Giving Health Care Policy a Dose of Mathematics

When a hospital or government wants to adjust their health policies — for instance, by encouraging more frequent screenings for certain diseases — how do they know whether their program will work or not?

If the service has already been implemented elsewhere, researchers can use that data to estimate its effects. But if the idea is brand-new, or has only been used in very different settings, then it’s harder to predict how well the new program will work. Luckily, a tool called a microsimulation can help researchers make an educated guess.

A microsimulation predicts the effects of a policy or program by modeling individual behavior. For instance, the Urban Institute’s Health Insurance Policy Simulation Model (HIPSM) simulates individual people, using publicly available data to create a realistic sample of the American population. The HIPSM simulates the reactions of insurance companies to policy change, reactions of employers to insurance companies, and finally how people will make choices about their health insurance based on the resulting options. The process is repeated until the model settles into an equilibrium. By adjusting the parameters of their model to match real-world data, the HIPSM can estimate how much people value health insurance covering the cost of medical services, and therefore how people will make decisions.

Governments around the world have adopted microsimulations to get insight into programs and policies. In Canada, for example, the OncoSim model quantifies the effects of screening programs on over 30 different types of cancer. As of 2018, microsimulation in health care had made its way to every populated continent.

References: