# International collation and sharing of information on data standards, quality & definitions

## What can we do together?

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Dec 5, 2008, London

# Outline

- International Methodology Consortium for Coded Health Information (IMECCHI)
- Datasets holding
- Data structure/elements
- Validity/comparability
- What can do together?

# International Methodology Consortium for Coded Health Information (IMECCHI)

**Optimal methodologies for deriving knowledge and wisdom from health data.**

BMC Health Services Research

BioMed Central

Correspondence

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# Identifying priorities in methodological research using ICD-9-CM and ICD-10 administrative data: report from an international consortium

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# Research Priorities

## Some examples…

- International meta-data documentation
- ICD-9 to 10 translation of PSI's
- Implementation and evaluation of diagnosis-type indicators
- Documentation of health system coding standards and training programs
- International development and validation of internal consistency systems for data validity

# Second Meeting – 2006 Montreux, Switzerland

- Refinement of research agenda
- Identification of core initiatives
  - Patient safety indicators
  - International meta-data project
- Development of Terms of Reference

# Third meeting - Calgary 2008

**Theme 1: Administrative Data Features**

- A compendium of meta-data
- International disease coding systems
- Validity of administrative data for clinical conditions

**Theme 2: Optimization of Administrative Data**

- Shadow billing and data completeness
- Measurement error in diagnostic codes
- Interventions for physicians, billing staff and coders

**Theme 3: Emerging Methods for EHR Data**

- Risk adjustment using laboratory and vital sign EHR data
- Assessment of symptom collection methods in primary care
- Ethical and legal issues in EHR research

# International collaboration

- Many advantages
  - Consensus on methodologies
  - Access to regional networks and resources
  - International comparisons
  - Harmonization of strategies
  - Potential bridging of national and international agendas
  - Opportunity for linkages with WHO, OECD

# www.IMECCHI.org

**For more information, please contact**

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# Examples of Canadian Data Holdings

# Where Can you Get Data in Canada?

- National Organizations
  - Canadian Institute of Health Information
  - Statistics Canada
  - Health Canada
- Provincial Organizations
  - Ministries of health
- Research Institutes/Universities
- Regional Organizations
  - Hospitals, etc.

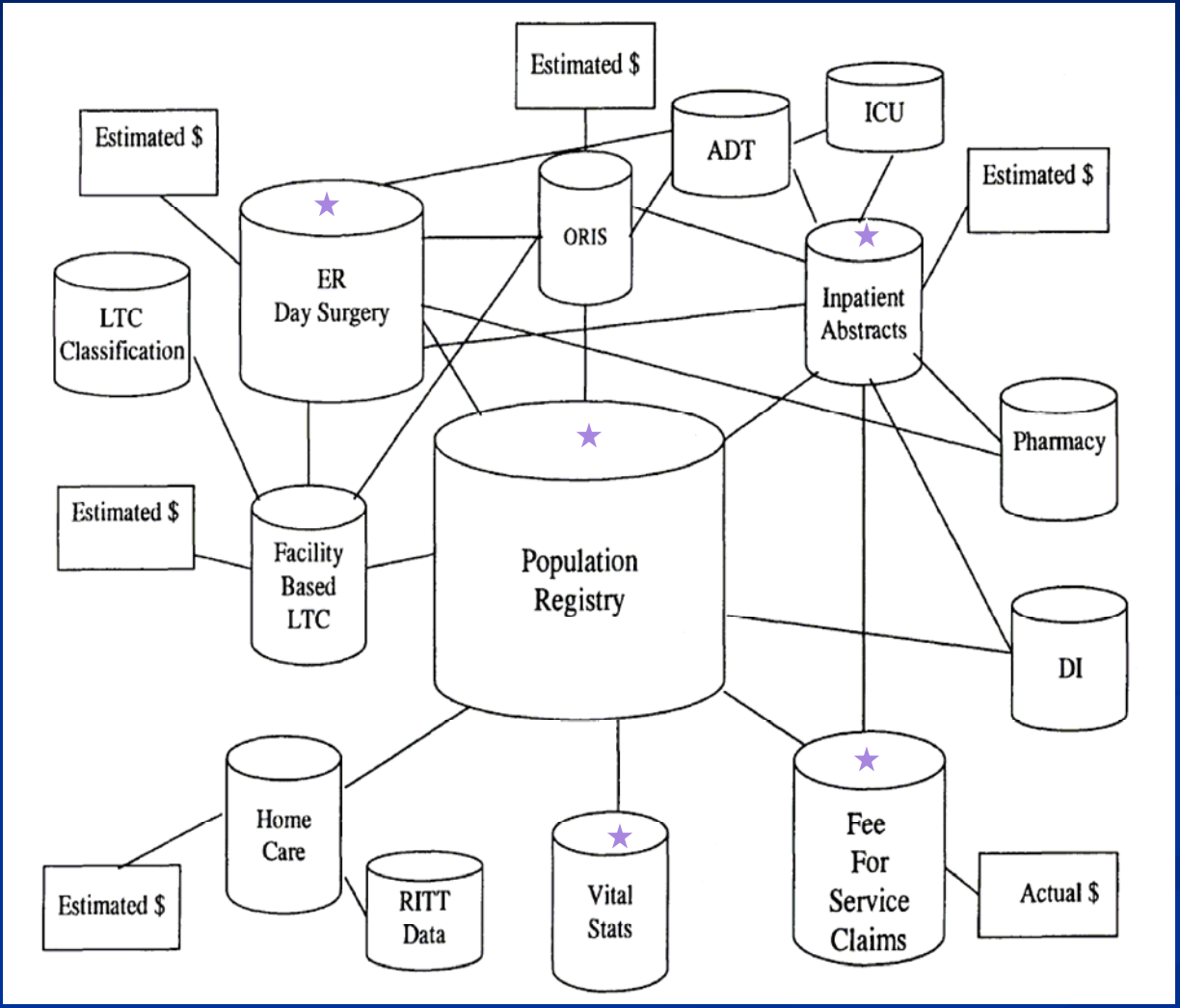
# Canadian Institute of Health Information Data Holdings

- Discharge Abstract Database
- Hospital Morbidity
- Ambulatory Care
- Hospital Mental Health
- Therapeutic Abortions
- Organ Registry
- Trauma Registries
- Joint Replacement Registry
- Continuing Care Reporting System
- Home Care Reporting System
- Rehabilitation Reporting System
- Ontario Mental Health Reporting System
- Medical Imaging Technology
- Prescribed Drug

# Provincial Databases

- Health insurance registry
- Hospital discharges
- Emergency/day surgery
- Physician claims
- Home care
- Long term care
- Drugs

# Calgary Health Region Data Holdings




ER/Day Surgery = **ACCS** or Ambulatory Care Classification System

Inpatient Abstracts = **DAD** or Discharge Abstract Database from CIHI

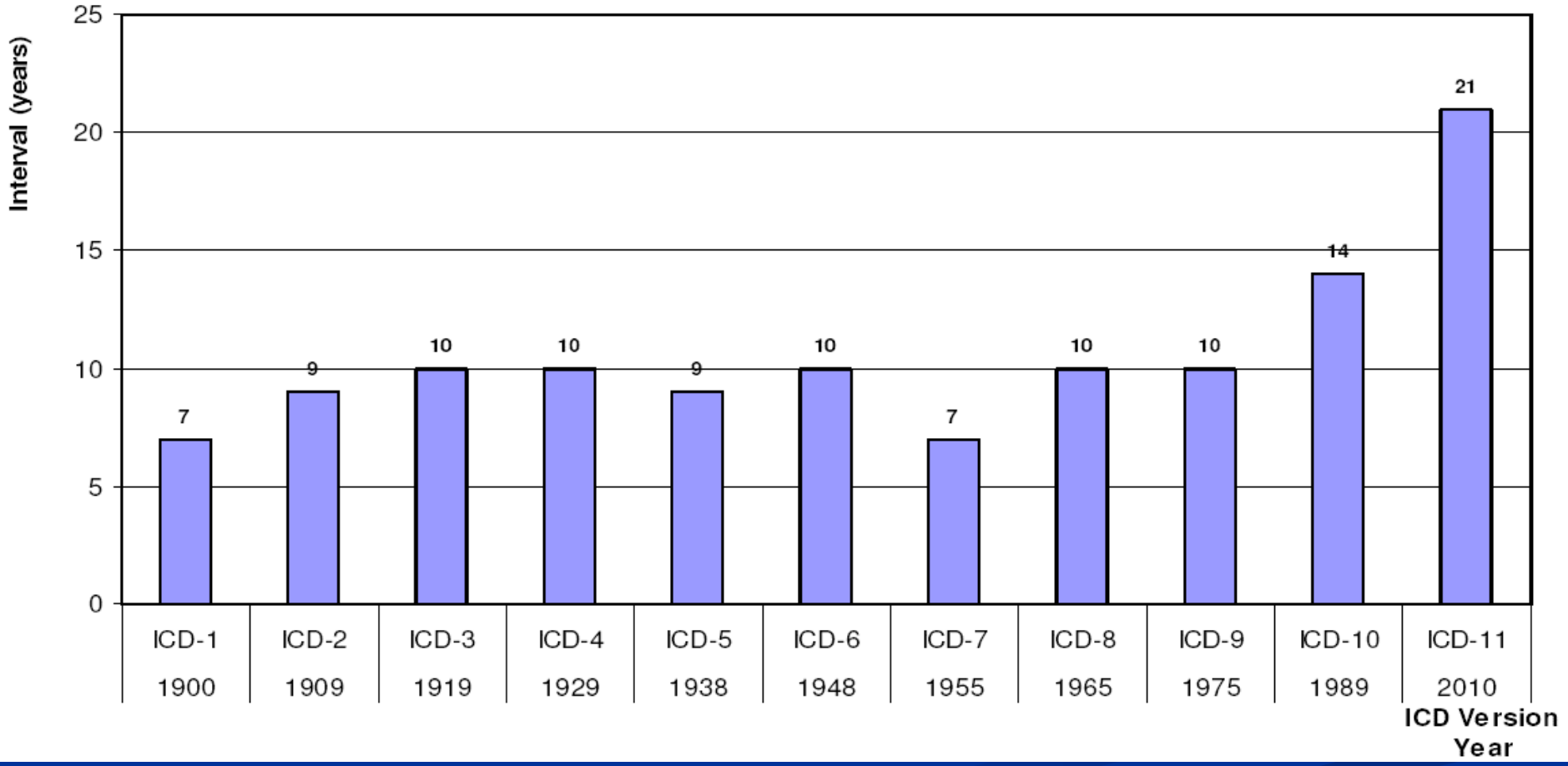
Fee For Service Claims = **PC claims** or physician claims

# Variables in Health Databases

Hospital Discharge Data

# Key Issues

- Coding system
- Number of coding fields for diagnosis and procedure
- Major diagnosis
- Diagnosis timing/type
- Disease grouping system


Interval (years)
25
20
15
10
5
0
7
9
10
10
9
10
7
10
10
14
21
ICD-1
1900
ICD-2
1909
ICD-3
1919
ICD-4
1929
ICD-5
1938
ICD-6
1948
ICD-7
1955
ICD-8
1965
ICD-9
1975
ICD-10
1989
ICD-11
2010
ICD Version
Year

# Diversity

- USA ICD-9 **C**M and ICD 10 **C**M
- Australia ICD-10 **A**M
- Canada ICD-10 **C**A
- Germany ICD-10 **G**M
- Thailand ICD-10 **T**M
- …
- Combined ICD *X M*

# Comparison

| Codes | ICD-10 CA 2006 (Canada) | ICD-10 GM 2007 (Germany) | ICD-10 AM 2006 (Australia) |
|---|---|---|---|
| A4151 | Septicemia due to Pseudomonas | Septicemia due to Escherichia coli [E. coli] | Sepsis due to Escherichia coli [E. Coli] |
| A4152 | Septicemia due to Serratia | Septicemia due to Pseudomonas | Sepsis due to Pseudomonas |
| G8201 | Flaccid paraplegia, complete | Flaccid paraparesis and paraplegia, incomplete, acute paresis of non traumatic genesis | Flaccid paraplegia, unspecified, acute |
| G8202 | Flaccid paraplegia, incomplete | Flaccid paraparesis and paraplegia, complete, chronic | Flaccid paraplegia, unspecified, chronic |
| L891 | Decubitus ulcer limited to breakdown of skin (stage 2) | Decubitus ulcer stage 1 | Decubitus [pressure] ulcer, stage II |
| L892 | Decubitus ulcer with fat layer exposed (stage 3) | Decubitus ulcer stage 2 | Decubitus [pressure] ulcer, stage III |
| L893 | Decubitus ulcer with depth involving muscle (stage 4) | Decubitus ulcer stage 3 | Decubitus [pressure] ulcer, stage IV |
| L894 | Decubitus ulcer with depth involving bone (stage 5) | Decubitus ulcer stage 4 | |
| S0620 | Diffuse brain injury without loss of consciousness | Diffuse brain and cerebellum injury, unspecified | Diffuse cerebral and cerebellar brain injury, unspecified |
| S0621 | Diffuse brain injury with brief loss of consciousness | Diffuse brain injury | Diffuse cerebral contusions |
| S0622 | Diffuse brain injury with moderate loss of consciousness | Diffuse cerebellum injury | Diffuse cerebellar contusions |
| S0623 | Diffuse brain injury with prolonged loss of consciousness with return to pre-existing level of consciousness | Multiple intracerebral and cerebral hematomas | Multiple intracerebral and cerebellar hematomas |

# Caution!!

- Common Codes But Different Descriptions

  V codes

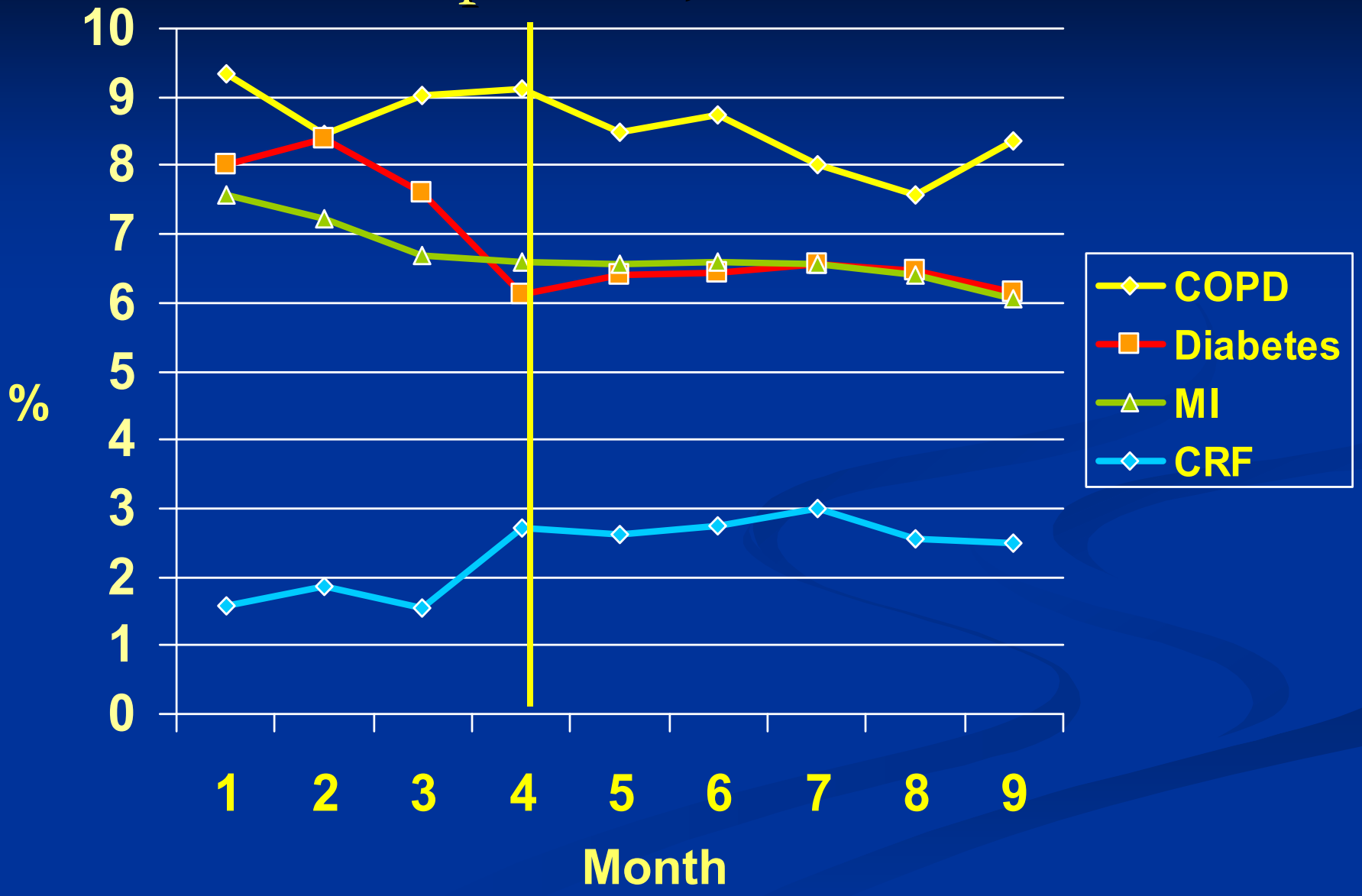
  E codes

# Disease and Procedure Classification

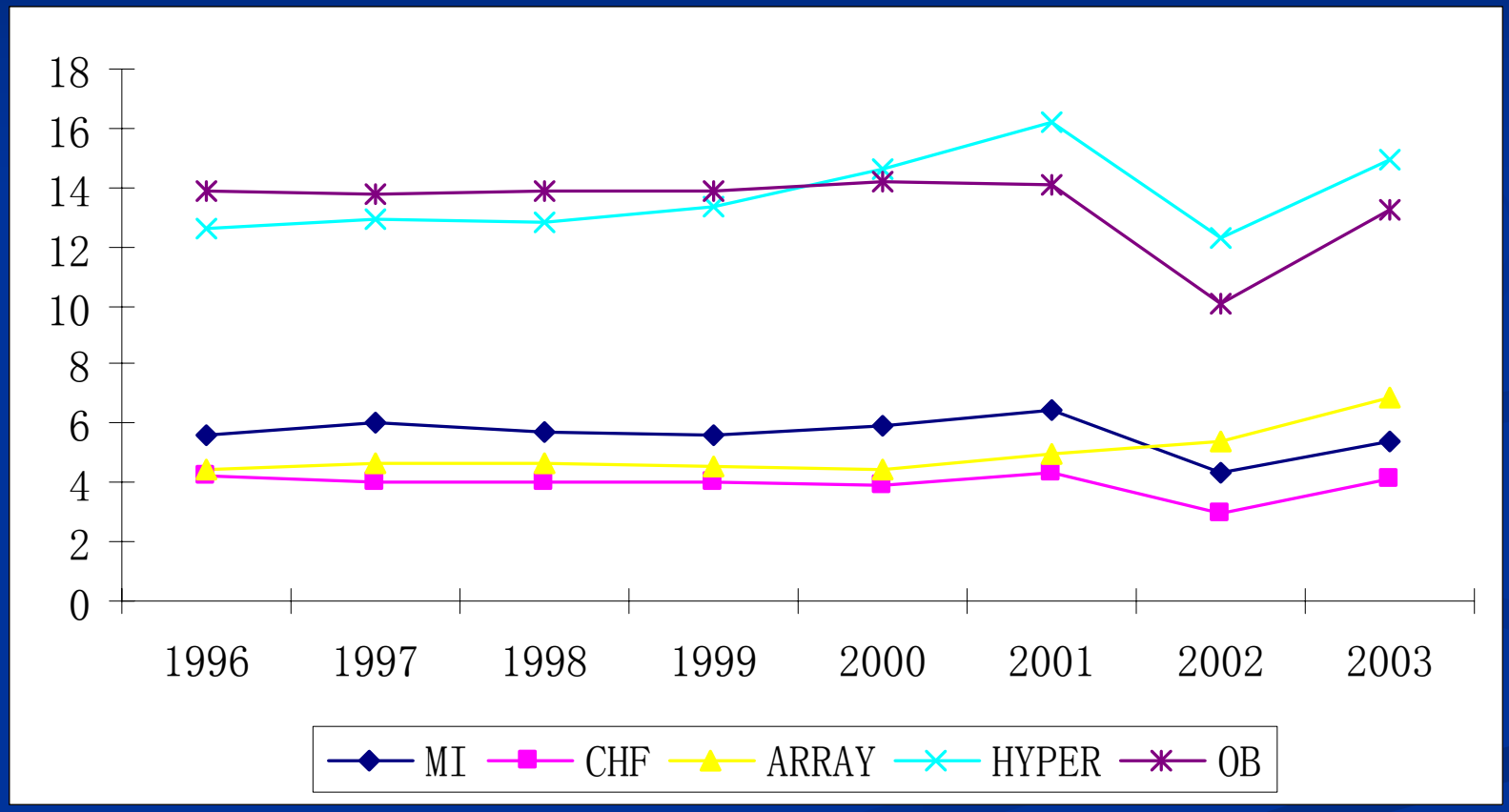
- ICD-9
- ICD-9-CM
- ICD-10-CA

- CCP
- ICD-9-CM
- CCI

# % Comorbidity in Calgary Health Region inpatients, 2002



# Alberta ICD-9-CM and ICD-10



# Coding system for dx and procedure?

# Administrative data

## Hospital discharge data

Dx1 Dxtype1, Dx1  Dxtype1… Dx16  Dxtype16

Pr1 Pr1date, Pr2 Pr2date …. Pr10 Pr10date

# Administrative data

## Hospital discharge data

Dx1 Dxtype1, Dx1 Dxtype1,,, Dx16 Dxtype16
M

M = Most responsible diagnosis - the condition associated with the longest length of stay or most resource intense.

# Administrative data

## Hospital discharge data

Dx1 Dxtype1, Dx1 Dxtype1,,, Dx16 Dxtype16

M 1

1 = Pre-Admit comorbidity - A diagnosis or condition that existed pre-admission and satisfies the requirements for determining comorbidity.

# Administrative data

## Hospital discharge data

Dx1 Dxtype1, Dx1 Dxtype1,,, Dx16 Dxtype16

M 1

2

2 = Post-admit comorbidity - A diagnosis or condition that arises post-admission and satisfies the requirements for determining comorbidity.

# Administrative data

## Hospital discharge data

Dx1 Dxtype1, Dx1 Dxtype1„ Dx16 Dxtype16

M 1

2

3

3 = Secondary diagnosis - A diagnosis or condition for which a patient may or may not have received treatment and does not satisfy the requirements for determining comorbidity.

# The development, evolution and modifications of ICD-10: challenges to the international comparability of morbidity data

N. Jetté, H. Quan, B. Hemmelgarn, S. Drosler, C. Maass, L. Moskal, W. Paoin, V. Sundararajan, S. Gao, R. Jakob, B. Üstün, W.A. Ghali

for the IMECCHI Investigators

# *Advances in Patient Safety*

AHRQ Agency for Healthcare Research and Quality
Advancing Excellence in Health Care

**Title: Adaptation of AHRQ Patient Safety Indicators for Use in ICD-10 Administrative Data by an International Consortium**

Hude Quan, Saskia Drösler, Vijaya Sundararajan, Eugene Wen, Bernard Burnand, Chantal Marie Couris, Patricia Halfon, Jean-Marie Januel, Edward Kelley, Niek Klazinga, Jean-Christophe Luthi, Lori Moskal, Eric Pradat, Patrick S. Romano, Jennie Shepheard, Lawrence So, Lalitha Sundaresan, Linda Tournay-Lewis, Béatrice Trombert-Paviot, Greg Webster, William A. Ghali, for the IMECCHI Investigators

# ICD-9-CM PSI

PSI 1: Complications of Anesthesia
PSI 2: Death in Low-mortality
PSI 3: Decubitus Ulcer
PSI 4: Failure to Rescue
PSI 5: Foreign Body Left During Procedure
PSI 6: Iatrogenic Pneumothorax
PSI 7: Selected Infections Due to Medical Care
PSI 8: Postoperative Hip Fracture
PSI 9: Postoperative Haemorrhage or Haematoma
PSI 10: Postoperative Physiologic and Metabolic Derangement
PSI 11: Posterative Respiratory Failure
PSI 12: Postoperative Pulmonary Embolism or Deep Vein Thrombosis
PSI 13: Postoperative Sepsis
PSI 14: Postoperative Wound Dehiscence
PSI 15: Accidental Puncture or Laceration
PSI 16: Transfusion Reaction
PSI 17: Birth Trauma—Injury to Neonate
PSI 18: Obstetric Trauma—Vaginal Delivery with Instrument
PSI 19: Obstetric Trauma—Vaginal Delivery without Instrument
PSI 20: Obstetric Trauma—Cesarean Delivery

AHRQ Agency for Healthcare Research and Quality
Advancing Excellence in Health Care

http://www.ahrq.gov/

# Need to harmonize AHRQ PSI administrative data definition between ICD-9-CM and ICD-10

# What grouping methods have been used in your datasets?

# Diagnosis-Related Group (DRG)

DRGs are assigned by a "grouper" program based on ICD diagnoses, procedures, age, sex, and the presence of complications or comorbidities.

- Further grouped into Major Diagnostic Categories (MDCs).
- Developed by 3M
- Classified about 500 groups
- Used as part of the prospective payment system
- Have been used since 1983

| MDC | Description |
|---|---|
| 0 | Ungroupable |
| 1 | Nervous System |
| 2 | Eye |
| 3 | Ear, Nose, Mouth And Throat |
| 4 | Respiratory System |
| 5 | Circulatory System |
| 6 | Digestive System |
| 7 | Hepatobiliary System And Pancreas |
| 8 | Musculoskeletal System And Connective Tissue |
| 9 | Skin, Subcutaneous Tissue And Breast |
| 10 | Endocrine, Nutritional And Metabolic System |
| 11 | Kidney And Urinary Tract |
| 12 | Male Reproductive System |

## DRG Versions

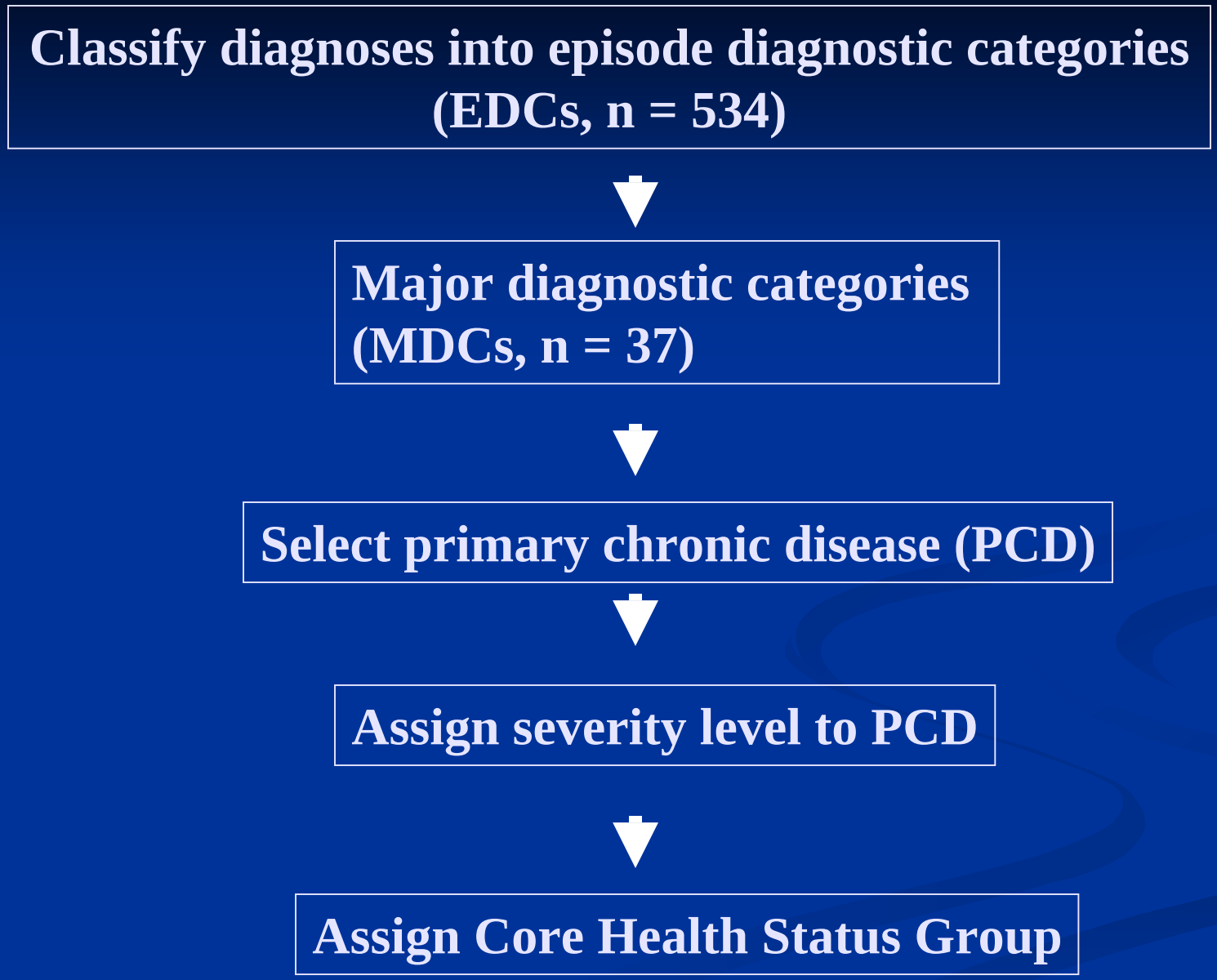
Medicare DRG
Refined DRGs (RDRG)
All Patient DRGs (APDRG)
Severity DRGs (SDRG)
All Patient Refined DRGs (APRDRG)
International-Refined DRGs (IRDRG)

# Case Mix Groups (CMG)

- **Developed by CIHI**
- **To group and describe types of inpatients discharged from acute-care hospitals.**
- **Modeled after the (DRG's) based on four criteria:**

1. **Patient groups had to make good clinical sense.**
2. **They had to be based on routinely collected data.**
3. **There had to be a manageable number of groups.**
4. **They had to be statistically homogeneous with respect to length of hospital stay.**

# Clinical Risk Groups Classification System (CRG)


Classify diagnoses into episode diagnostic categories (EDCs, n = 534)
Major diagnostic categories (MDCs, n = 37)
Select primary chronic disease (PCD)
Assign severity level to PCD
Assign Core Health Status Group

# Clinical Risk Groups Classification System (CRG)

**Core Health Status Groups:**

1. **Healthy**
2. **Significant acute diagnosis**
3. **Single minor chronic**
4. **Multiple minor chronic pairs**
5. **Single dominant or moderate chronic**
6. **Multiple significant chronic pairs**
7. **Chronic triplets**
8. **Dominant / metastasized / recurrent malignancies**
9. **Catastrophic**

# Validity and Comparability

# Key Issues

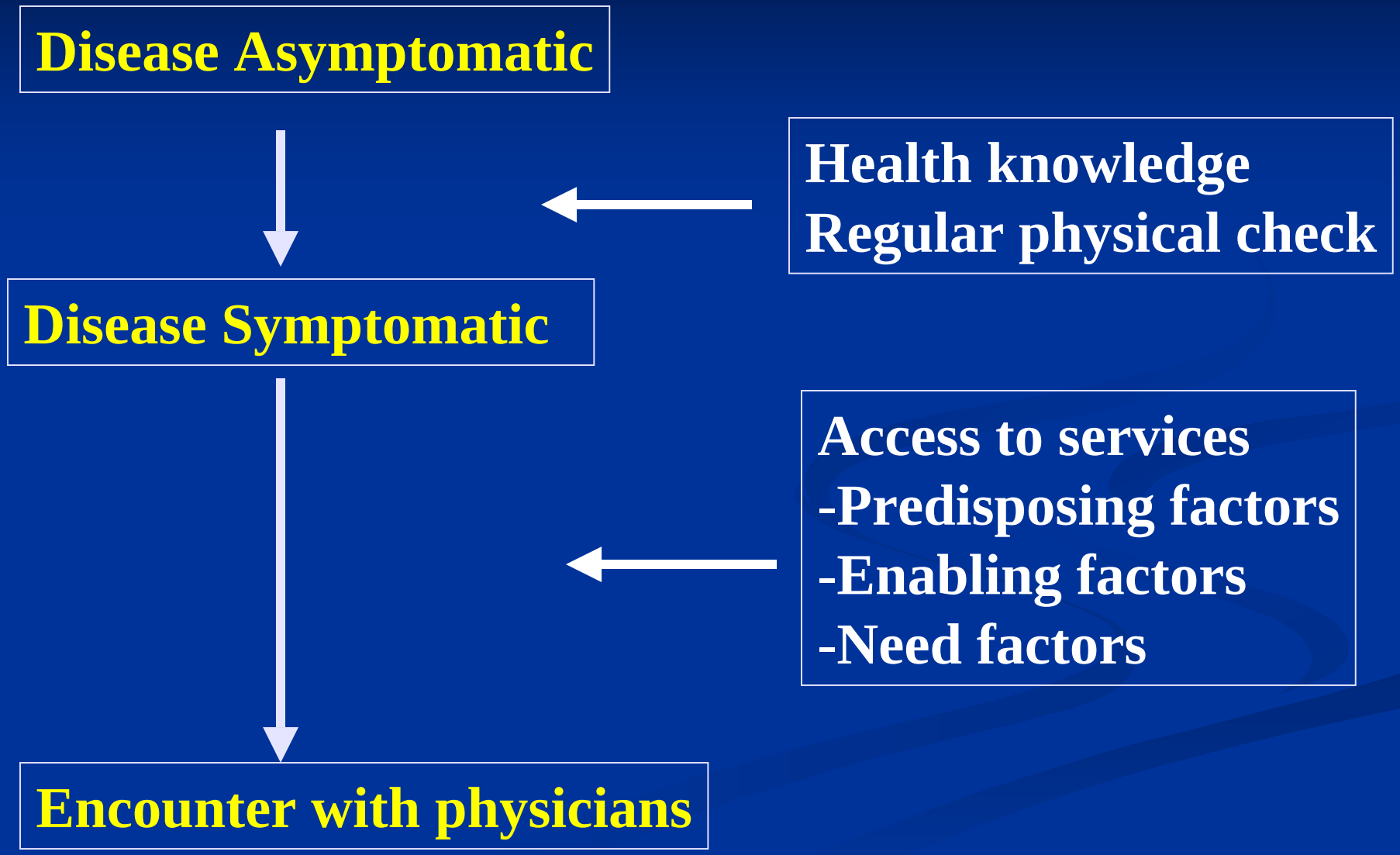
- ‘Gold Standard’
- ICD coding definition for conditions

