Cardiovascular disease (CVD) makes a substantial contribution to the burden of disease in New Zealand. Rates of CVD are declining over time however there are disparities in the rate of new CVD diagnoses (CVD incidence) by ethnicity and socioeconomic position. There is extensive literature on the risk factors for CVD and the impact of CVD on social outcomes.

This post summarises some of the methods used to identify cardiovascular disease (CVD, Part B) and the ischaemic heart disease (IHD, Part A) subset in administrative health datasets, such as the Integrated Data Infrastructure (IDI). There are several ways of identifying new cases of CVD and each method has different strengths and limitations. Two main health datasets underpin these methods; hospital admissions data and pharmaceutical data. The research question and study design will have an influence on the choice of methods selected.

An understanding of the hospital admission datasets and diagnostic codes is crucial. There are two relevant tables; the hospital admissions table (publically funded hospital discharges event information) and the diagnostic codes table (publically funded hospital discharges – diagnosis/ procedure information). Hospital admissions have an event id for each admission (moh_evt_event_id_nbr) that can be used to link to the table with the corresponding diagnostic codes. Diagnosis codes use a system of coding called ICD codes (including diagnosis codes, procedural codes etc.). There are primary and secondary diagnostic codes
for each hospital admission, and the primary code is the main reason for hospital admission. The version of ICD codes used in health data has changed over time. The Health Data Dictionary is an excellent source of information about these changes and the meaning of variables in the admissions and diagnosis datasets (See the IDI Wiki, and Statistics NZ website).

ICD diagnosis and procedural codes can be obtained online from the World Health Organization (WHO). The Australian Modification (ACM) ICD codes are used in New Zealand and some of the end digits in the ACM ICD codes differ from those on the WHO website. This is important for identifying diagnoses that use the full ICD code length rather than just the higher level groupings.

It is also important to define what is meant by new cases of disease (incidence rate). Will the analysis include all cases after a particular date? Or will the analysis eliminate cases where a previous diagnosis with the same disease has been recorded previously, and within what time range? Or is the study question about the number of people who have ever had a diagnosis (prevalence)?

A. Ischaemic Heart Disease

Chronic conditions table

The Ministry of Health produces a variable in the long-term conditions table for coronary heart disease (CHD; aka IHD), stroke and for myocardial infarction. This is an excellent source of data with minimal manipulation required however an understanding of how these tables are produced is important in interpreting an analysis. These codes are based on specific definitions summarised here, but do not include a broader category of CVD. Data sources used included publically and privately funded hospital discharge information. For the detailed information please see the data dictionary;


The definition of CHD is a healthcare user who meets any one of the following conditions:

1. National Minimum Dataset (NMDS) diagnosis codes:

   ICD-9-CMA: 410-414, V4581, V4582

   ICD-10-AM: I20-I25, Z951, Z955 (MI, angina, stent)

2. NMDS procedure codes:

   ICD-9-CMA: 3601, 3602, 3603, 3604, 3605, 3606, 3607, 3610, 3611, 3612, 3613, 3614, 3615, 3616
3. **Two or more dispensings of any of the following drugs, in the most recent 12 month period:**

1577 - Glyceryl trinitrate, 2377 - Isosorbide dinitrate, 2836 - Isosorbide mononitrate, 1272 – Nicorandil, 1949 - Perhexiline maleate

The ‘first incident date’ field represents the first date the person received a ‘CHD diagnosis’ (listed above) in NMDS. This may not necessarily be the first incident date as a person may have been dispensed a ‘CHD pharmaceutical’ (listed above) before this date. The CHD data is complete between 01/01/2007 and 30/06/2013. It has been provided from 1985 onwards (the record from 1955 is likely an error), but the Ministry of Health recommend that records with an incident date before 2007 should be used with caution.

