Opinion: Epidemiologists look at the big picture to solve medical mysteries

BY CHRISTOPHER LABOS   OCTOBER 13, 2014

Laws discouraging smoking are the result of the knowledge generated by epidemiology researchers.
Photograph by: JOEL SAGET, Montreal Gazette

Ebola, SARS, H1N1, child obesity, smoking, and HIV: every day it seems that there is a new epidemic threatening to put us into an early grave. This year, McGill is reflecting on the 50 years since its academic epidemiology and public health program began.

In the first part of the 20th century, magazine ads said "More Doctors Smoke Camels than any Other Cigarette." Heart attacks were brought on by stress, polio was caused by ice cream, cervical cancer was caused by smoking, and lung cancer was caused by a virus.

Things change. In the second half of the 20th century, as vaccines and antibiotics tamed most infectious diseases, the public health community shifted its focus to a new set of chronic problems. A new strategy was now needed. Theories of disease began to be shaped less by opinion and conventional wisdom and more from data gleaned from the study of thousands of people. Epidemiology (the study of what makes people sick) took centre stage.

The U.S. Surgeon General issued his landmark report on smoking in 1964. Anti-smoking laws and

bans on advertising followed (though after some decades, and much industry opposition). Medications were developed to treat high blood pressure and the "silent killer" became much less fatal. Fluoride was put in drinking water to prevent tooth decay, vaccines were developed against polio, and babies were put to sleep on their backs. Seatbelts were put in cars, lower speed limits were put on roads, and babies were put in car seats. Today we live about 10 years longer than we did half a century ago.

This is the result of the knowledge generated by epidemiology researchers on these and many other public health problems. This population research is different and less headline grabbing than traditional laboratory experiments. There are no beakers of bubbling concoctions, no lab rats running mazes, no dissected brain specimens on Petri dishes, no billows of smoke and few cries of Eureka! This is the study of populations, of intact free-living humans. Lab rats bred from the same litter, fed the same food, and exposed to the same conditions are much easier to study. This is the study of big data; the data on thousands of people with hundreds of individual characteristics.

So epidemiologists are forced to think more like human ecologists than lab scientists, to find common factors in vastly different individuals, and to separate real medical causes from the coincidences of everyday life.

It is a task that requires supreme patience. When it comes to diseases like dementia, heart disease and cancer, the time lag between "cause" and "effect" is measured in decades, so the trail is more complex, and the culprit more difficult to identify and isolate. When cases of a rare form of vaginal cancer started appearing in young women, researchers had to use a clever study design to tease out the solution. The cause was diethylstilbestrol (DES) but it was taken not by the young women, but by their mothers while they had been pregnant some 20 to 30 years earlier.

But with each solution comes a new set of problems. Fifty years ago, one seldom heard the words Alzheimer, autism, BMI, cholesterol, hand sanitizer or folic acid (check the label on your bread). The terms, ADHD, MRI, HPV, statins, Lyme disease and West Nile virus hadn't been coined. Childhood obesity was unusual. As some infectious diseases recede, others emerge. Modern lifestyle, technology, and recreation are creating longer term epidemics of their own that may only be apparent to those who look back from 2064 to now. So the slow, methodical, plodding and often-thankless work will continue. The search for the cause of these new population epidemics is underway.

So what is truth and what is pure coincidence? The McGill MinMed lecture series "Figuring out what makes people sick" will help shed light on these new mysteries: why do heart disease, Alzheimer's and cancer continue to wreak havoc today? How is the changing landscape of childbirth affecting the health of mothers and their children? How can we rapidly identify harmful medications? How can we decide if new medical tests do us any good? How do the public health detectives of past and present figure out what we should be afraid of and what is actually harmless?

McGill Mini-Med offers a six-week lecture series, presented by professors in the Department of Epidemiology, Biostatistics and Occupational Health, beginning Oct. 21. For more information: mcgill.ca/minimed/home

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