# Hospital discharge data

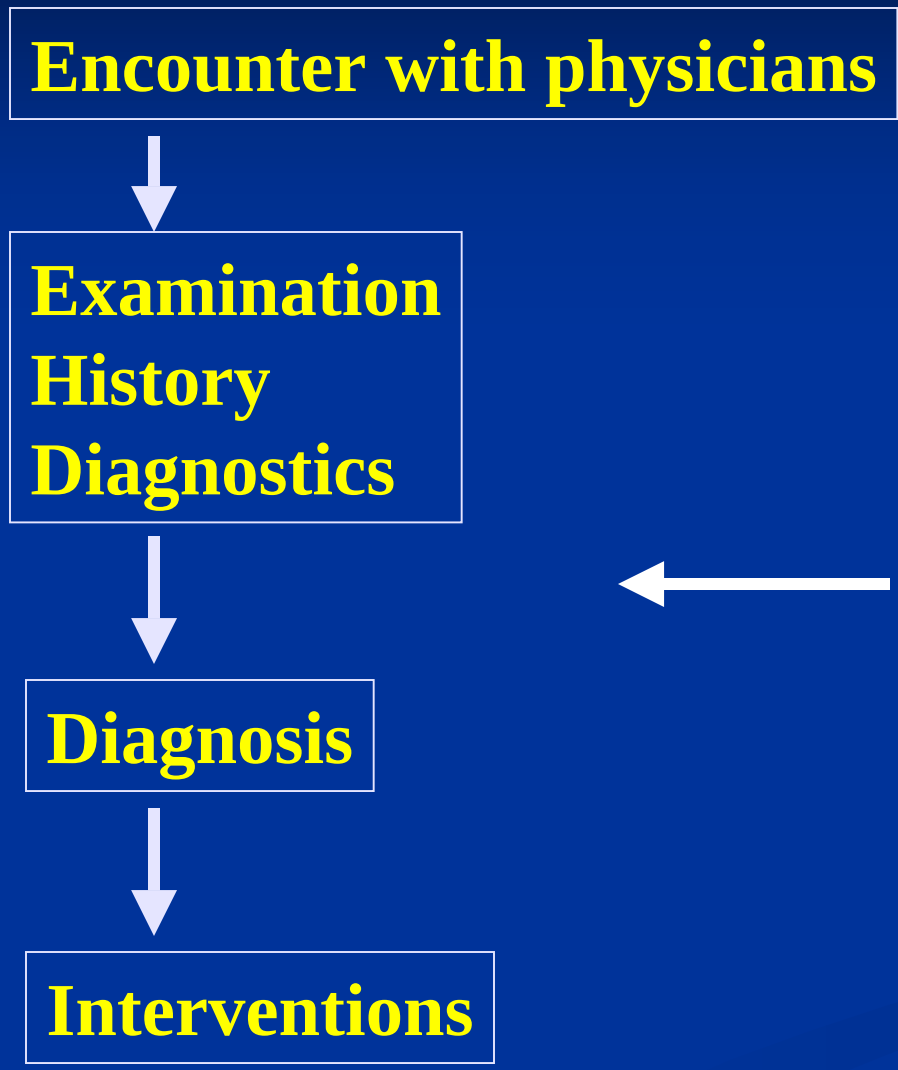
CIHI
ICIS

Alberta
HEALTH AND WELLNESS

# Sources of Bias in Administrative Data



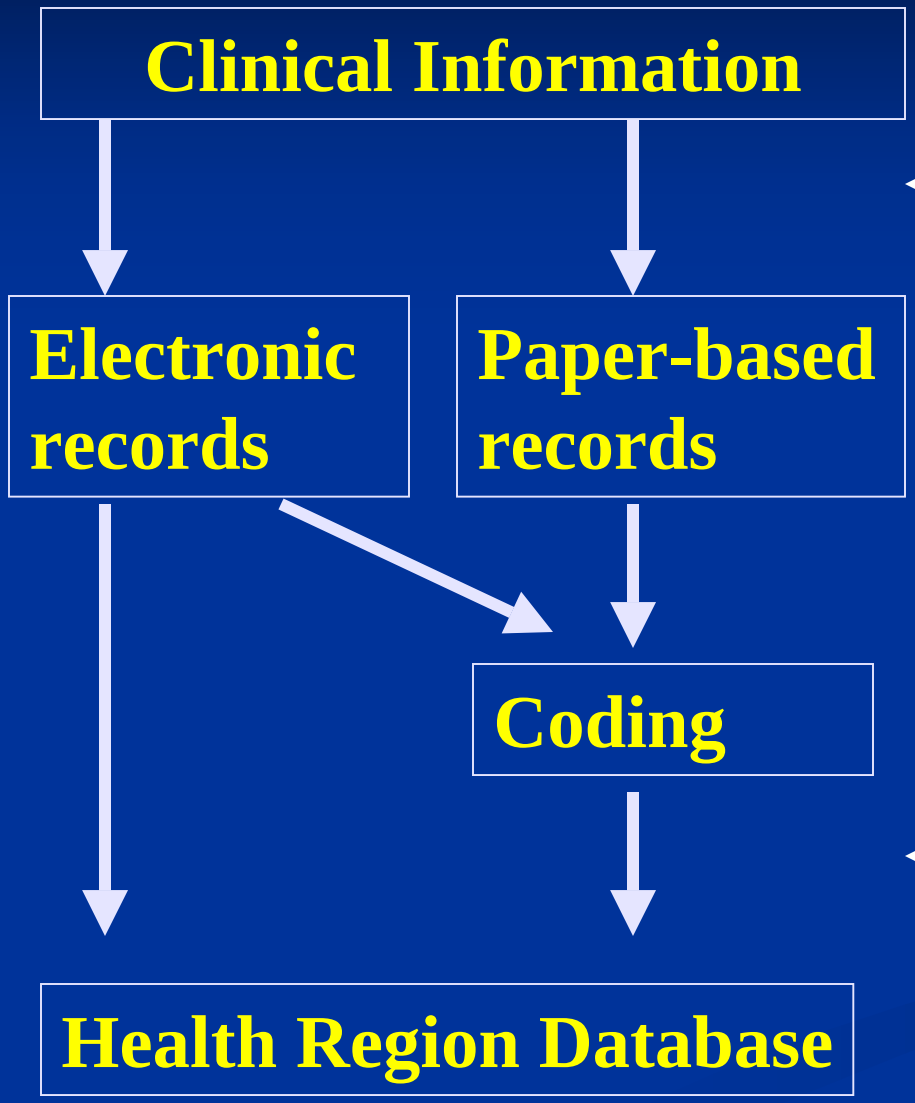
# Sources of Bias in Administrative Data




**Patient**
- Gender
- Urban/Rural, distance
- Race/ ethnicity
- Language

**Physician**
- Knowledge
- Experience
- Practice initiatives
- Attitudes on guidelines
- Follow-up
- Continuity of care

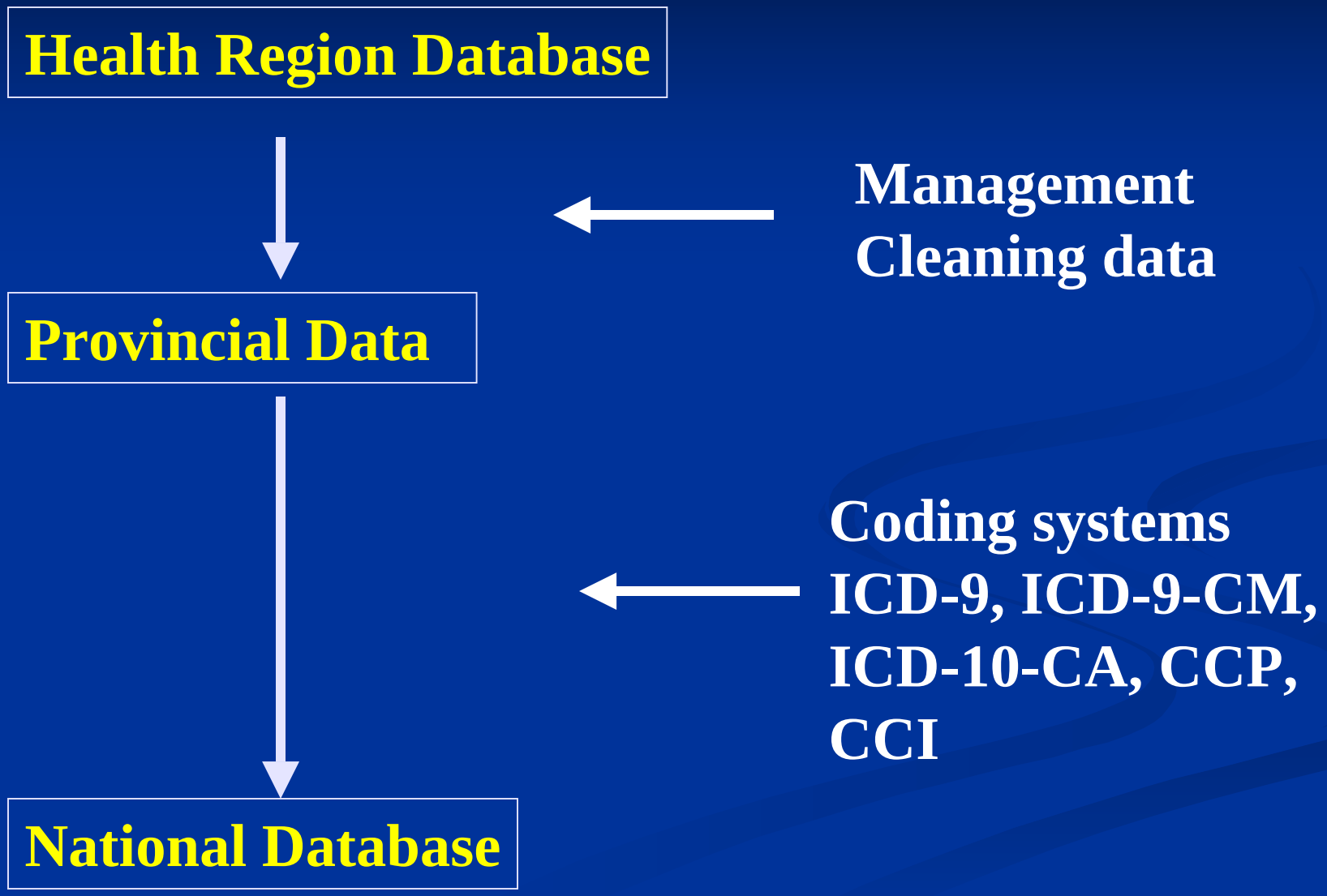
# Sources of Bias in Administrative Data




