke syndrome) to 34489 (Other specified paralytic syndrome). Required for calculating PSI 3.

[4] As previously mentioned, ICD-10-CA/CCI is a more specific and updated coding classification than ICD-9-CM. Therefore, numerous ICD-10-CA/CCI codes can map to a single ICD-9-CM code. Alternatively, there may be some codes where there is no direct translation from ICD-10-CA/CCI to ICD-9-CM.

All ICD-9-CM codes that did not translate directly from ICD-10-CA were analysed individually with respect to which indicator(s) they appeared in and where the code was located (i.e. in the numerator, denominator, both, or in the exclusions of a given indicator).

In cases where CIHI provided no translation, the WHO's *International Statistical Classification of Diseases and Related Health Problems*, 10th Revision, Tabular List of inclusions and four-character subcategories [3] and the Incidence and Prevalence Database ICD-9 and ICD-10 conversion [4] were used to determine whether other ICD-10-CCI codes translated to ICD-9-CM contained equivalent information to that required by the AHRQ indicator.

For example, 00322 (ICD-9-CM—Salmonella Pneumonia) is one of the codes required for calculation of the Pneumonia Mortality Rate (IQI 20). None of the ICD-10-CA/CCI codes listed in CIHI's conversion table translates directly to 00322. However, there are two ICD-10-CA/CCI codes that would contain this information that do translate to ICD-9-CM codes.

[3] Available at <http://www3.who.int/icd/vol1htm2003/fr-icd.htm>

[4] Available at http://www.tdrdata.com/ICDTrans/IPD_ICDTables.asp

ICD-10-CA to ICD-9-CM code conversion table

ICD-10-CA	ICD-9-CM
A022 Localized salmonella infections	00329 Other localized Salmonella infections
J170 Pneumonia in bacterial disease classified elsewhere	4848 Pneumonia in other infection diseases

Since 4848 is one of the ICD-9-CM codes analysed to calculate IQI 20, the information for Salmonella Pneumonia is already captured within the indicator. Additionally, since this indicator measures deaths due to pneumonia infection, using the information contained in A022 (Localized salmonella infections), the conversion to 00329 (Other localized Salmonella infections) would be inappropriate as it would include information about Salmonella infections that was not specific to Pneumonia infection.

This exercise was performed to ensure that the proper information contained within the ICD-10-CA/CCI codes was being captured by a given indicator, even in the absence of a direct ICD-10-CA to ICD-9-CM translation.

[5] ICD-10-CA/CCI is a more specific and updated coding classification than ICD-9-CM. Therefore, numerous ICD-10-CA/CCI codes can map to a single ICD-

9-CM code. Alternatively, some codes do not translate directly from ICD-10-CA/CCI to ICD-9-CM. The following table contains the ICD-9CM diagnosis codes required for calculating Congestive Heart Failure (IQI 16). The italicized codes (39891 to 40493) do not translate directly from ICD-10-CA/CCI to ICD-9-CM.

ICD-9-CM codes required for calculation of Congestive Heart Failure mortality rate (IQI 16)

Code	Description	Code	Description
39891	<i>RHEUMATIC HEART FAILURE</i>	42821	Acute Systolic Heart Failure
40201	<i>MAL HYPERT HRT DIS W CHF</i>	42822	Chronic Systolic Heart Failure
40211	<i>BENIGN HYP HRT DIS W CHF</i>	42823	Acute On Chronic Systolic Heart Failure
40291	<i>HYPERTEN HEART DIS W CHF</i>	4289	Heart Failure NOS
40401	<i>MAL HYPERT HRT/REN W CHF</i>	42830	Diastolic Heart Failure NOS
40403	<i>MAL HYP HRT/REN W CHF&RF</i>	42831	Acute Diastolic Heart Failure
40411	<i>BEN HYPERT HRT/REN W CHF</i>	42832	Chronic Diastolic Heart Failure
40413	<i>BEN HYP HRT/REN W CHF&RF</i>	42833	Acute On Chronic Diastolic Heart Failure
40491	<i>HYPERT HRT/REN NOS W CHF</i>	42840	Systolic/Diastolic Heart Failure NOS
40493	<i>HYP HRT/REN NOS W CHF&RF</i>	42841	Acute Systolic/Diastolic Heart Failure
4280	Congestive Heart Failure	42842	Chronic Systolic/Diastolic Heart Failure
4281	Left Heart Failure	42843	Acute/Chronic Systolic/Diastolic Heart Failure
42820	Systolic Heart Failure NOS		

Although a direct translation does not exist from an ICD-10-CA code to an ICD-9-CM code, equivalent information can be found in other ICD-10-CA/CCI codes. For example, Rheumatic Heart Failure (ICD-9-CM code 39891) information is contained in ICD-10-CA code I099 (Rheumatic heart disease, unspecified). However, since this is an “unspecified” code, information that is not specific to Chronic Heart Failure Mortality (IQI 16) will also be contained in this code.

