ICU
MANAGEMENT & PRACTICE

Pandemic Toolkit Offers Flu With a View

Scientists at the Department of Energy's Pacific Northwest National Laboratory have created a Pandemic Influenza Planning Tool to model the spread of a disease through various age groups and geographic populations. It also allows decision-makers to carefully assess the benefit of their decisions for different scenarios in advance.

"No single approach provides an optimal strategy when battling the spread of a pandemic," said Robert Brigantic, PNNL operations research scientist, "But, the use of this tool can allow health officials to more accurately predict how a disease might evolve when various mitigation strategies are applied."

These results could be valuable in developing an aggressive preventive strategy and deciding how best to use limited resources.

Brigantic's tool allows officials to easily evaluate potential response options by manipulating modeling parameters and running different simulations. For instance, officials could assess closing schools to decrease disease spread, initiate preventative media campaigns, or evaluate distributing antiviral medications to easily evaluate potential mitigation approaches.

In late September, PNNL demonstrated an early prototype of the tool during a Walla Walla County, Wash., Pandemic Influenza emergency exercise. Officials simulated an H1N1 Swine Flu outbreak and used the tool to predict resource needs and shortfalls, such as the loss of critical staff and lack of hospital beds.

"The tool illustrated how essential services can fail when critical employees became ill," said Gay Ernst, director of emergency management in Walla Walla County. "Visualizing possible disease progression enables us to consider how many critical personnel may be unavailable at one time and plan accordingly."

To help users also understand and visualize the effects of potential scenarios, PNNL teamed with Purdue University to add a visual analytic element to the toolkit called PanViz. It allows decision makers to visually track a simulation of spreading influenza on a video monitor. Users can toggle on and off various decision measures and visually see and examine the impact of those modifications and how they may alter the spread of the outbreak over time across counties in a state.

PNNL has demonstrated the planning tool during its development to Washington State Public Health as well as emergency officials in Los Angeles County and in Indiana. Researchers are improving the system's infectious disease modeling capabilities by making underlying algorithms more sophisticated and precise. Including more mitigation strategies and incorporating input from public health and emergency management experts is a priority as developers enhance the model.

This work was originally developed under a $50,000 subcontract with Purdue University to create the Pandemic Influenza Planning Tool for use by Indiana state as part of its pandemic influenza planning exercises. If additional funding is secured, Brigantic hopes to expand the model capabilities to see how additional social-distancing actions, such as telecommuting, cancelling social events and imposing quarantines might influence the virtual spread of a pandemic. He also envisions incorporating additional social modeling and behavioral responses.

Brigantic and his team are also conducting related modeling and simulation analysis for the Centers for Disease Control and Prevention to establish effective and efficient screening of passengers arriving on international flights for pandemic influenza.

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