



Population Risk Adjustment Grouping Project  
Privacy Impact Assessment, January 2015



Canadian Institute  
for Health Information

Institut canadien  
d'information sur la santé



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Better data. Better decisions.  
Healthier Canadians.

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To lead the development and maintenance of comprehensive and integrated health information that enables sound policy and effective health system management that improve health and health care.

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Excellence, Innovation

The Canadian Institute for Health Information (CIHI) is pleased to publish the following privacy impact assessment in accordance with its [Privacy Impact Assessment Policy](#):

- Population Risk Adjustment Grouping (PRAG) project, January 2015

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Ottawa, January 2015

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# Quick facts about the Population Risk Adjustment Grouping project

1. The Population Risk Adjustment Grouping (PRAG) project was established to develop a methodology and grouping software for population grouping, developed using CIHI data and expertise.
2. The grouping software will
  - Assist the Canadian Institute for Health Information (CIHI) and our clients in monitoring population health, predicting health care utilization patterns, surveillance and monitoring of diseases, explaining variations in health care resource use;
  - Provide a foundation for funding models;
  - Allow comparisons of inputs across jurisdictions; and
  - Provide clients with a comprehensive basis for standardization of populations when conducting interjurisdictional analysis.
3. The development project started April 1, 2013, and is scheduled to be completed March 31, 2016.
4. The key deliverables for this project are the population risk adjustment grouping methodology, the SAS software that will apply the population grouping methodology and related documentation.
5. The development of this clinical classification system will be carried out using 6 years of data from Ontario, Saskatchewan, Alberta and British Columbia. These 4 jurisdictions were chosen because they have fairly complete coverage across a wide spectrum of CIHI data holdings containing data at the patient level.
6. The PRAG will link and use patient-level data from existing CIHI sources, as well as some data collected specifically for use in the PRAG project.

# 1 Introduction

The Canadian Institute for Health Information (CIHI) collects and analyzes information on health and health care in Canada. Its mandate is to lead the development and maintenance of comprehensive and integrated health information that enables sound policy and effective health system management that improve health and health care. CIHI obtains data directly from hospitals and other health facilities, long-term care homes, regional health authorities, medical practitioners and governments. This data includes health information about services provided to patients, residents and clients, registration and practice information about health professionals, and health expenditure information.

The purpose of this privacy impact assessment (PIA) is to examine the privacy, confidentiality and security risks associated with the Population Risk Adjustment Grouping (PRAG) project. This PIA is focused primarily on the assessment of the risks associated with the new PRAG project-specific data collected by CIHI, as well as on the increased risk of identification of individuals presented by the PRAG data in its entirety, when brought together (i.e., linked) as a program of work at CIHI. Privacy risks associated with the management of CIHI's individual existing sources of data are addressed within the respective database-specific PIAs already completed and available at [www.cihi.ca](http://www.cihi.ca).

The assessment includes a review of the 10 privacy principles set out in the Canadian Standards Association's *Model Code for the Protection of Personal Information*, as they apply to the development of the PRAG.

The primary driver for this PIA is compliance with CIHI's [Privacy Impact Assessment Policy](#).

## 2 The PRAG project at CIHI

### 2.1 Background

A population grouping methodology creates clinical profiles for individuals as well as resource indicators that describe their current and future health system needs. Population grouping methodologies have many applications in managing, evaluating and conducting research on the health care system. The methodology is clinically driven and groups the entire population. Its foundation is a set of groups, or cells, that describe a person's clinical conditions and the severity of those conditions, with a strong focus on chronic conditions. The clinical groups and related predictive models will make use of 6 years of patient-level data from multiple data sources. The data will be linked to be able to see the population across health sectors and longitudinally over the 6 years of data.

