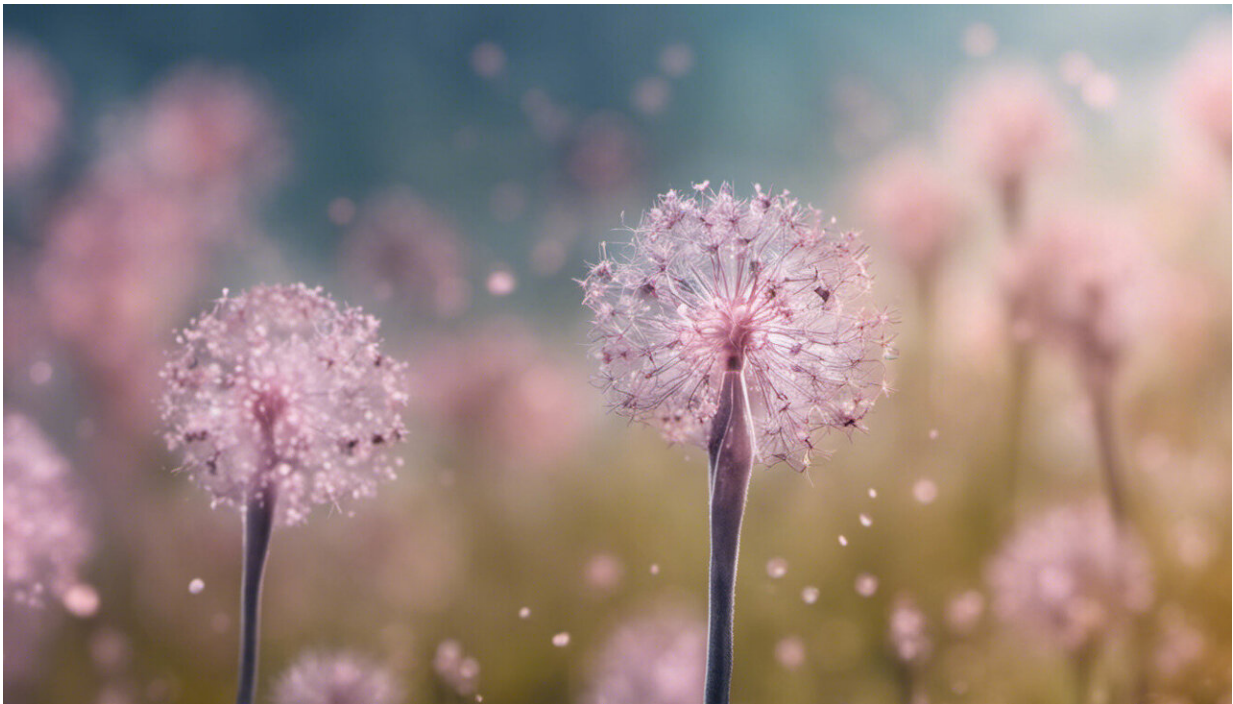# COVID-19: Researchers to model novel coronavirus for spread mitigation

April 10 2020, by Miranda Buckheit

Credit: AI-generated image (disclaimer)

In an effort to help mitigate the disruptive effects of the deadly COVID-19 virus, an interdisciplinary team of Penn State researchers are developing a novel methodology to analyze its spread and the impacts on policy with a goal of creating better-prepared and more-resilient health care systems.

The team, with faculty from Penn State's College of Engineering, College of Health and Human Development and Penn State Health Milton S. Hershey Medical Center, received a $200,000 grant for Rapid Response Research from the National Science Foundation (NSF).

Hui Yang, associate professor in the Harold and Inge Marcus Department of Industrial and Manufacturing Engineering (IME) and director of the Penn State Center for Health Organization Transformation (CHOT), will leverage data analytics and simulation models to gain a better understanding of how human movement spreads the virus across geographic locations. This understanding has implications for three types of crisis strategies: regional health care infrastructure, regulatory measures, and transparent information distribution.

Using machine learning and artificial intelligence, Yang will simulate transmission rates of COVID-19 in local, state and federal capacities.

"If there is a specific geographic region and ill people move to it, then healthy people will be at risk, so how can we model this and respond to the virus spread?" Yang asked. "This is a resource allocation problem and needs strategic decision making; for example, health care is a resource."

Health policy experts in the College of Health and Human Development (HHD) will weigh in on strategic decision making and public interventions based on this data. The HHD team will use the data and simulation models to investigate how various policies and infectious disease control can help health care systems become more resilient and respond more efficiently to disruptive events like the COVID-19 pandemic.

Dennis Scanlon, distinguished professor of health policy and

administration, said that several features of the novel [coronavirus](link) make it unique, which creates uncertainty for policy makers. For example, the high degree of infectiousness, the ability for asymptomatic individuals to spread the virus, and the lack of good data on the underlying population infection rate are important factors when developing simulation models.

"We're learning new things about the virus every day," Scanlon said. "Underlying the magnitude of this crisis is the type of health care that people need and the limited resources that we have in the United States. For policy makers, this requires quick decisions with uncertain information. Inevitably, some decisions will be less than optimal."

Dr. Christopher DeFlitch is the chief medical information officer and an emergency physician for the Milton S. Hershey Medical Center and a professor at Penn State College of Medicine. Nearly 10 years ago, he founded the Penn State CHOT, and he is a long-standing member of NSF CHOT. DeFlitch has worked with Yang in the center for more than two years.

DeFlitch sees this new project as an opportunity to collaborate and help alleviate some stress for the medical professionals that are currently going "above and beyond" in their line of duty to provide bedside care.

"Through Penn State and NSF, this is an incredibly passionate, smart group of people coming together to solve a very hard problem," DeFlitch said. "This is the first pandemic of our lifetime, and it has potential long-lasting impacts for our health care delivery systems. It's critical to bring together this team to provide theoretical and practical problem-solving approaches, and Penn State, as a research powerhouse, is the place to do it."

Yunfeng Shi, assistant professor of health policy and administration, said that everyone has a stake in this pandemic and that the new collaborative

research can help potentially improve reactions.

"I was trained as an interdisciplinary researcher, so I believe that working across disciplines to holistically analyze this issue provides an important perspective to better address the current problem and future crises," Shi said.

Marta Ventura and Yidan Wang, IME doctoral students and members of CHOT, will assist on the project.

"We have to do what we can, where we are, right now," Yang said. "Our team has complementary expertise; we can work together, and we can do this no matter where we are. The mission of Penn State CHOT is to advance the knowledge and practice of transformational strategies in evidenced-based health care management and clinical practice. We can help now and for the future."

Provided by Pennsylvania State University