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Use of linked electronic health records to evaluate cardiovascular risk prediction models in Ontario, Canada

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Introduction

Electronic health records (EHR) contain individual-level clinical information not found in traditional administrative databases. As part of the CANHEART-Strategy for Patient Oriented Research (SPOR) initiative, we created a linked EHR-administrative data cohort that enables us to measure the Framingham and ACC/AHA Pooled Cohort cardiovascular risk prediction scores in Ontario, Canada.

Objectives and Approach

An EHR primary care cohort was created using the Electronic Medical Record Administrative data Linked Database (EM-RALD) database, which contains the blood pressure and lipid values, weight and height measures, prescriptions and smoking status of up to 350,000 patients in Ontario, Canada. We enriched the lipid information through linkage to the Ontario Laboratory Information System, which is a repository of 90%+ of all lipid tests in Ontario. Individual-level information on comorbidities, hospitalizations and mortality attributed to cardiovascular causes (e.g. myocardial infarction, stroke, cardiovascular mortality) were obtained through linkage to provincial health administrative and vital statistics databases using CANHEART methodology (www.canheart.ca).

Results

Patients were entered into the cohort between 2008 and 2014 if they had measurements for blood pressure and lipids (total cholesterol and high-density lipoprotein) taken within a year of each other during this accrual window. The earliest such group of values was chosen and determined the individual's index date. Age, sex, smoking, diabetes and anti-hypertensive treatment status were extracted from EHR or administrative data to calculate the two scores. Patients were excluded if not aged 40-75 on the index date or if they had a history of cardiovascular disease. A cohort of 84,628 Ontario residents (mean age 55.0 years) had the elements required to calculate both scores. Follow-up for outcome events were done through record linkage to the end of 2014, with a mean follow-up of

3.62 years.

Conclusion/Implications

The creation of this cohort will allow for the validation of the Framingham and AHA/ACC Pooled Cohort equations in the diverse Ontario population. It would also enable the possible development of a new 'made-in-Canada' cardiovascular risk prediction model.