For many years, jurisdictions have encouraged CIHI to consider offering a population grouping methodology. In 2010, CIHI commissioned Hay Group to assess client needs and the value of a CIHI program to offer a population grouping methodology. The Hay Group's report recommended that CIHI implement a national program. Since then, CIHI has assessed the feasibility of offering a population grouping program and examined options for acquiring a methodology. Licensing 1 of several commercially available population grouping methodologies was considered, as was the option of developing one in-house. In January 2013, CIHI decided to go with the in-house development option due to the high cost of commercially available groupers and because none were built using Canadian data.

CIHI's decision to develop a population grouping methodology ensures that CIHI's clients will have a made-in-Canada methodology that reflects Canada's population and health care system, meets the needs of Canadian clinical administrators and health care researchers, and takes full advantage of the wealth of health care data available at CIHI and elsewhere in Canada. Furthermore, this decision ensures that the methodology will be transparent, allowing clients to understand the logic used to assign a person to a particular cell and resource indicators.

The population grouping methodology will assist our stakeholders in identifying groups of potential future high users of the health care system, monitoring population health, predicting health care utilization patterns, explaining variations in health care resource use and providing a foundation for funding models. All of this information will provide a comprehensive basis for standardization when conducting interjurisdictional analyses.

Population grouping methodologies use person-level clinical information contained in the administrative data that is collected during hospital stays, physician office visits, community care services and so on. Administrative data from any health sector can be used if it is of sufficient quality and can contribute to providing a useful portrait of a person's morbidity, level of functioning and clinical risk.

The richness of CIHI's clinical data holdings provides opportunities for population grouping that are unavailable to most jurisdictions internationally. Data sources for the PRAG were selected, in part, by the coverage of person-level health data across Canada and the ability to link data over time and across health sectors.

The PRAG will use data from the following existing sources of CIHI data:

- Discharge Abstract Database (DAD);
- National Ambulatory Care Reporting System (NACRS);
- Continuing Care Reporting System (CCRS);
- Canadian Patient Cost Database (CPCD); and
- Patient-Level Physician Billing (PLPB) repository (includes Alberta and Saskatchewan data at the time of assessment).

In addition to the patient-level data from existing CIHI data holdings, participating provinces have agreed to provide CIHI with additional PRAG project-specific patient-level data, including

- Ontario and British Columbia patient-level physician billing data supplied to CIHI for specific purposes of the PRAG project, which has not yet been incorporated within the routine data flow to CIHI’s PLPB repository;
- Registered Persons (RP) data from Ontario, Saskatchewan, Alberta and British Columbia; and
- Alberta Health Services Patient Longitudinal Data File and Patient Cost Data File.

The development of the PRAG methodology will require that the above data be linked at the patient level over time and across various health sectors.

The key deliverables for this project are the grouping methodology, as well as SAS software that will apply the population grouping methodology and related documentation. The SAS grouping software will be shared with organizations involved in health system administration and health policy research. A technical report that describes the methodology will be published. Table 1 lists the project milestones.

**Table 1:** Project milestones

Milestone	Date
Project plan approved by CIHI Executive Committee	April 2013
CIHI Executive Committee approves collection of PRAG project-specific data	June 2014
Prototype clinical classification release to Expert Committee and project stakeholders	October 2014
Delivery of second draft classification and first draft of predictive model	March 2015
Delivery of finalized classification and predictive model with documentation	September 2015
Population grouping methodology v1.0 SAS grouping software and user guide completed	February 2016
Report about methodology written (English only, to be published in 2015–2016)	March 2016
Release of final classification, predictive model and SAS grouping software along with documentation and user guide	March 2016

## 2.2 Data and data flow

The figure illustrates the high-level data flow for the PRAG project. Much of the data used in the PRAG project comes directly from existing internal CIHI sources, including the PLPB repository, the DAD, NACRS, CCRS and the CPCD. Record-level data from existing CIHI sources, with original health card numbers removed and replaced with consistently encrypted health card numbers, are made available to authorized staff within CIHI’s SAS analytical environment. Some additional PRAG-specific data collection was also required.