For this reason, calculation of IQI 16 was restricted to codes: 4280, 4281, 42820, 42821, 42822, 42823, 4289, 42830, 42831, 42832, 42833, 42840, 42841, 42842 and 42843.

[7] The following ICD-9-CM codes are required for calculation of Acute Myocardial Infarction Mortality (IQIs 15 & 32).

ICD-9-CM codes required for calculation of Acute Myocardial Infarction mortality rate (IQIs 15 & 32)

Code	Description	Code	Description
41001	AMI Anterolateral, Initial	41051	AMI Lateral NEC, Initial
41011	AMI Anterior Wall, Initial	41061	True Post Infarct, Initial
41021	AMI Inferolateral, Initial	41071	Subendo Infarct, Initial
41031	AMI Inferopost, Initial	41081	AMI NEC, Initial
41041	AMI Inferior Wall Initial	41091	AMI NOS, Initial

Both IQIs 15 & 32 measure AMI mortality rates. The ICD-10-CA coding classification does not translate directly into any of these ICD-9-CM codes. In order to

capture the information contained in ICD-10-CA codes for patients diagnosed with an AMI, the following ICD-10-CA codes were used for calculating AMI mortality rates.

ICD-10-CA to ICD-9-CM code conversion table

ICD-10-CA	ICD-9-CM
I210 Acute transmural MI of anterior wall	41010 AMI Other Anterior Wall, Episode NOS
I211 Acute transmural MI of inferior wall	41040 AMI Other Inferior Wall Episode NOS
I212 Acute transmural MI of other site	41080 AMI Other Specified Site Episode NOS
I213 Acute transmural MI of unspecified site	41090 AMI Unspecified, Episode Unspecified
I2140 Acute subendocardial MI of anterior wall	41070 Subendocardial AMI, Episode NOS
I2141 Acute subendocardial MI of inferior wall	41070 Subendocardial AMI, Episode NOS
I2142 Acute subendocardial MI of other sites	41070 Subendocardial AMI, Episode NOS
I2149 Acute subendocardial MI, unspecified site	41070 Subendocardial AMI, Episode NOS
I219 AMI unspecified	41090 AMI Unspecified, Episode Unspecified

[8] Human Immunodeficiency Virus Disease (ICD-9-CM code 042) is required for calculating Death in low mortality DRGs (PSI 2). ICD-10-CA/CCI contains this information as HIV disease (B24) which is converted to 0429 in ICD-9-CM by CIHI's conversion table. Therefore, all information on HIV required for calculation of PSI 2 was taken from ICD-10-CA/CCI code B24.

Appendix K: Hospitals and Health Authorities

Since 2001, health-care services in British Columbia have been managed and delivered by five regional health authorities and a Provincial Health Services Authority. [1] The acute-care facilities included in The Fraser Institute's *Hospital Report Card: British Columbia 2008* are listed below under the authority that governs them.

[1] Source: British Columbia Ministry of Health. <<http://www.health.gov.bc.ca/socsec/about.html>>.

Fraser Health Authority

CITY	HOSPITAL
Abbotsford	Matsqui-Sumas-Abbotsford General Hospital
Burnaby	Burnaby Hospital
Burnaby	Fellburn Hospital
Burnaby	St Michael's Centre Extended Care Hospital
Chilliwack	Chilliwack General Hospital
Delta	Delta Hospital
Hope	Fraser Canyon Hospital
Langley	Langley Memorial Hospital
Maple Ridge	Ridge Meadows Hospital & Health Care Centre
Mission	Mission Memorial Hospital
New Westminster	Queen's Park Hospital
New Westminster	Royal Columbian Hospital
Port Moody	Eagle Ridge Hospital & Health Care Centre
Surrey	Surrey Memorial Hospital
White Rock	Peace Arch District Hospital

Interior Health Authority

CITY	HOSPITAL
100 Mile House	100 Mile District General Hospital
Alexis Creek	Red Cross Outpost Nursing Station, Alexis Creek
Armstrong	Pleasant Valley Health Centre
Ashcroft	Ashcroft & District General Hospital
Barriere	Barriere & District Health Centre
Blue River	Red Cross Outpost Nursing Station, Blue River
Castlegar	Castlegar & District Community Health Centre
Chase	Chase & District Health Centre
Clearwater	Dr Helmcken Memorial Hospital