**Quality of charts**
- Speciality
- Hospital type
- Location
- Physician

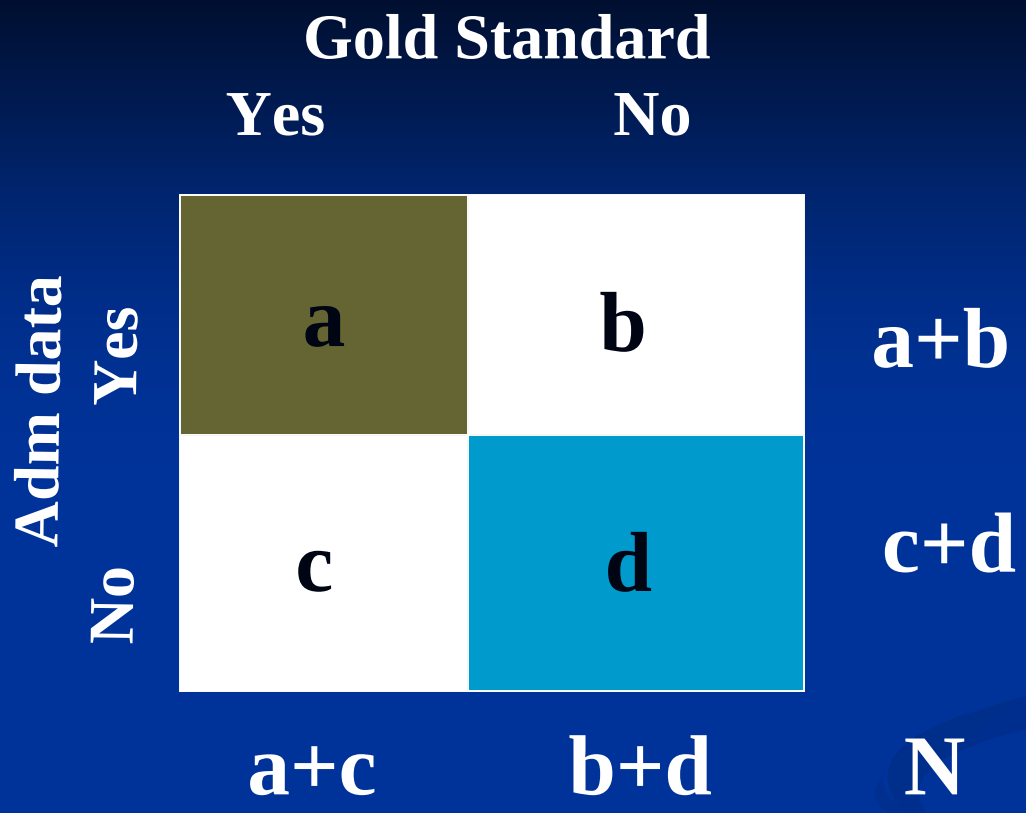
**Coding system**
**Coder training**
**Coding rules**
**Volume**
**Hospital**

# Sources of Bias in Administrative Data



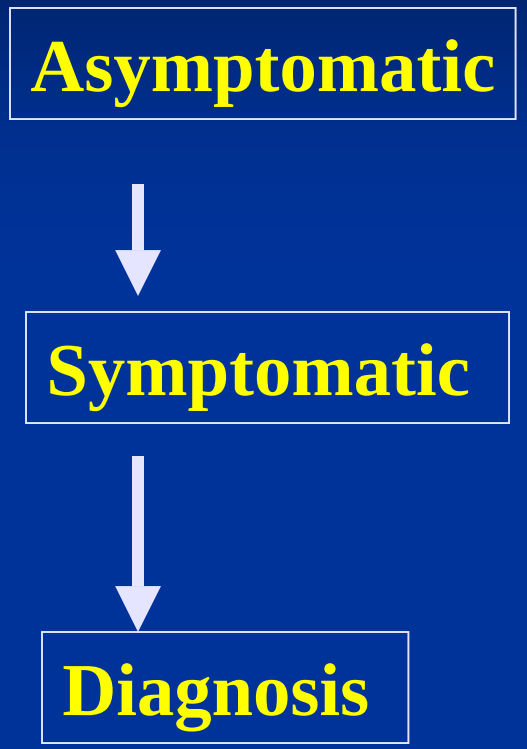
# Concepts

Sensitivity
Specificity
Negative Predictive value
Positive predictive value
Kappa




Sensitivity, specificity, positive predictive value
Negative predictive value, kappa

# “Gold standard”




- Diagnostics
- Survey – self-report
- Physical Measurement
- Disease registry
- Chart review
- Laboratory data

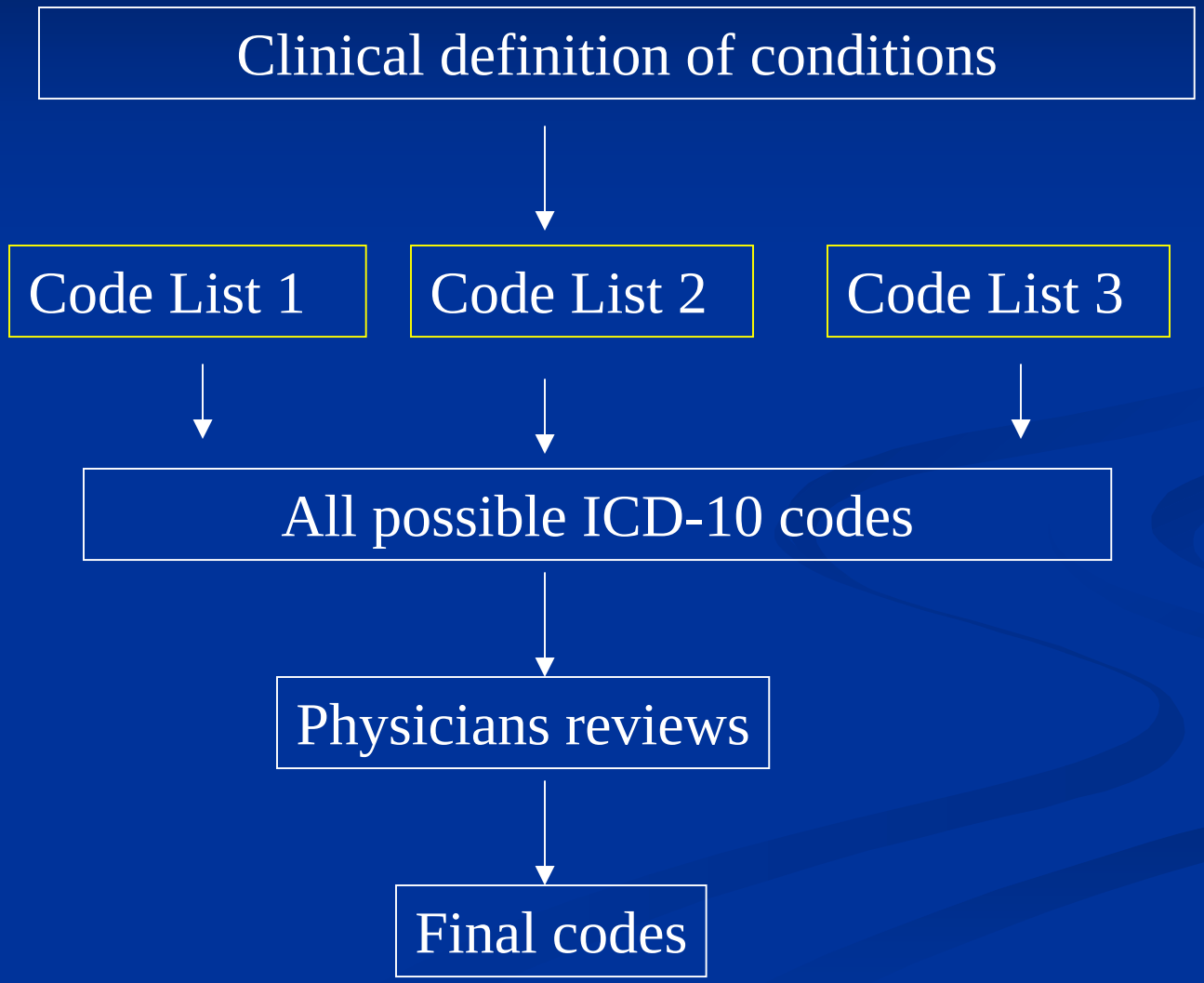
**Defining Conditions**

- Documentations
- Diagnosis criteria

# Development ICD-9/10 coding definitions for conditions

| Code | Definition |
|---|---|
| **ICD 9 CM** | |
| 410 | Acute myocardial infarction |
| 411 | Other acute and subacute forms of ischemic heart disease |
| 412 | Old myocardial infarction |
| 413 | Angina pectoris |
| 414 | Other forms of chronic ischemic heart disease |
| 427 | Cardiac dysrhythmias |
| 428 | Heart failure |
| 429 | Ill-defined descriptions and complications of heart disease |
| 518 | Other diseases of lung |
| 780 | General symptoms |
| 780.2 | Syncope and collaps |
| 785 | Symptoms involving cardiovascular system |
| 785.51 | Cardiogenic shock |
| 786 | Symptoms involving respiratory system and other chest symptoms |
| 786.5 | Chest pain |
| **ICD 10 CA** | |
| I20 | Angina pectoris |
| I21 | Acute myocardial infarction |
| I22 | Subsequent myocardial infarction |
| I23 | Certain current complications following acute myocardial infarction |
| I24 | Other acute ischemic heart diseases |
| I25 | Chronic ischemic heart disease |
| I25.2 | Old myocardial infarction |
| I46 | Cardiac arrest |
| I51 | Complications and ill-defined descriptions of heart disease |
| I51.3 | Intracardiac thrombosis, not elsewhere classified |

# ICD Definition Development



# Coding Algorithms for Defining Comorbidities in ICD-9-CM and ICD-10 Administrative Data

*Hude Quan, MD, PhD,*† Vijaya Sundararajan, MD, MPH, FACP,‡ Patricia Halfon, MD,§ Andrew Fong, BCOMM,* Bernard Burnand, MD, MPH,§ Jean-Christophe Luthi, MD, PhD,§ L. Duncan Saunders, MBBCh, PhD,¶ Cynthia A. Beck, MD, MASc,*‖ Thomas E. Feasby, MD,** and William A. Ghali, MD, MPH,*†,††*

**Objectives:** Implementation of the International Statistical Classification of Diseases and Related Health Problems, 10th Revision (ICD-10) coding system presents challenges for using administrative data. Recognizing this, we conducted a multistep process to develop ICD-10 coding algorithms to define Charlson and Elixhauser comorbidities in administrative data and assess the performance of the resulting algorithms.