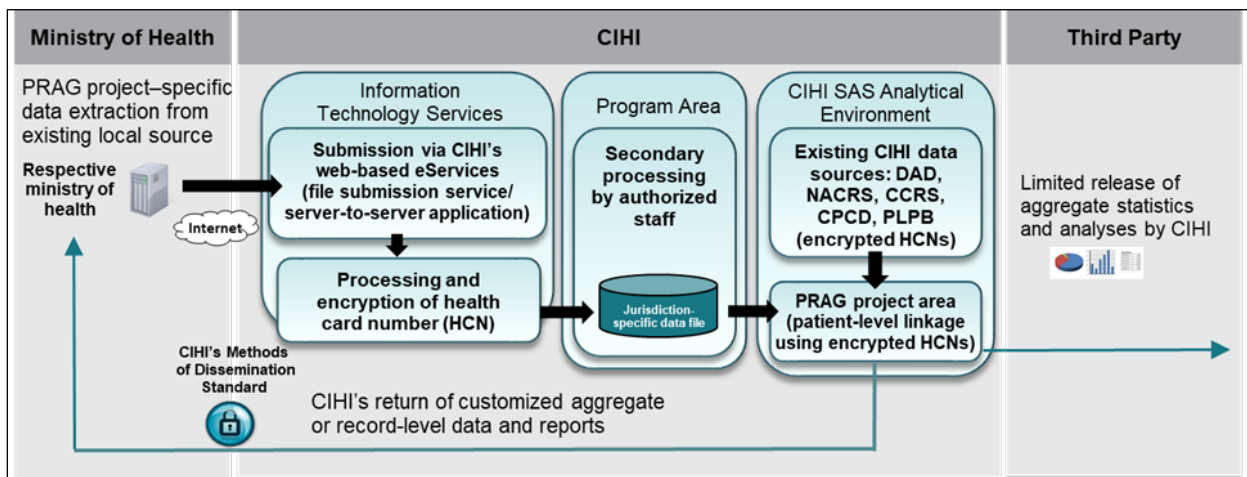


The additional PRAG project-specific data flow directly to CIHI from provincial and territorial ministries of health. The data submitted to CIHI is routinely collected and retained by ministries of health in order to address jurisdiction-specific requirements (e.g., to remunerate physicians and improve the quality of the planning and management of the delivery of health care services for Canadians). Because of project timelines, rather than conform to CIHI submission specifications, each data provider will extract data from its existing data sources and prepare the data for submission based on jurisdiction-specific submission specifications negotiated with CIHI. Data will be submitted to CIHI using CIHI's secure web-based or server-to-server applications.

Once received by CIHI, PRAG project-specific data files are immediately processed and the jurisdiction-issued health card number found in each file is encrypted. Once the health card numbers are encrypted, data files may be accessed by a limited number of authorized staff if additional processing is required before the files are transferred to the PRAG Project Area within CIHI's SAS analytical environment.

Authorized analytical staff will access data used in the PRAG project via CIHI's SAS analytical environment. All requests for access to the PRAG Project Area are processed through CIHI's centralized Service Desk. This process ensures that all requests for access to PRAG project data are traceable and authorized.

**Figure:** Data flow, Population Risk Adjustment Grouping project



## 3 Privacy analysis

### 3.1 Authorities governing CIHI and data use in the PRAG project

#### General

CIHI adheres to its [Privacy Policy, 2010](#) and to any applicable privacy legislation and/or agreements.

#### Legislation

CIHI is a secondary data collector of health information, specifically for the planning and management of the health system, including statistical analysis and reporting. Data providers are responsible for meeting the statutory requirements in their respective jurisdictions, where applicable, at the time the data is collected.

All provinces and territories have public-sector privacy legislation in place. This legislation includes provisions that authorize public bodies covered by the acts to disclose person-identifiable data, without the consent of the individual, for statistical purposes. Newfoundland and Labrador, Nova Scotia, New Brunswick, Ontario, Manitoba, Saskatchewan and Alberta also have health information–specific privacy legislation with express lawful authority to use and disclose personal health information, without individual consent, for purposes of managing the health system, including statistical analysis and reporting.

