Appendix A. ICES data completeness and linkages: detailed description of registries

ICES data have been shown to be valid for socio-demographic data, physician billing claims, and primary diagnoses from hospitalizations.[1]

Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD)
The DAD is compiled by the Canadian Institute for Health Information (CIHI) and contains administrative, clinical (diagnoses and procedures/interventions), demographic, and administrative information for all admissions to acute care hospitals in Ontario. At ICES, consecutive DAD records are linked together to form 'episodes of care' among the hospitals to which patients have been transferred after their initial admission.

Prior to April 1, 2002, diagnoses (up to 16 on a given DAD record) are captured using the International Statistical Classification of Diseases, Injuries, and Causes of Death, 9th Revision (ICD-9) coding system and procedures (up to 10 on a given DAD record) are captured using the Canadian Classification of Diagnostic, Therapeutic, and Surgical Procedures (CCP) coding system. Following April 1, 2002, diagnoses (up to 25 on a given DAD record) are captured using the International Statistical Classification of Diseases and Related Health Problems, 10th Revision, Canada (ICD-10-CA) coding system and interventions (up to 20 on a given DAD record) are captured using the Canadian Classification of Health Interventions (CCI) coding system. In a hospital medical record reabstraction study of 14,500 hospital discharges from 18 hospital sites between April 2002 and March 2004, DAD records were demonstrated to have excellent agreement (over 99%) for nonmedical information such as demographic and administrative data. Regarding diagnoses, median agreement between the original DAD records and the reabstracted records for the 50 most common most responsible diagnoses was 81% (Sensitivity 82%; Specificity 82%).[2] The corresponding median agreement for the 50 most frequently performed surgical procedures was 92% (sensitivity 95%, positive predictive value 91%).

National Ambulatory Care Reporting System (NACRS)
The NACRS is compiled by the Canadian Institute for Health Information (CIHI) and contains administrative, clinical (diagnoses and procedures), demographic, and administrative information for all patient visits made to hospital- and community-based ambulatory care centres (emergency departments, day surgery units, hemodialysis units, and cancer care clinics) in Ontario. At ICES, NACRS records are linked with other data sources (DAD, Ontario Mental Health Reporting System [OMHRS]) to identify transitions to other care settings, such as inpatient acute care or psychiatric care. Prior to April 1, 2002, diagnoses (up to 6 on a given NACRS record) are captured using the ICD-9 coding system and procedures (up to 10 on a given NACRS record) are captured using the CCP coding system. Following April 1, 2002, diagnoses (up to 10 on a given NACRS record) are captured using the ICD-10-CA coding system and interventions (up to 10 on a given NACRS record) are captured using the CCI coding system. NACRS emergency department diagnosis codes have been extensively validated.

Ontario Health Insurance Plan (OHIP) Claims History Database
The OHIP claims database contains information on inpatient and outpatient services provided to Ontario residents eligible for the province's publicly funded health insurance system by fee-for-

service health care practitioners (primarily physicians) and "shadow billings" for those paid through non-fee-for-service payment plans.

Billing codes on the claims (OHIP fee codes) identify the care provider, their area of specialization and the type and location of service. OHIP billing claims also contain a 3-digit diagnosis code - the main reason for the service - captured using a modified version of the ICD, 8th revision coding system. OHIP claims are well completed, but the validity of the diagnosis coding is highly variable.[2]

Office of the Registrar General (ORGD) Vital Statistics Database
The ORGD Vital Statistics Database contains information on all deaths registered in Ontario starting on January 1, 1990. Information on the causes of death (immediate, antecedent, and underlying) recorded on the death certificate are captured. At ICES, we derive a single cause of death variable based on the underlying cause of death if available and, otherwise, the immediate cause of death using the ICD-9 coding system.

Registered Persons Database (RPDB)
The RPDB provides basic demographic information (age, sex, location of residence, date of birth, and date of death for deceased individuals) for those issued an Ontario health insurance number. The RPDB also indicates the time periods for which an individual was eligible to receive publicly funded health insurance benefits and the best known postal code for each registrant on July 1st of each year.

Immigration, Refugees and Citizenship Canada's Permanent Resident Database
The Ontario portion of the Immigration, Refugees and Citizenship Canada Permanent Resident Database includes immigration application records for people who initially applied to land in Ontario since 1985. The dataset contains permanent residents' demographic information such as country of citizenship, level of education, mother tongue, and landing date. New immigrants who are currently residing in Ontario but originally landed in another province are not captured in this dataset. The dataset and its linkages have been validated in two separate publications.[3-4]

ICES Physician Database (IPDB)
The ICES physician database contains information on all physicians practicing in Ontario. The dataset contains physicians' demographic information, Canadian vs international training, billing number, and license number. Data quality reports indicate 98.7-99.9% valid data for all variables, except Canadian training which had 95.8% valid data (i.e. 4.2% missing).

Ontario Institution Database (INST)
This database contains 4,439 medical institutions in the province of Ontario and links inpatient and outpatient services provided to Ontario residents at these institutions through the OHIP database.

ASTHMA database
This database contains information on asthma-related visits and treatments in the province of Ontario. Validation measures have been published and indicate good performance for children with a sensitivity of 89% and specificity of 72% when compared to paper chart abstraction.[5-7]

Additional references for registries

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