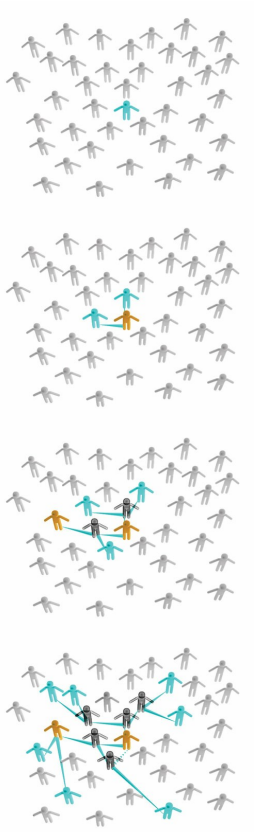
Predicting Outbreaks: Supercomputers Help Forecast Diseases' Spread

HEALTH, INTEGRATIVE BIOLOGY, STATISTICS & DATA SCIENCES, RESEARCH, SCIENCE IN MOTION, COVID-19

How an infectious disease spreads depends on the social lives of the people living near the outbreak. Using math, advanced statistics, and high-powered supercomputers, it's possible to model the complex web of daily interactions that occur at school, home, work, healthcare settings, and in the community to predict the way diseases will spread.



Applications:

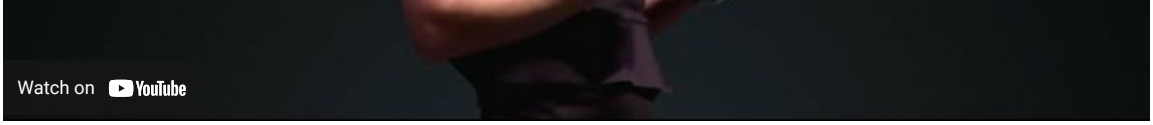
Knowing where, when, and how quickly a dangerous pathogen is likely to spread is key to controlling an outbreak. The Texas Pandemic Toolkit is an online resource that allows public health officials to simulate pandemics on supercomputers at UT's Texas Advanced Computing Center (TACC). The toolkit also includes decision-support tools that help officials plan for future crises, determine how and where to use limited supplies of medicines and vaccines, and deploy other disease-fighting resources.

When a relatively new and deadly disease unfolds on the other side of the globe, forecasting can be difficult. Dr. Lauren Ancel Meyers, a professor of integrative biology and statistics and data sciences, and her colleagues have made projections about several global epidemics.

In the Ebola epidemic, for example, the team used a combination of epidemiological data (numbers of cases occurring each day) and genomic sequences from the circulating Ebola virus. Studies of prior Ebola outbreaks in Africa suggest that a large number of people may have been immunized by exposure to Ebola without getting sick. Dr. Meyers' research team worked to determine whether silent immunity exists, in the hopes of improving forecasts and the ability of doctors and nurses on the frontlines to more safely treat sick patients.

Editor's Update: Dr. Lauren Ancel Meyers and her research team used the approach described in this article to address the threat of COVID-19. She heads the UT Austin COVID-19 Modeling Consortium, which houses an interactive website where you can find projections for your state and city.

She is working closely with a range of stakeholders from the Centers for Disease Control to Texas cities to the White House to local Texas health agencies. Watch the video below where she describes her work at UT.



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