**Methods:** ICD-10 coding algorithms were developed by "translation" of the ICD-9-CM codes constituting Deyo's (for Charlson comorbidities) and Elixhauser's coding algorithms and by physicians' assessment of the face-validity of selected ICD-10 codes. The process of carefully developing ICD-10 algorithms also produced modified and enhanced ICD-9-CM coding algorithms for the Charl-

**Results:** Among 56,585 patients in the ICD-9-CM data and 58,805 patients in the ICD-10 data, frequencies of the 17 Charlson comorbidities and the 30 Elixhauser comorbidities remained generally similar across algorithms. The new ICD-10 and enhanced ICD-9-CM coding algorithms either matched or outperformed the original Deyo and Elixhauser ICD-9-CM coding algorithms in predicting in-hospital mortality. The C-statistic was 0.842 for Deyo's ICD-9-CM coding algorithm, 0.860 for the ICD-10 coding algorithm, and 0.859 for the enhanced ICD-9-CM coding algorithm, 0.868 for the original Elixhauser ICD-9-CM coding algorithm, 0.870 for the ICD-10 coding algorithm and 0.878 for the enhanced ICD-9-CM coding algorithm.

**Conclusions:** These newly developed ICD-10 and ICD-9-CM comorbidity coding algorithms produce similar estimates of comor-

# Mortality in 4 country data

| Score | Canada | Switzerland | Australia | Japan |
|---|---|---|---|---|
| 0 | 0.36 | 0.51 | 0.37 | 1.53 |
| 1 | 2.43 | 2.83 | 2.81 | 2.60 |
| 2 | 4.24 | 3.09 | 5.80 | 3.75 |
| 3 | 8.51 | 5.68 | 8.24 | 6.25 |
| 4 | 10.26 | 7.57 | 11.05 | 6.55 |
| 5 | 16.54 | 12.30 | 15.96 | 8.13 |
| 6+ | 13.70 | 11.40 | 16.43 | 16.76 |
| C-statistics | 0.836 | 0.772 | 0.840 | 0.701 |

# Cross-National Comparative Performance of Three Versions of the ICD-10 Charlson Index

*Vijaya Sundararajan, MD, MPH,*† Hude Quan, MD, PhD,‡§ Patricia Halfon, MD,¶ Kiyohide Fushimi, MD, PhD,‖ Jean-Christophe Luthi, MD, PhD,¶ Bernard Burnand, MD, MPH,¶ and William A. Ghali, MD, MPH,‡§** for the International Methodology Consortium for Coded Health Information (IMECCHI)*

**Objective:** The Charlson comorbidity index has been widely used for risk adjustment in outcome studies using administrative health data. Recently, 3 International Statistical Classification of Diseases, Tenth Revision (ICD-10) translations have been published for the Charlson comorbidities. This study was conducted to compare the predictive performance of these versions (the Halfon, Sundararajan, and Quan versions) of the ICD-10 coding algorithms using data from 4 countries.

**Methods:** Data from Australia (N = 2000–2001, max 25 diagnosis codes), Canada (N = 2002–2003, max 16 diagnosis codes), Switzerland (N = 1999–2001, unlimited number of diagnosis codes), and Japan (N = 2003, max 11 diagnosis codes) were analyzed. Only the first admission for patients age 18 years and older, with a length of stay of ≥2 days was included. For each algorithm, 2 logistic regression models were fitted with hospital mortality as the outcome and the Charlson individual comorbidities or the Charlson index score as independent variables. The c-statistic (representing the area under the receiver operating characteristic curve) and its 95% probability bootstrap distribution were employed to evaluate model performance.

**Results:** Overall, within each population's data, the distribution of comorbidity level categories was similar across the 3 translations. The Quan version produced slightly higher median c-statistics than the Halfon or Sundararajan versions in all datasets. For example, in Japanese data, the median c-statistics were 0.712 (Quan), 0.709 (Sundararajan), and 0.694 (Halfon) using individual comorbidity coefficients. In general, the probability distributions between the Quan and the Sundararajan versions overlapped, whereas those between the Quan and the Halfon version did not.

**Conclusions:** Our analyses show that all of the ICD-10 versions of the Charlson algorithm performed satisfactorily (c-statistics 0.70–0.86), with the Quan version showing a trend toward outperforming the other versions in all data sets.

(*Med Care* 2007;45: 1210–1215)

Risk adjustment is a vital component in health services utilization and outcome studies. The Charlson Comorbidity Index, well-validated in many international studies, has facilitated this process.[1] Several ICD-9-CM coding algorithms of the Charlson index were developed for use with administrative hospital discharge abstract data.[2–4] After the recent implementation of International Statistical Classification of Diseases, Tenth Revision (ICD-10) 3 ICD-10 translations of the Charlson index were formulated in Switzerland (Halfon version),[5] Australia (Sundararajan version),[6] and Canada (Quan version)[7] (Table 1). Of these 3 translations, the Halfon and Sundararajan versions were developed independently of one another, using different approaches: clinical judgment about the original Charlson definition of comorbidities in combination with the Deyo ICD-9-CM codes in the Halfon version, and a computerized mapping file to translate the Deyo ICD-9-CM to ICD-10-AM followed by coder and clinical review for the Sundararajan version (Table 1). In comparison, the Quan version combined the strengths of the Halfon and Sundararajan versions and, to further improve on this base, incorporated an intensive clinician and professional coder panel review.[7]

With 3 versions of the Charlson comorbidity algorithm and the country-specific nature of ICD-10 codes, the question arises of how these algorithms perform when applied to administrative data routinely collected in various countries. No empirical evidence is available to address this question. Thus, we aimed to compare the predictive ability of the Halfon, Sundararajan, and Quan versions of the ICD-10

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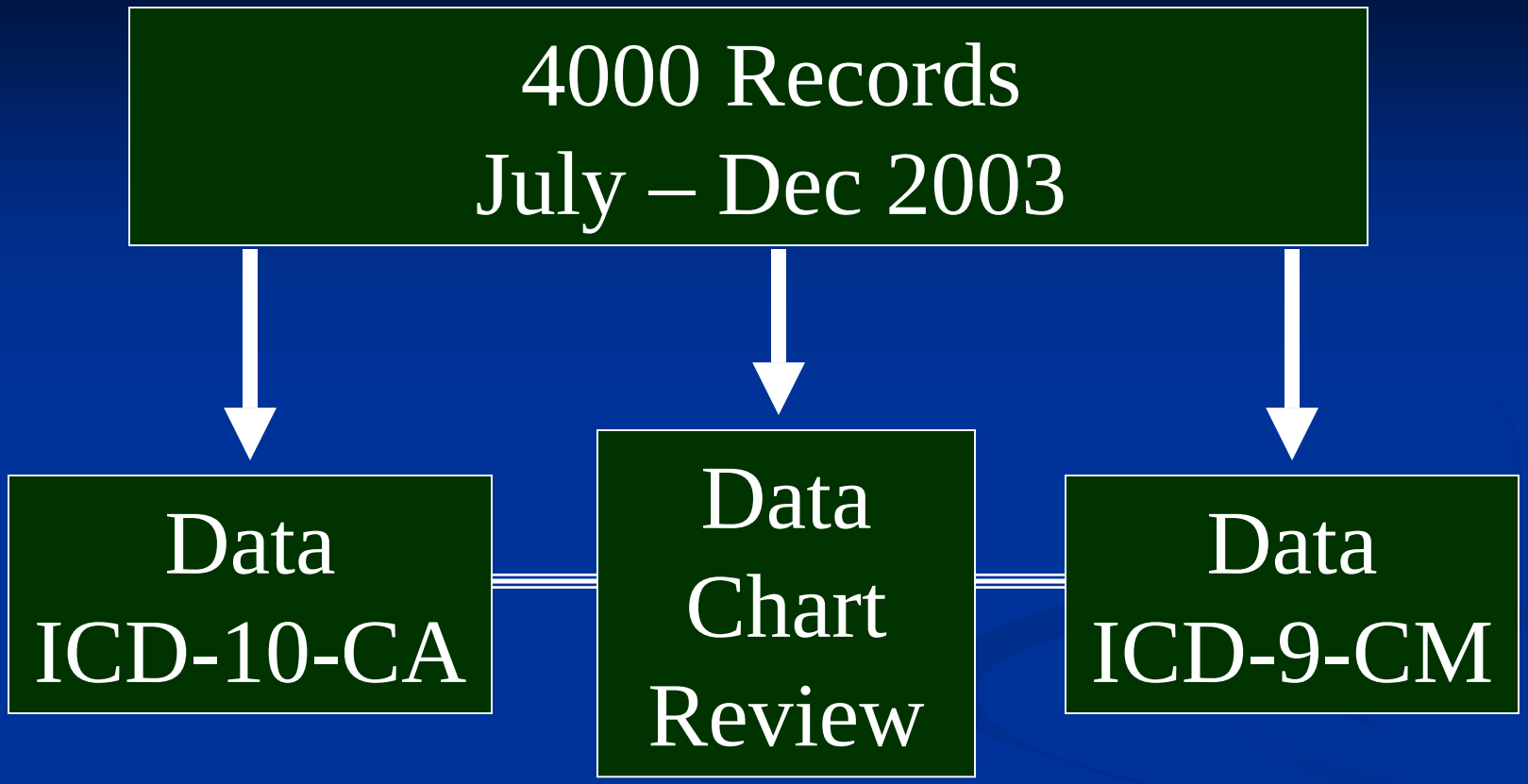
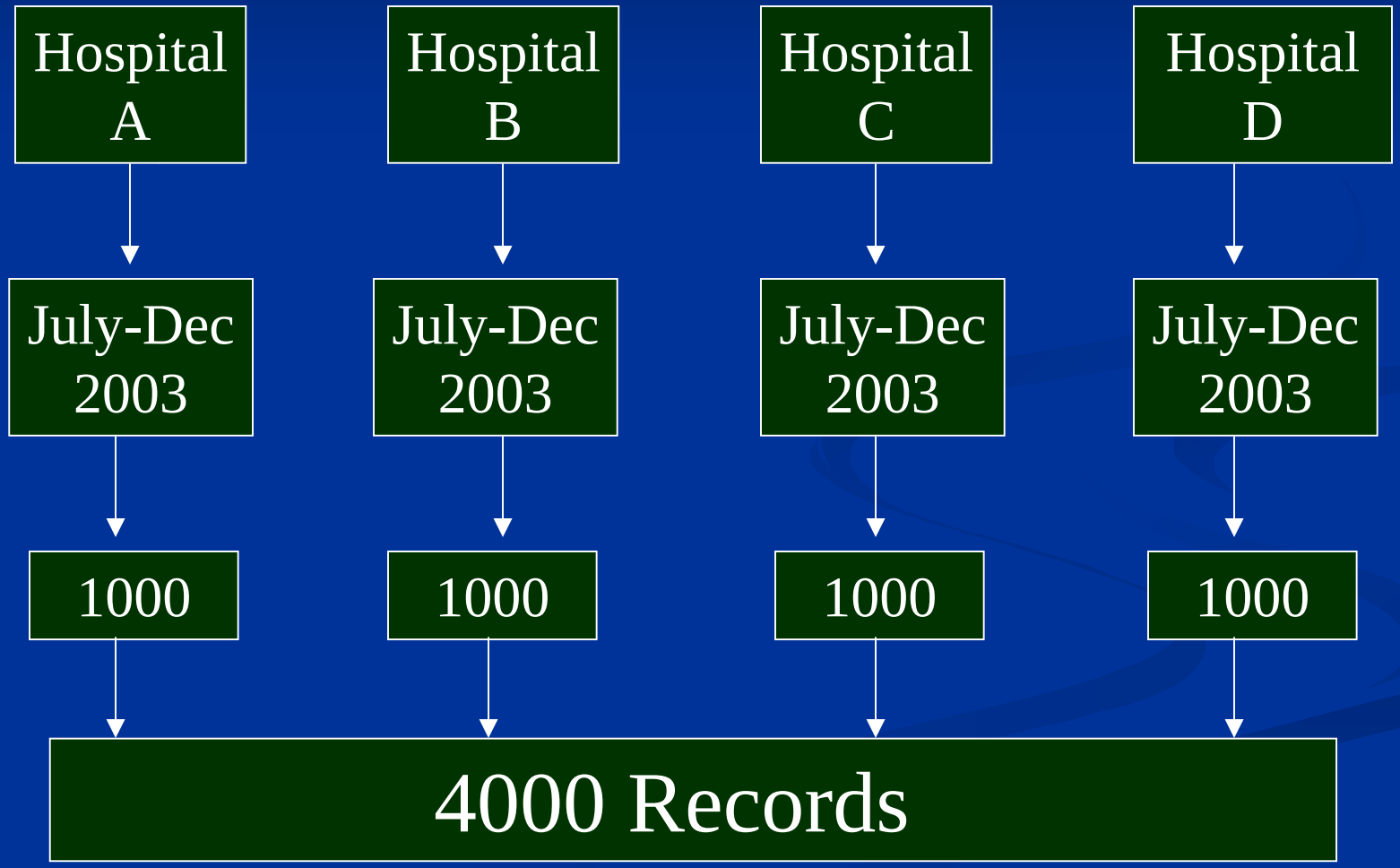
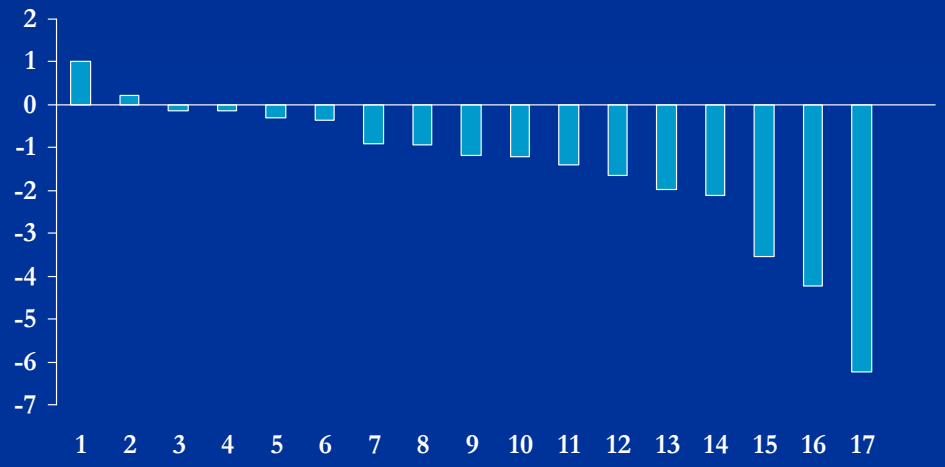

