RESEARCH BRIEF

IMPROVING MASS VACCINATION CLINC OPERATIONS

Volunteer "patients" wait to be screened at the Montgomery County, Md., mass vaccination clinic exercise.

The potential

In the event of a bioterrorist attack, each affected county in the U.S. is responsible for quickly vaccinating or providing medication to its residents.

Possible outbreaks include anthrax, smallpox, and the plague. However, most counties do not have experience with operating mass vaccination clinics.

If the disaster happens, emergency responders could be overwhelmed by the magnitude of the task, leading to confusion and unrest.

County emergency preparedness planners need tools to help them plan clinics that have enough capacity to vaccinate residents quickly while avoiding congestion.

Simulation models and spreadsheet models can be used not only for mass vaccination clinics but also for clinics that dispense medication and other types of emergency response activities. With the aid of the vaccination clinic model generator, planners can quickly estimate staffing needs for any type of clinic or treatment center.

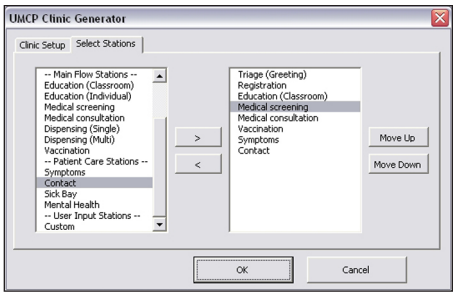
The challenge

Every U.S. county shares the great problem of how to deal with potential bioterrorism.

The Centers for Disease Control and Prevention (CDC) offers specific guidelines on how each county should prepare for such catastrophic occurrences. However, their guides are based on very simple capacity analysis that fails to consider the complexity of running mass vaccination clinics at near-capacity levels.

Moreover, most counties do not have experience with conducting mass vaccination clinics. Thus, planners have very little insight into how clinic design variables such as layout, staffing, and patient flow affect performance. A poor clinic design will have insufficient capacity and long lines of patients waiting for vaccinations. More patients require more space as they wait to receive treatment. If too many patients are in the clinic, they cause congestion, crowding and confusion.

The research



Setup dialog for a clinic model.

Dr. Jeffrey Herrmann and his research team have conducted a simulation study to evaluate alternative clinic designs with the intent of finding means to reduce waiting time, increase efficiency, and improve overall clinic design.

Montgomery County (a Maryland county bordering the District of Columbia) recently conducted a mass vaccination clinic exercise with several hundred volunteers. These "patients" went through the clinic, which was set up at a local high school. Each patient was given a timestamp form upon arrival.

The forms were stamped at six different stations, which allowed Dr. Herrmann's team to analyze the length of wait time for the proposed clinic design. In addition to the timestamp forms, the process was videotaped to allow for further analysis.

Main interface of the clinic model.

With the help of the simulation software Arena®, the research team was able to synthesize the patient flow into a simulation model. The results were used with queueing equations to create a spreadsheet model, a form which is accessible to most emergency preparedness planners. Custom queueing models can easily be created by users, taking into account the stations used in their clinic and the appropriate population data. After creating the model, the user can adjust settings and staffing levels and immediately see their effects on the clinic. A report page provides a printable summary of clinic and station parameters and performance measures.

This research has shown that simulation and spreadsheet models can evaluate how changes to clinic design increase or reduce queues, time in system, and number of patients in the clinic. They can be extended to gain insight into staging areas, transportation, and county-wide operations to offer the most efficient and effective system for mass vaccinations. Dr. Herrmann and his research team are continuing to develop design tools to help counties plan mass vaccination clinics.

Research team

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Software

Clinic Planning Model Generator v.1.21 is now available for download free of charge at *www.isr.umd.edu/Labs/CIM/projects/clinic/*. The generator is a MS Excel spreadsheet with Visual Basic macros that runs in most Windows environments. A user guide, template and sample clinic model are also available for download.

In July 2006 the CDC required that agencies receiving federal funding use this software to design dispensing /vaccination clinics.

Web links

www.isr.umd.edu/Labs/CIM/projects/clinic/

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