For example, CIHI is recognized as a prescribed entity under the *Personal Health Information Protection Act* of Ontario. Custodians in Ontario may disclose personal health information to CIHI without patient consent pursuant to Section 29 as permitted by Section 45(1) of the act.

#### Agreements

As indicated in Section 2.2, data will flow directly to CIHI from ministries of health responsible for provincial and territorial medical care plans. Data flow, including some data for the sole purposes of the development of a population grouping methodology, will be governed by CIHI's [Privacy Policy, 2010](#), existing legislation in the jurisdictions and existing data-sharing agreements with the provinces and territories. The data-sharing agreements set out the purpose, use, disclosure, retention and disposal requirements of personal health information provided to CIHI, as well as any subsequent disclosures that may be permitted.

The agreements also describe the legislative authority under which personal health information is disclosed to CIHI. Where required, existing data-sharing agreements will be updated or separate agreements established to include the provision of data for use in the PRAG project to CIHI, prior to the submission of data to CIHI.

## 3.2 Principle 1: Accountability for personal health information

CIHI's president and chief executive officer is accountable for ensuring compliance with CIHI's [Privacy Policy, 2010](#). CIHI has a chief privacy officer and general counsel, a corporate Privacy, Confidentiality and Security team, a Privacy and Data Protection Committee of its Board of Directors and an external chief privacy advisor.

### Organization and governance

CIHI's Case Mix department has overall responsibility for the project's objectives and primary responsibility for its deliverables. Other CIHI departments are contributing to this project by

- Facilitating data linkage across data holdings and longitudinally;
- Providing subject matter expertise about using and interpreting data in the project that is already part of CIHI's data holdings; and
- Assisting with efforts to work with CIHI stakeholders in order to obtain additional data to fill data gaps.

The following table identifies key internal senior positions with responsibilities for the PRAG in terms of privacy and security risk management:

Position/group	Roles/responsibilities
<b>Vice President, Programs</b>	Responsible for the overall operations and strategic direction of the PRAG
<b>Director, Methodologies and Specialized Care</b>	Responsible for strategic and operational decisions about the PRAG
<b>Manager, Case Mix</b>	Responsible for ongoing management and uptake of the PRAG; makes day-to-day operational decisions about the PRAG
<b>Chief Information Security Officer</b>	Responsible for the strategic direction and overall implementation of CIHI's Information Security program
<b>Chief Privacy Officer</b>	Responsible for the strategic direction and overall implementation of CIHI's Privacy program

### Expert group and clinical panel

The PRAG Expert Group is composed of senior health ministry staff and both Canadian and international health researchers who have experience either using or developing population grouping methodologies. They provide advice on the development of the methodology and help ensure that it will meet the needs of organizations involved in health system administration and health policy analysis. In addition, the PRAG Clinical Panel, consisting of physicians and other clinicians, will provide advice on the clinical classification.

### 3.3 Principle 2: Identifying purposes for personal health information

The purpose of the PRAG project is to develop a methodology and grouping software for population grouping, developed using CIHI data and expertise. The grouping software will assist CIHI and clients in monitoring population health, predicting health care utilization patterns, surveillance and monitoring of diseases, and explaining variations in health care resource use, and will provide a foundation for funding models. It will also allow comparisons of inputs across jurisdictions and will provide clients with a comprehensive basis for standardization of populations when conducting interjurisdictional analysis.

The PRAG development project will collect personal health information, including patient identifiers in the form of the jurisdiction-assigned health card numbers, in order to facilitate linkage of person-level data across data holdings and time. Collection of patient identifiers, for example, enables CIHI to add (i.e., link) PRAG project-specific information to information that it already holds about a patient's contact with the health care system (e.g., hospital stay data collected in the Discharge Abstract Database and National Ambulatory Care Reporting System).