4000 Records
July – Dec 2003
Data
ICD-10-CA
Data
Chart
Review
Data
ICD-9-CM

# Alberta Teaching Hospitals

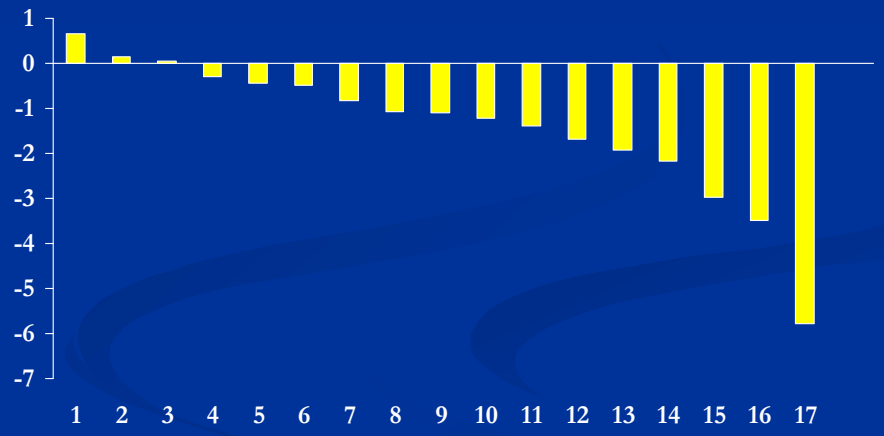


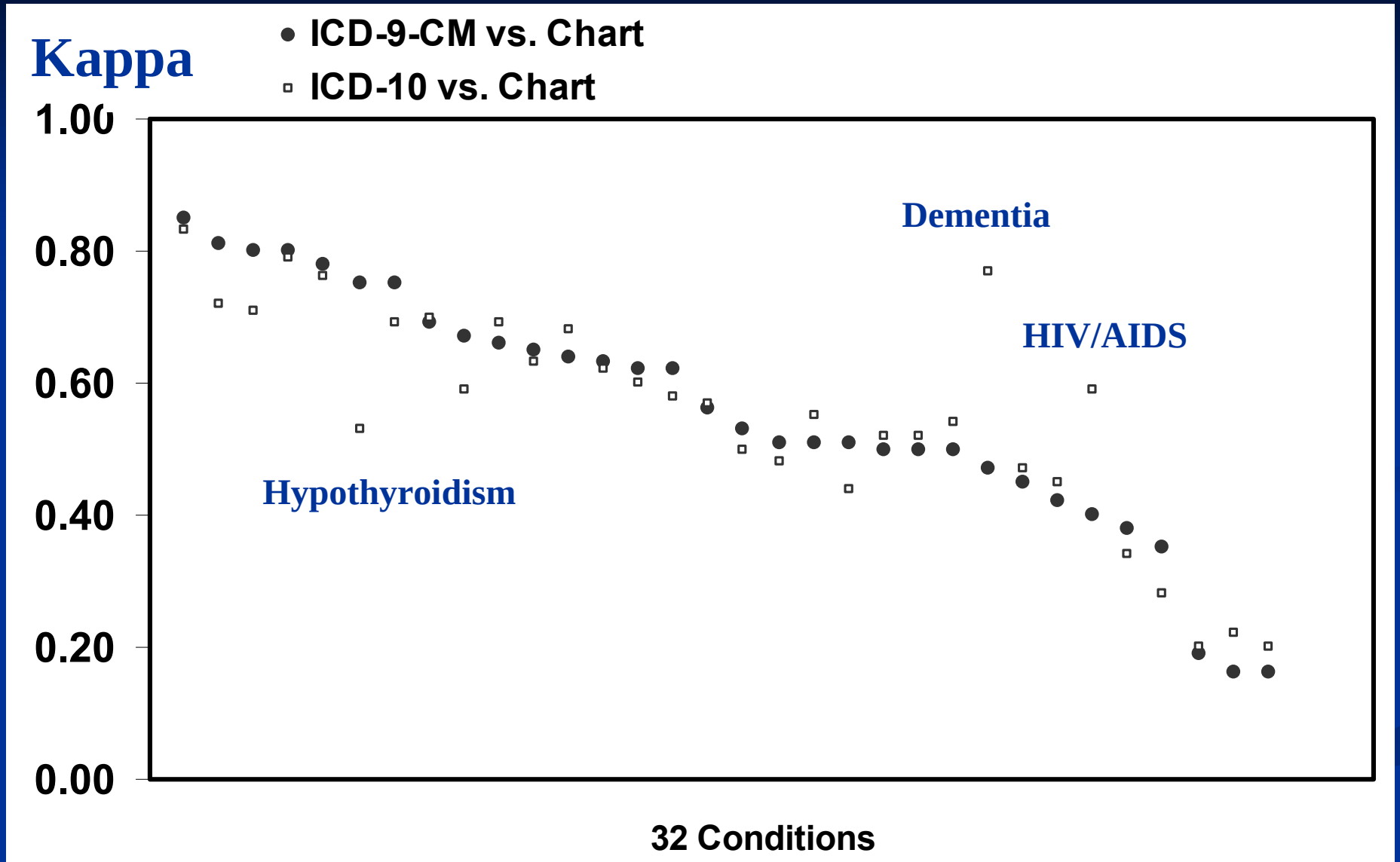
# Difference in prevalence (%)

## % in ICD 10 data - % in charts




## % in ICD 9 CM data - % in charts




Kappa
ICD-9-CM vs. Chart
ICD-10 vs. Chart
1.00
0.80
0.60
0.40
0.20
0.00
Dementia
HIV/AIDS
Hypothyroidism
32 Conditions

# Kappa= 0-0.20 (Poor)

Barium radiograph (0.08)

Computerized tomography scan (0.01)

Insertion of nasogastric tube (0.12)

Tracheal intubation (0.04)

Ultrasound (0.03)

## Kappa 0.81 and over (near perfect)

Bone marrow aspirate (0.93)

Hemo or peritoneal dialysis (0.83)

Lumbar puncture (0.81)

Mechanical ventilation (0.9)

Percutaneous abdominal drainage (0.85)

Thoracentesis (0.85)

**Table 29: Estimates of agreement, sensitivity, specificity, and predictive values for hypertension algorithms**

| # Years | | Algorithm | κ | Sens. (%) | Spec. (%) | Youden | PPV (%) | NPV (%) |
|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 1+ P | 0.65 | 68.4 | 94.7 | 0.63 | 74.6 | 93.0 |
| | 2 | 2+ P | 0.54 | 48.4 | 97.5 | 0.46 | 81.4 | 89.3 |
| | 3 | 1+ H or 1+ P | 0.66 | 70.1 | 94.4 | 0.65 | 73.9 | 93.3 |
| | 4 | 1+ H or 2+ P | 0.56 | 51.1 | 97.1 | 0.48 | 79.9 | 89.7 |
| | 5 | 1+ H or 1+ P or 1+ Rx | 0.68 | 89.9 | 88.7 | 0.79 | 64.4 | 97.5 |
| | 6 | 1+ H or 1+ P or 2+ Rx | 0.70 | 89.0 | 89.9 | 0.79 | 66.6 | 97.3 |
| 2 | 7 | 1+ P | 0.67 | 79.4 | 91.9 | 0.71 | 69.1 | 95.2 |
| | 8 | 2+ P | 0.66 | 66.3 | 95.6 | 0.62 | 77.5 | 92.6 |
| | 9 | 1+ H or 1+ P | 0.68 | 81.2 | 91.6 | 0.73 | 68.8 | 95.6 |
| | 10 | 1+ H or 2+ P | 0.67 | 69.4 | 95.2 | 0.65 | 76.8 | 93.2 |
| | 11 | 1+ H or 1+ P or 1+ Rx | 0.64 | 91.9 | 86.0 | 0.78 | 59.8 | 97.9 |
| | 12 | 1+H or 1+ P or 2+ Rx | 0.66 | 91.2 | 87.3 | 0.78 | 62.0 | 97.8 |
| 3 | 13 | 1+ P | 0.67 | 83.2 | 90.3 | 0.74 | 66.0 | 95.9 |
| | 14 | 2+ P | 0.68 | 72.4 | 94.8 | 0.68 | 76.0 | 93.8 |
| | 15 | 1+ H or 1+ P | 0.67 | 84.9 | 89.9 | 0.75 | 65.7 | 96.3 |
| | 16 | 1+ H or 2+ P | 0.70 | 75.6 | 94.4 | 0.71 | 75.2 | 94.5 |
| | 17 | 1+ H or 1+ P or 1+ Rx | 0.62 | 92.8 | 84.0 | 0.77 | 56.8 | 98.1 |
| | 18 | 1+H or 1+ P or 2+ Rx | 0.64 | 92.2 | 85.7 | 0.78 | 59.4 | 98.0 |

