

# Manitobans with Chronic Disease: How Many? How Can We Tell?

# MANITOBA CENTRE FOR HEALTH POLICY

Summary by Carolyn De Coster and RJ Currie, based on the report: Defining and Validating Chronic Diseases: An Administrative Data Approach by Lisa Lix, Marina Yogendran, Charles Burchill, Colleen Metge, Nancy McKeen, David Moore, and Ruth Bond Do you have a chronic disease? For over half of you, the answer is yes. Six out of ten Canadians have a chronic disease, such as high blood pressure, diabetes or asthma.

In the past, public health departments focussed mainly on preventing contagious diseases—things like cholera, typhoid or measles. Times have changed. The contagious diseases of the past are under control, while chronic diseases are on the rise. So chronic diseases are the main focus of public health departments today. To prevent them, we need to know how widespread they are, who is at risk of getting a chronic disease, and how disease patterns are changing over time.

However, getting this information is not straightforward. One way of finding out is by surveys. Another method is to look at healthcare data: records of physician billings, hospital admissions and prescribed drugs. And that is what this study does. MCHP was asked by Manitoba Health to see how well healthcare data can identify Manitobans with chronic illnesses.

## What we did

With the help of a Working Group for the project, we picked six chronic diseases to look at: arthritis—both rheumatoid and osteoarthritis—asthma, coronary heart disease, diabetes, hypertension (high blood pressure) and stroke.

For each chronic disease, we developed several algorithms, or sets of rules. An algorithm has four parts: the type of data, number of years, diagnosis or drug codes and number of contacts.

Three types of data were available: hospitalizations, physician claims and prescriptions filled. The number of years ranged between one and five. Diagnosis or drug codes came from a review of other studies and from consultations with doctors and pharmacists. The number of contacts means the number of times there was a hospital diagnosis, a physician diagnosis or a prescription filled.

Each of the algorithms is a combination of those four parts. For instance, one definition for diabetes is one or more hospitalizations with a diabetes diagnosis in a year. That means that any Manitoban who had at least one hospitalization with a diabetes diagnosis in one year would be called a diabetes case. A different definition is two physician visits with a diabetes diagnosis over two years. Or one prescription for a drug to treat diabetes over two years. There are many definitions possible. We have 18 definitions of diabetes alone. For the six chronic diseases combined, we tested over 150 definitions. Each definition gave us a different answer of how many Manitobans had the specific chronic disease. So we needed to check our results against another source to see how well they matched.

Statistics Canada does a national health survey every two years, called the Canadian Community Health Survey or CCHS. We

# Measures used to test validity:

*Kappa* is a measure of agreement between two sources.

*Sensitivity* is the probability of correctly identifying a chronic disease using the algorithm among those who CCHS identified with the disease.

*Specificity* is the probability of correctly identifying the absence of chronic disease using the algorithm among those who CCHS identified as not having the disease.

*Youden's Index* is an index that combines sensitivity and specificity.

*Positive Predictive Value* is the probability that a chronic disease detected using the algorithm is truly a chronic disease.

*Negative Predictive Value* is the probability that if the algorithm says chronic disease is absent, then it truly is absent.

used the CCHS as a validation source. It asks a sample of people across the country a number of questions to find out if they have a chronic disease. The surveyor will say:

Now I'd like to ask about certain chronic health conditions which you may have. We are interested in 'long-term conditions' that have lasted or are expected to last 6 months or more and that have been diagnosed by a health professional.

This is followed by questions like: *Do you have diabetes? Do you have high blood pressure?* 

While we used the CCHS as a standard of comparison, that doesn't mean it's 100% accurate. The survey relies on answers to questions, and people might not answer accurately. They might forget they were diagnosed with a chronic disease because it happened a long time ago. Or they might not know they have, say, high blood pressure because the doctor used a technical term like *hypertension* that they didn't understand. Conversely, patients might say



that they do have a chronic condition, like arthritis, even if it was never actually diagnosed by a health care provider.