### 3.4 Principle 3: Consent for the collection, use or disclosure of personal health information

Ministries of health will disclose PRAG project-specific data to CIHI for the purposes of developing the PRAG methodology. CIHI is a secondary collector of data and will not have direct contact with patients, health service providers or facilities supplying data used in the PRAG to ministries of health for this project. CIHI relies on the data providers to meet their data collection, use and disclosure rules and responsibilities, including those related to consent and notification, as outlined in jurisdiction-applicable laws, regulations and policies.

### 3.5 Principle 4: Limiting collection of personal health information

CIHI is committed to the principle of data minimization. Per sections 1 and 2 of CIHI's [Privacy Policy, 2010](#), CIHI collects from data providers only the information that is reasonably required for health system uses, including statistical analysis and reporting, in support of the management, evaluation or monitoring of the health care system.

CIHI limits its collection of personal health information to that which is necessary to support authorized data quality and analytical activities.

In addition to CIHI's established ongoing collections of health data, from time-to-time, CIHI may undertake new collections of health data, either for an ongoing program of work or for a time-limited specific project. New collections of either type require approval by the Executive Committee prior to initiating collection.

In June 2014, the PRAG project received Executive Committee approval to collect PRAG project-specific data (see Table 1).

The PRAG is a time-limited project that requires collection of some data not already integrated into routine, standardized data flow to CIHI. PRAG project-specific data was identified and supplied to CIHI through negotiations with each participating jurisdiction. The following are examples of personal health information and other data that may be considered sensitive from a patient perspective for each type of PRAG project-specific data collected by CIHI:

- Patient-level physician billing data not yet incorporated within the routine data flows to CIHI's Patient Level Physician Billing repository—Ontario and British Columbia will supply patient-level fee-for-service and non-fee-for-service claims data from their respective jurisdictions for specific use in the PRAG project. Data includes patient health card number, admission date, provider service and claim information, assessment date, service date, diagnostic code, residential postal code, birthdate and sex.
- Registered Persons data from Ontario, Saskatchewan, Alberta and British Columbia—RP data includes patient health card number, eligibility start and end date, postal code of residence, birthdate, sex and date of death for all persons registered with the respective provincial health care services plan.
- Alberta Health Services Patient Longitudinal Data File and Health Services Patient Cost Data File—These contain 10 years of longitudinal hospital, ambulatory care and physician claims data for all people registered with the Alberta health insurance system, and the cost data related to each person in the longitudinal file. Data includes patient health card number, eligibility start date, eligibility end date, birthdate, sex and date of death.

The rationale for the collection of PRAG project-specific elements that could present an increased risk of direct or indirect identification is provided in the appendix.

### 3.6 Principle 5: Limiting use, disclosure and retention of personal health information

#### Limiting use

CIHI will limit the use of all data in the PRAG project to authorized purposes, as described in Section 3.3, in compliance with applicable agreements. CIHI staff will be permitted to access and use data on a need-to-know basis only, including for data processing and quality management, producing statistics and data files, conducting analyses and completing project deliverables. All CIHI staff are required to sign a confidentiality agreement at the commencement of employment, and they are subsequently required to renew their commitment to privacy yearly.

As described in Section 2.2, the original health card numbers supplied to CIHI are removed and replaced with consistently encrypted health card numbers, both for the data already held by CIHI and the PRAG project-specific data collected (original health card numbers are removed and replaced upon receipt). Since 2009, data sets used for internal CIHI analysis purposes do not contain identifiers, such as unencrypted health card numbers. Health card numbers in an unencrypted form are available to CIHI staff on an exceptional, need-to-know basis only, subject to internal approval processes, as set out in CIHI's *Privacy Policy and Procedures, 2010*.

## Data linkage

Data linkages are performed between the PRAG project-specific data and other CIHI data sources. While this potentially creates a greater risk of identification of an individual, CIHI will undertake the following mitigating steps to reduce the risk.