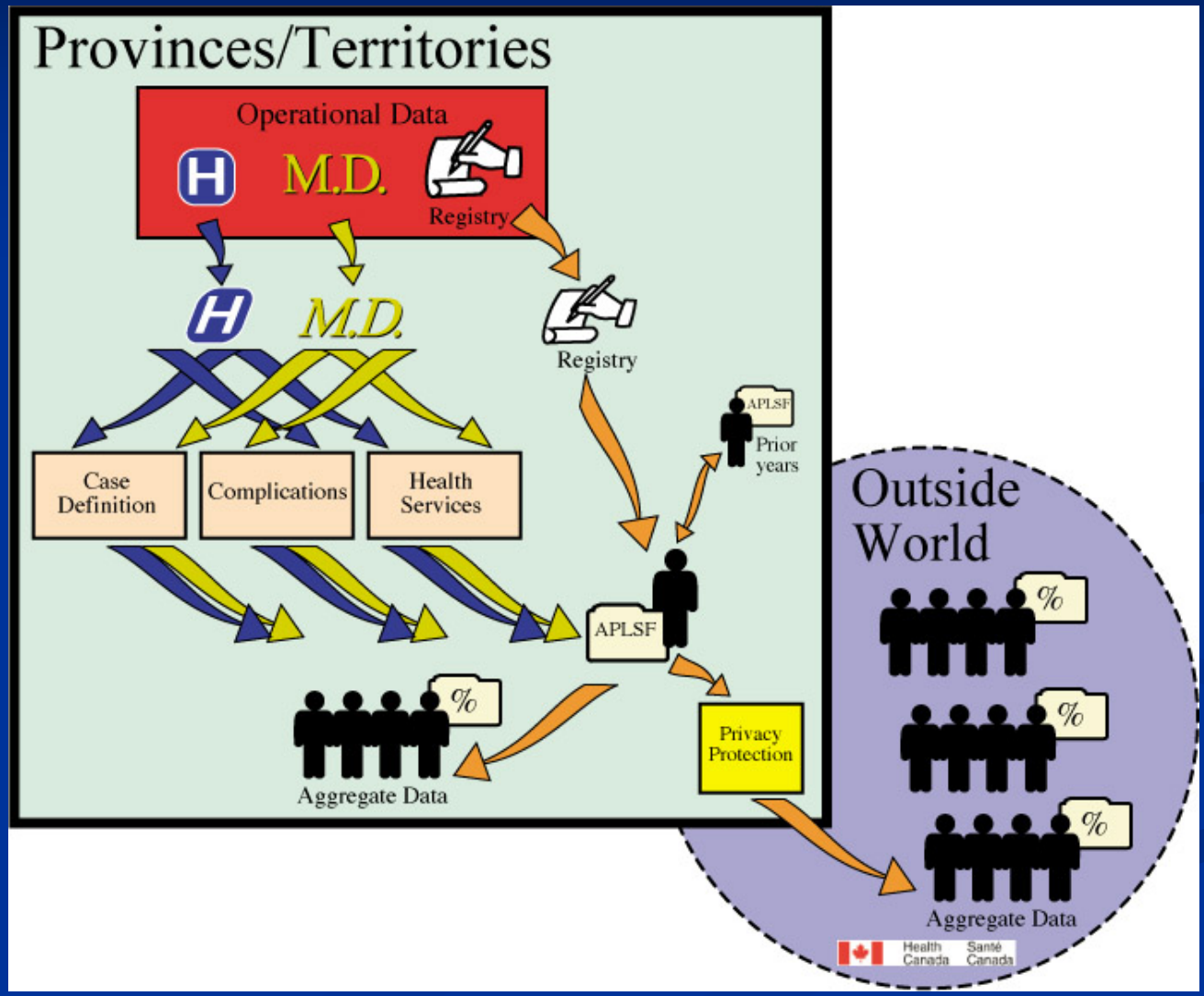
# Hypertension Definition
## (2 claims or 1 hospitalization within 2 years)
## Chart review and administrative data

| | |
|---|---|
| Sensitivity: | 75% |
| Specificity: | 94% |
| PPV: | 81% |
| NPV: | 92% |
| Kappa: | 0.71 |

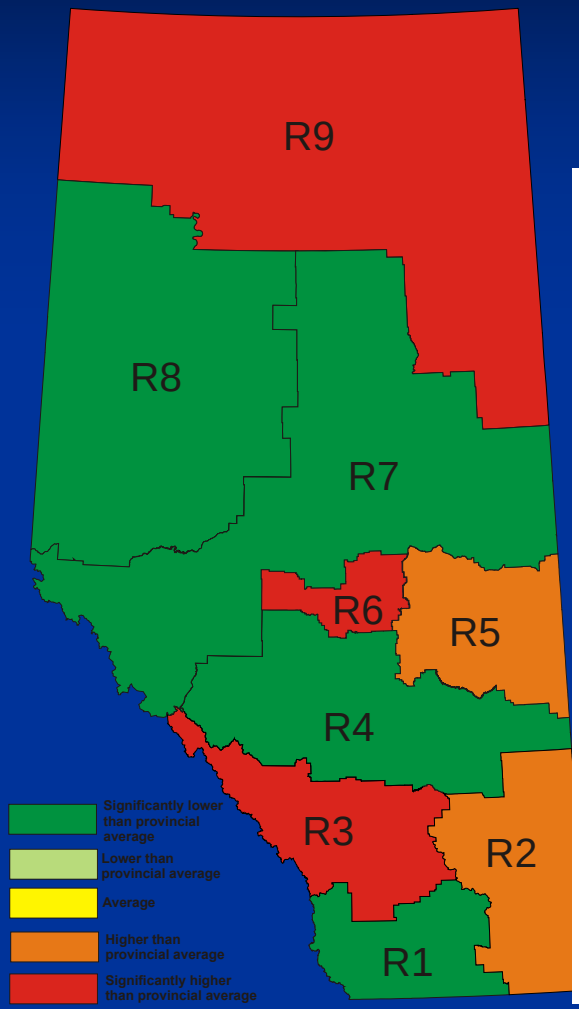
# Diabetes Case Definition

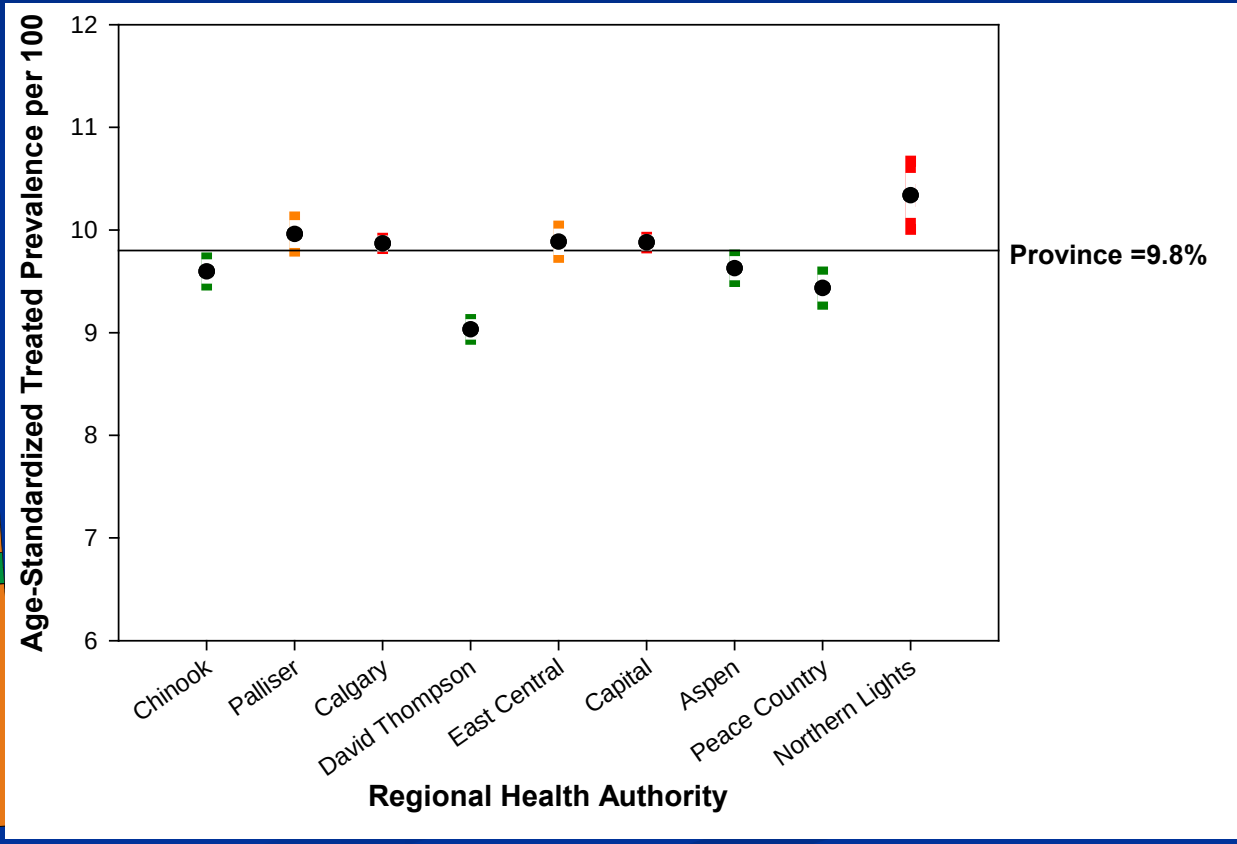
| Method | Sensitivity | PPV |
|---|---|---|
| **1 claim or 1 hospital (2 yr)** | 0.91 | 0.61 |
| **2 claim or 1 hospital (2 yr)** | 0.86 | 0.80 |

# Data Extraction and Analysis



# Regional differences in the treated prevalence of hypertension, Alberta 2003



# Validated Conditions

AMI
Hypertension
Diabetes
Epilepsy
Chronic renal disease
Charlson and Elixhauser comorbidities
AHRQ patient safety indicators

# What can we do for structure, quality and definition ?

- Documentations
- Internal logical check of data
- Statistical methods
- Standardizing coding algorithms for conditions (Concept Dictionary)
- Training