COACTION PUBLISHING

Automated chronic disease surveillance and visualization using electronic health record data

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Objective

Develop methods for automated chronic disease surveillance and visualization using electronic health record (EHR) data.

Introduction

Chronic diseases are the leading causes of mortality and morbidity for Americans but public health surveillance for these conditions is limited. Health departments currently use telephone interviews, medical surveys and death certificates to gather information on chronic diseases but these sources are limited by cost, timeliness, limited clinical detail and/or poor population coverage. Continual and automated extraction, analysis and summarization of EHR data could advance surveillance in each of these domains.

Methods

We leveraged the Electronic medical record Support for Public Health (ESP) surveillance platform to create a chronic disease surveillance module. ESP is an open source software (esphealth.org) that reads structured EHR data, analyzes them for events of public health interest and communicates findings to public health agencies. We created algorithms to identify diabetes types using a combination of diagnosis codes, laboratory tests and medication prescriptions. We then applied these algorithms to the ESP installation in Atrius Health, a multisite, ambulatory practice with over 700,000 patients. We programmed ESP to create patient level linelists each night that detail patients' demographics (age, sex, race/ethnicity and zip code), vitals (body mass index, blood pressure and pregnancy status), key laboratories (hemoglobin A1C and cholesterol levels), diabetes type and care (medications and medical nutrition counseling). De-identified linelists are transmitted nightly to a secure website called the 'RiskScape' that automatically maps selected health indicators and stratifies results by age group, race/ethnicity, year of diagnosis and body mass index. Users can customize indicators and stratifications displayed by RiskScape.

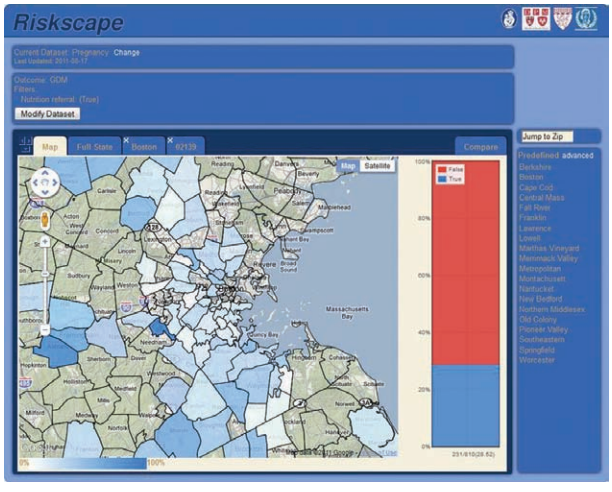

Fig. 1. Automatic mapping of disease prevalence.

Fig. 2. Automatic stratification by region, age, and race/ethnicity.

Results

The RiskScape presents a timely, clinically rich picture of the health of large populations using EHR data that is refreshed nightly. Examples of RiskScape views and report options are shown in Fig. 1 and 2. Fig. 1 maps the rate of nutrition referrals by zip code amongst women with gestational diabetes. Fig. 2 stratifies these results by age and race/ethnicity within the greater Boston area and compares them to statewide averages.

Conclusions

Automated analysis and presentation of EHR data can provide a rich, timely picture of chronic disease prevalence, care and complications for large populations. This technology has a great potential to advance public health practice by highlighting specific populations with gaps in care that merit targeted interventions.

Keywords

Chronic disease; surveillance; electronic health records; visualization; diabetes

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