Sections 14 to 31 of CIHI's [Privacy Policy, 2010](#) govern linkage of records of personal health information. Pursuant to this policy, CIHI permits the linkage of personal health information under certain circumstances. Data linkage within a single data holding for CIHI's own purposes is generally permitted. Data linkage across data holdings for CIHI's own purposes and all third-party requests for data linkage are subject to an internal review and approval process. When carrying out data linkages, CIHI will generally do so using encrypted health card numbers. The linked data remains subject to the use and disclosure provisions in the [Privacy Policy, 2010](#).

Criteria for approval of data linkages are set out in Section 24 of CIHI's [Privacy Policy, 2010](#), as follows:

1. The individuals whose personal health information is used for data linkage have consented to the data linkage; or
2. All of the following criteria are met:
  - a. The purpose of the data linkage is consistent with CIHI's mandate;
  - b. The public benefits of the linkage significantly offset any risks to the privacy of individuals;
  - c. The results of the data linkage will not be used for any purpose that would be detrimental to the individuals that the personal health information concerns;
  - d. The data linkage is for a time-limited specific project and the linked data will be subsequently destroyed in a manner consistent with sections 28 and 29; or
  - e. The data linkage is for purposes of an approved CIHI ongoing program of work where the linked data will be retained for as long as necessary to meet the identified purposes and, when no longer required, will be destroyed in a manner consistent with sections 28 and 29; and
  - f. The data linkage has demonstrable savings over other alternatives or is the only practical alternative.

Section 28 of CIHI's [Privacy Policy, 2010](#) sets out the requirement that CIHI will destroy personal health information and de-identified data in a secure manner, using destruction methodologies appropriate to the format, media or device, such that reconstruction is not reasonably foreseeable.

Section 29 of CIHI's [Privacy Policy, 2010](#) further requires that for linked data, secure destruction will occur within 1 year after publication of the resulting analysis or 3 years after the linkage, whichever is sooner, in a manner consistent with CIHI's Information Destruction Standard. For linked data resulting from a CIHI ongoing program of work, secure destruction will occur when the linked data is no longer required to meet the identified purposes, in a manner consistent with CIHI's Information Destruction Standard. This requirement applies to both data linkages for CIHI's own purposes and for third-party data requests.

In April 2013, the PRAG project received approval from CIHI's Privacy, Confidentiality and Security team to perform data linkage using encrypted health card numbers for purposes of an approved ongoing program of work.

## Return of own data

Section 34 of CIHI's [Privacy Policy, 2010](#) establishes that the return of data to the ministry of health that originally provided it to CIHI is not considered a disclosure; rather, it is considered a use. CIHI may return data used in the PRAG project via its web-based eServices or other approved CIHI method of dissemination.

## Limiting disclosure

### Public release of PRAG data

Given that the purpose of the PRAG project is the development of the grouping methodology, SAS software that will apply the population grouping methodology and related documentation, publication of any data used in PRAG development by the PRAG project is unlikely. Any CIHI release of data, were it to take place, would be aggregate data designed to minimize any risk of identification and residual disclosure, in compliance with CIHI's [Privacy Policy, 2010](#). This generally requires a minimum of 5 observations per cell.

## Limiting retention

CIHI will retain PRAG project-specific data for as long as necessary to meet the identified purposes, in compliance with applicable agreements and retention schedules, and when no longer required, data will be destroyed in compliance with sections 28 and 29 of CIHI's [Privacy Policy, 2010](#).

## 3.7 Principle 6: Accuracy of personal health information

In compliance with CIHI's Data Quality Framework Assessment Policy, CIHI internal data sources used in the PRAG are subject to data quality assessment on a regular basis, based on CIHI's [Information Quality Framework](#). The process of completing the framework includes numerous activities to assess the various dimensions of quality, including the accuracy of the CIHI data.

Given the time-limited nature of the project, PRAG project-specific data used by CIHI will be accepted as supplied by each data provider, and subject to limited data quality assessment based on project requirements.