CITY	HOSPITAL
Cranbrook	East Kootenay Regional Hospital
Creston	Creston Valley Hospital
Edgewood	Red Cross Outpost Nursing Station, Edgewood
Elkford	Elkford & District Diagnostic and Treatment Centre
Fernie	Elk Valley Hospital
Golden	Golden & District General Hospital
Invermere	Invermere & District Hospital
Kamloops	Overlander Extended Care Hospital
Kamloops	Royal Inland Hospital
Kaslo	Victorian Community Health Centre of Kaslo
Kelowna	Kelowna General Hospital
Keremeos	Keremeos Diagnostic & Treatment Centre
Lillooet	Lillooet Hospital & Health Centre
Logan lake	Logan Lake Health Centre
Lytton	St Bartholomew's Hospital
Merritt	Nicola Valley Health Centre
Nakusp	Arrow Lakes Hospital
Nelson	Kootenay Lake Hospital
Nelson	Mount St. Francis Hospital
New Denver	Slocan Community Health Centre
Oliver	South Okanagan General Hospital
Penticton	Penticton Regional Hospital
Princeton	Princeton General Hospital
Revelstoke	Queen Victoria Hospital
Salmon Arm	Shuswap Lake General Hospital
Sparwood	Sparwood Health Centre
Summerland	Summerland Health Centre
Trail	Kootenay Boundary Regional Hospital
Vernon	Vernon Jubilee Hospital
Williams Lake	Cariboo Memorial Hospital

Northern Health Authority

CITY	HOSPITAL
Atlin	Atlin Health Centre
Burns Lake	Lakes District Hospital & Health Centre
Chetwynd	Chetwynd General Hospital

CITY	HOSPITAL
Dawson Creek	Dawson Creek & District Hospital
Dease Lake	Stikine Regional Health Centre
Fort Nelson	Fort Nelson General Hospital
Fort St James	Stuart Lake Hospital
Fort St John	Fort St John General Hospital
Fraser Lake	Fraser Lake Diagnostic & Treatment Centre
Hazelton	Wrinch Memorial Hospital
Houston	Houston Health Centre
Hudson's Hope	Hudson's Hope Gething Diagnostic & Treatment Centre
Kitimat	Kitimat General Hospital
Mackenzie	Mackenzie & District Hospital
Masset	Queen Charlotte Islands General Hospital, Masset Site
McBride	McBride & District Hospital
Prince George	Prince George Regional Hospital
Prince Rupert	Prince Rupert Regional Hospital
Queen Charlotte	Queen Charlotte Islands General Hospital
Quesnel	G.R. Baker Memorial Hospital
Smithers	Bulkley Valley District Hospital
Stewart	Stewart General Hospital
Terrace	Mills Memorial Hospital
Tumbler Ridge	Tumbler Ridge Health Care Centre
Valemount	Valemount Health Centre
Vanderhoof	St John Hospital

Vancouver Coastal Health Authority

CITY	HOSPITAL
Bella Coola	Bella Coola General Hospital
North Vancouver	Lions Gate Hospital
Pemberton	Pemberton & District Health Centre
Powell River	Powell River General Hospital
Richmond	The Richmond Hospital
Sechelt	St Mary's Hospital
Squamish	Squamish General Hospital
Vancouver	G.F. Strong Centre
Vancouver	George Pearson Centre

CITY	HOSPITAL
Vancouver	U.B.C. Health Sciences Centre Hospital
Vancouver	Vancouver General Hospital
Vancouver	Louis Brier Hospital
Vancouver	Holy Family Hospital
Vancouver	Mount Saint Joseph Hospital
Vancouver	St Paul's Hospital
Waglisla	R.W. Large Memorial Hospital
Whistler	Whistler Diagnostic & Treatment Centre

Vancouver Island Health Authority

CITY	HOSPITAL
Alert Bay	Cormorant Island Community Health Centre
Bamfield	Red Cross Outpost Nursing Station, Bamfield
Campbell River	Campbell River & District General Hospital
Chemainus	Chemainus Health Care Centre
Comox	St Joseph's General Hospital
Duncan	Cowichan District Hospital
Galiano	The Lady Minto Gulf Islands Hospital
Gold River	Gold River Health Clinic
Kyuquot	Red Cross Outpost Nursing Station, Kyuquot
Ladysmith	Ladysmith & District General Hospital
Nanaimo	Nanaimo Regional General Hospital
Parksville	Trillium Lodge
Port Alberni	West Coast General Hospital
Port Alice	Port Alice Hospital
Port Hardy	Port Hardy Hospital
Port McNeill	Port McNeill & District Hospital
Qualicum Beach	Eagle Park Health Care Facility
Saanichton	Saanich Peninsula Hospital
Tahsis	Tahsis Health Centre
Tofino	Tofino General Hospital
Victoria	Juan de Fuca Hospitals
Victoria	Queen Alexandra Centre for Children's Health
Victoria	Royal Jubilee Hospital
Victoria	The Gorge Road Hospital

CITY	HOSPITAL
Victoria	Victoria General Hospital
Victoria	Mount St Mary Hospital

Provincial Health Services Authority

CITY	HOSPITAL
Port Coquitlam	Riverview Hospital
Vancouver	British Columbia's Children's Hospital
Vancouver	Sunny Hill Health Centre for Children