**Stroke**

Definition: where the healthcare user had a publicly funded discharge in NMDS between 1 Jan 1988 and 30 Jun 2001 with a primary diagnosis of 430-432, 433.01, 433.11, 433.21, 433.31, 433.81, 433.91, 434.01, 434.11, 434.91, 436 (ICD 9) or a hospital discharge in NMDS between 1 Jul 2001 and 31 Dec 2013 with a primary diagnosis of I60-I64 (ICD-10-AM-II).

**Acute myocardial infarction**

Definition: where the healthcare user had a publicly funded discharge in NMDS between 1 Jan 1988 and 30 Jun 2001 with a primary diagnosis of 410 (ICD 9) or a discharge between 1 Jul 2001 and 31 Dec 2013 with a primary diagnosis of I21 (ICD-10-AM-II).

**Slight modification to define Ischaemic Heart disease**

IHD has also been identified, using similar methods as above, by Thornley et al (2011). The Thornley definition includes some procedure codes that are not used in the chronic conditions IHD definition, and uses one or more dispensing episode of any of the 5 drugs, rather than two dispensing episodes in the chronic conditions definition. The figure below shows the overlap between the two datasets in their population (Figure 2). People were classified as IHD if they had either:

1. Hospital discharge diagnosis of coronary artery disease, or one of the following procedures: coronary angioplasty, stent, percutaneous coronary intervention, or coronary artery bypass graft surgery
   - ICD9: 410x to 414x, 36.0x, 36.1x to 36.2x
   - ICD10: I20x to I25x, 3530400 to 3530501, 3531000 to 3531005, 3849700 to 3850304, 9020100 to 9020103, 3863700, 3845619, 3865308, 3850500
2. One or more dispensing episodes for any of the following drugs used to treat CHD between 2007 and 2008: glyceryl trinitrate, isosorbide dinitrate, isosorbide mononitrate, nicorandil, perhexiline

![Figure 2: Thornley et al. (2011) figure comparing the overlap in the CHD population on angina medication (brown) and identified from hospital discharge data (green).](attachment_865)

**B. Cardiovascular Disease**

The above codes do not provide a definition for the broader category of CVD which includes coronary heart disease and other diagnoses as well as strokes, heart disease and other cardiovascular disease (Figure 1). Definitions of CVD differ by what datasets they use, and by how broad or specific is the list of conditions that they comprise.

1. **Hospital diagnosis codes only, a broad CVD definition**
The ICD codes used by BODE3 and in the VHIN CVD earthquake research project in the IDI required broad definitions of CVD and are listed here below. This categorisation includes all the diagnoses in Figure 1 such as valvular disease, arrhythmias, strokes and other cerebrovascular events but excluding transient ischaemic attacks (TIAs). These ICD10 codes originate from CVD studies in Christchurch and were derived by cardiologists for the classification of clinical events (Ellis et al., 2011). This categorisation uses primary diagnosis codes and not procedural codes or angina medications.

ICD10 codes for this CVD definition;


Myocardial infarction

Subset of ICD10 codes for myocardial infarction, which includes STEMI and NSTEMI events.

I210-I214, I219, I220, I221, I228, I229

2. Diagnosis codes and angina drug codes

In some cases the above code was adjusted to include angina medications. Statistical code is available that uses this CVD definition. This was developed in the VHIN Catalyst project examining the costs of cardiovascular disease; VHIN costs of cardiovascular disease project.

3. Diagnosis codes and procedural codes, more specific CVD definition

In another paper on CVD medication dispensing by Kerr et al (2014) CVD was defined using diagnostic and procedural ICD codes. The definition of CVD was generally more specific with a narrower set of ICD codes (excludes strokes and valve disease), however it also included a handful of ICD codes that were not in the broad CVD definition described above. (Kerr et al., 2014)

Summary

We have broadly outlined some of the challenges in defining cardiovascular disease and coronary heart disease in the IDI, and some examples of how this has been done. The Ministry of Health Chronic Conditions table provides an important starting point, and should
be used with a full understanding of the Health Data Dictionary. The final choice of IHD or CVD definition will depend on the research question and study design. For any queries or feedback please contact vhin@otago.ac.nz.

References


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