## 3.8 Principle 7: Safeguards for personal health information

### CIHI's Privacy and Security Framework

CIHI has developed a [Privacy and Security Framework](#) to provide a comprehensive approach to privacy and security management. Based on best practices from across the public, private and health sectors, the framework is designed to coordinate CIHI's privacy and security policies and provide an integrated view of the organization's information management practices. Key aspects of CIHI's system security with respect to the data used in the PRAG project are highlighted below.

#### System security

CIHI recognizes that information is secure only if it is secure throughout its entire lifecycle: creation and collection, access, retention and storage, use, disclosure and disposition. Accordingly, CIHI has a comprehensive suite of policies that specifies the necessary controls for the protection of information in both physical and electronic formats, up to and including robust encryption and secure destruction. This suite of policies and the associated standards, guidelines and operating procedures reflect best practices in privacy, information security and records management for the protection of the confidentiality, integrity and availability of CIHI's information assets.

System control and audit logs are an integral component of CIHI's Information Security Program. CIHI's system control and audit logs are immutable. Analysis at CIHI is generally conducted with the use of de-identified record-level data, where the health card number has been removed or encrypted. In exceptional instances, staff will require access to original health card numbers. Section 10 of CIHI's *Privacy Policy and Procedures, 2010* sets out strict controls to ensure access is approved at the appropriate level and in the appropriate circumstances, and that the principle of data minimization is adhered to at all times. CIHI logs access to personal health information as follows:

- Access to health card numbers and patient names (rarely collected) within CIHI's operational production databases;
- Access to data files containing personal health information extracted from CIHI's operational production databases and made available to the internal analytical community on an exceptional basis; and
- Changes to permissions in operational production databases.

CIHI's employees are made aware of the importance of maintaining the confidentiality of personal health information and other sensitive information through a mandatory privacy and security training program and through ongoing communications about CIHI's privacy and security policies and procedures. Employees attempting to access a CIHI information system must confirm, prior to each logon attempt, their understanding that they may not access or use the computer system without CIHI's express prior authority or in excess of that authority.

CIHI is committed to safeguarding its information technology ecosystem, securing its data holdings and protecting information with administrative, physical and technical security safeguards appropriate to the sensitivity of the information. Audits are an important component of CIHI's



overall Information Security program; they are intended to ensure that best practices are being followed and they assess compliance with all information security policies, procedures and practices implemented by CIHI. Audits are used to assess, among other things, the technical compliance of information-processing systems with best practices and published architectural and security standards; CIHI's ability to safeguard its information and information-processing systems against threats and vulnerabilities; and the overall security posture of CIHI's technical infrastructure, including networks, servers, firewalls, software and applications.

An important component of CIHI's audit program is regular third-party vulnerability assessments and penetration tests of its infrastructure and selected applications. All recommendations resulting from third-party audits are tracked in the Corporate Action Plan Master Log of Recommendations, and action is taken accordingly.

### 3.9 Principle 8: Openness about the management of personal health information

CIHI makes information available about its privacy policies, data practices and programs relating to the management of personal health information. Specifically, CIHI's Privacy and Security Framework and [Privacy Policy, 2010](#) are available to the public on its corporate website ([www.cihi.ca](http://www.cihi.ca)).

### 3.10 Principle 9: Individual access to, and amendment of, personal health information

Personal health information held by CIHI is not used by CIHI to make any administrative or personal health decisions affecting the individual. Requests from individuals seeking access to their personal health information will be processed in accordance with sections 60 to 63 of CIHI's [Privacy Policy, 2010](#).

### 3.11 Principle 10: Complaints about CIHI's handling of personal health information

As set out in sections 64 and 65 of CIHI's [Privacy Policy, 2010](#), complaints about CIHI's handling of personal health information are investigated by the chief privacy officer, who may direct an inquiry or complaint to the privacy commissioner of the jurisdiction of the person making the inquiry or complaint.

## 4 Privacy assessment summary and conclusion

There are no recommendations at this time and privacy risks identified during this assessment have been mitigated. This PIA will be updated or renewed in compliance with CIHI's [Privacy Impact Assessment Policy](#).

