MedicalXpress

Computer model shows US vulnerable to MDR-TB epidemic

September 27 2010

While the U.S. has made great progress in the prevention and treatment of tuberculosis, the nation has become more susceptible to potential epidemics of multidrug-resistant tuberculosis (MDR-TB), according a study led by Johns Hopkins researchers. Computer simulations show that as TB prevalence falls, the risk for more extensive MDR-TB increases. In addition, the simulation also showed that higher detection of TB cases without proper treatment of cases also increased risk. The study findings are published in the September 22 edition of the journal *PLoS ONE*.

An interactive TB computer simulation used by the research team is available at mdr.tbtools.org.

MDR-TB is a form of tuberculosis that is resistant to at least two of the primary antibiotics used to treat the disease. The World Health Organization estimates that MDR-TB affects between 0.5 and 2 million people each year worldwide, but there were only 111 cases reported in the U.S. in 2006.

For the analysis, the researchers developed a computer model to simulate the potential for MDR-TB epidemics. Eighty-one scenarios covering a 500-year period were created with varying levels of treatment quality, diagnosis accuracy, microbial fitness and the degree of immunogenicity of drug-susceptible TB.

According to the study, when 75 percent of active TB cases are detected, improving therapeutic compliance from 50 percent to 75 percent can

reduce the probability of an epidemic from 45 percent to 15 percent. Paradoxically, improving the case-detection rate from 50 percent to 75 percent when compliance with directly observed treatment is constant at 75 percent increases the probability of MDR-TB epidemics from 3 percent to 45 percent.

"The ability of MDR-TB to spread depends on the prevalence of drug-susceptible TB," said David Bishai, MD, PhD, MPH, senior author of the study and associate professor in the departments of Population, Family and Reproductive Health and International Health at the Johns Hopkins Bloomberg School of Public Health. "The most successful approach to reduce this risk for MDR-TB epidemics in the U.S. would be to ensure that populations around the world combine high rates of case findings that are tightly coupled to high compliance with directly observed drug therapy."

More information: "Heightened Vulnerability to MDR-TB Epidemics after Controlling Drug-Susceptible TB", *PLoS ONE*.

Provided by Johns Hopkins University Bloomberg School of Public Health