While neither the CCHS nor the algorithms will be 100% accurate, it is valuable to compare results using the two sources, as we did in this study. Now we know more about the strengths and weaknesses of each data source, and we have a better picture of how many Manitobans have each chronic disease.

Several measures were used to compare the survey data and the algorithms (see box pg. 1). Key to these measures is that for each method we want to compare not only how many people do have the diseases but also how many don't.

That is, if the survey says that a certain percentage of the population has, say, diabetes, do the various algorithms come to the same conclusion? And the reverse: Is there agreement between the survey and the algorithms on the proportion of persons that don't have diabetes. Both measures are important in assessing validity.

### What's in the report

We find that agreement between the algorithms and the survey ranges from high to low and depends on the chronic disease. Agreement is high for asthma, diabetes and high blood pressure; it is medium for osteoarthritis, heart disease and stroke; it is low for rheumatoid arthritis. The low agreement for rheumatoid arthritis may be partly because the question in the survey was not understood by some of the participants; other studies comparing healthcare and survey data have had better results.

The report provides detailed information about using healthcare data to measure chronic disease in Manitoba.

- Each of the 150+ algorithms is described along with its performance on the six validity measures.
- □ *Prevalence*—the proportion of Manitobans with the chronic disease—is given for each algorithm.
- Prevalence is also compared between algorithms and over several years.
- Statistical models tell us whether the prevalence for different algorithms is affected by things like the age, sex, region and socioeconomic status of the population.
- Venn diagrams show the degree of overlap among the different types of data: hospitalizations, physician visits and prescriptions. For example, in Figure 1 we use an algorithm to define diabetes based on either a hospital diagnosis or a physician visit or a prescription, each in one year. Each circle represents one of the three types of data.

Where there is no overlap, a case is identified only in that particular data type, like 731 diabetes cases in the hospital record but not in physician or prescription records. Where the circles overlap, we see where cases are identified in two or three data types, like 813 cases in both the hospital and prescription data and 4971 cases in all three data sources. Add it all up and we can identify 55,511 Manitobans with diabetes.

#### *How our methods can be used*

The algorithms presented in this report have a number of applications. Researchers and policymakers can use the algorithms to measure how



**Prescription** 

many Manitobans have certain chronic diseases. They can do this not only for the entire province, but also for subgroups, such as older adults, or people living in a specific region. The impact on the healthcare system of having a chronic disease can be explored further. Or one could look at the connection between chronic diseases and things like social circumstances, the environment or

The choice of an algorithm may depend on a number of factors. One of these is the question to be answered. For instance, if it's important to identify all possible cases

of a chronic disease, then one would choose the algorithm with high sensitivity. This might be the case if you wanted to start up a provincewide program to reduce the risk of high blood pressure.

On the other hand, if you want to assess a treatment program's impact, you want to be sure it's aimed at people who have the disease. So to help avoid mislabelling someone as asthmatic or diabetic or whatever, you would choose the algorithm with high specificity.

Availability of data can also influence your choice of algorithm. Unlike Manitoba, some jurisdictions have only hospital or physician claims, but not prescription data. Or they may have fewer years available to them. The report can be used to give researchers and decisionmakers an idea of the impact of these restrictions on measuring the number of people with chronic diseases.

As public health departments begin to focus on chronic diseases, the tools developed in this report will sharpen the picture—highlighting where chronic diseases are increasing or decreasing, pinpointing hot spots, and making clearer the impact of prevention programs. They will make it easier to target chronic diseases in Manitoba and perhaps, like contagious diseases, bring them under control.

WANT THE COMPLETE REPORT? YOU CAN DOWNLOAD IT FROM OUR WEB SITE: www.umanitoba.ca/centres/mchp/ OR ORDER IT FROM MCHP: PH. (204) 789-3819; FAX (204) 789-3910; EMAIL reports@cpe.umanitoba.ca Manitoba Centre for Health Policy, University of Manitoba, Winnipeg, Manitoba, R3E 3P5