## Appendix A: Jurisdiction-specific risk of identification

The following tables describe the jurisdiction-specific data elements that could present an increased risk of direct or indirect identification of an individual, including the jurisdiction-specific data element definitions and a rationale for their collection.

**Table A1:** Patient-level physician billing data not yet included in CIHI's PLPB Repository

Data element and reason for collection/comments	Ontario	British Columbia
<b>Patient's Identifier:</b> Patient health card number <b>Rationale:</b> Used to link to data in other CIHI databases to provide a comprehensive picture of each patient's clinical profile	X	X
<b>Patient's Postal Code:</b> Patient full postal code of residence <b>Rationale:</b> Used for geographical analysis of service location compared with patient location of residence and to append spatial variables from other data sources (e.g., census)	X	X
<b>Sex:</b> Sex of patient <b>Rationale:</b> Used when looking at sex breakdown in any analysis	X	X
<b>Service Location Indicator:</b> Full postal code populated only if service event location is the patient's home <b>Rationale:</b> Used for geographical analysis of service location compared with patient location of residence	X	X

**Note**

X The data element is captured by the jurisdiction.

**Table A2:** Registered Persons Data

Data element and reason for collection/comments	Ontario	Saskatchewan	Alberta	British Columbia
<b>Patient's Identifier:</b> Patient health card number <b>Rationale:</b> Used to link to data in other CIHI databases to provide a comprehensive picture of each patient's clinical profile	X	X	X	X
<b>Patient's Postal Code:</b> Patient full postal code of residence <b>Rationale:</b> Used for geographical analysis of service location compared with patient location of residence and to append spatial variables from other data sources (e.g., census)	X	X	X	X
<b>Sex:</b> Sex of patient <b>Rationale:</b> Used when looking at sex breakdown in any analysis	X	X	X	X

Data element and reason for collection/comments	Ontario	Saskatchewan	Alberta	British Columbia
<p><b>Patients Death Date:</b> Date of death (if applicable)</p> <p><b>Rationale:</b> Patient death date (if applicable) will be used to model cost in the final year of life. The final year of life is often a high-cost year and so it is important to know when individuals died. The exact date of death is important in modelling cost based on number of months of life in a given fiscal year.</p>	X	X	X	X

**Note**

X The data element is captured by the jurisdiction.

**Table A3:** Alberta Health Services Patient Longitudinal Data File and Patient Cost Data File

Data element and reason for collection/comments
<p><b>Patient's Identifier:</b> Patient health card number</p> <p><b>Rationale:</b> Used to link to data in other CIHI databases to provide a comprehensive picture of each patient's clinical profile</p>
<p><b>Patient's Postal Code:</b> Patient full postal code of residence</p> <p><b>Rationale:</b> Used for geographical analysis of service location compared with patient location of residence and to append spatial variables from other data sources (e.g., census)</p>
<p><b>Sex:</b> Sex of patient</p> <p><b>Rationale:</b> Used when looking at sex breakdown in any analysis</p>

## Appendix B: Text alternative for figure

### Text alternative for Figure: Data flow, Population Risk Adjustment Grouping project

This figure illustrates the high-level data flow for the PRAG project.

Much of the data used in the PRAG project is sourced directly from existing internal CIHI data holdings (PLPB, DAD, NACRS, CCRS and CPCD). Some additional PRAG-specific data is collected directly from provincial and territorial ministries of health via CIHI's secure web-based or server-to-server applications.

The original health care numbers contained in record-level PRAG data from both sources are encrypted and integrated into CIHI's SAS analytical environment, where they can be accessed on a need-to-know basis by authorized CIHI staff.

The PRAG project returns customized record-level and aggregate reports to respective ministries of health, and releases limited aggregate statistics and analyses to third parties.

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Cette publication est aussi disponible en français sous le titre *Évaluation des incidences sur la vie privée du projet de regroupement ajusté selon les risques de la population, janvier 2015.*

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