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Operations research promises continued gains for HIV treatment in resource-limited countries

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In the past 10 years, the global campaign to expand treatment for millions of people with AIDS living in resource-limited countries, especially in sub-Saharan Africa, has gained substantial commitments in public and private financing, and has made major strides in making treatment available to those who need it. A new collaborative study by researchers at Weill Cornell Medical College and the Clinton Foundation HIV/AIDS Initiative explores how to combine engineering science with medical care to guarantee the long-term success of these treatment programs.

In an article published online this month in the *BMC Health Services Research* journal, the researchers show how the use of sophisticated mathematical modeling approaches used in the field of operations research can help maximize the efficient use of limited resources, notably antiretroviral drugs and medical personnel.

"Operations research offers a powerful set of tools that have been used successfully in everything from World War II to Wal-Mart-style logistics planning. These tools ought to be used to increase the success of existing programs and to help expand access to HIV care and treatment in resource-limited countries," says lead author Dr. Wei Xiong, instructor in public health at Weill Cornell Medical College. "For example, operations research could help with the planning of a national drug distribution system, or with predicting the demand for services at local

clinics and the best ways to staff them."

"To date, HIV treatment scale-up has appropriately focused first on policy-level issues, such as program initiation and costs, and secondarily on operational-level issues," adds co-investigator Dr. Nathaniel Hupert, associate professor of public health at Weill Cornell Medical College and associate attending physician at NewYork-Presbyterian Hospital/Weill Cornell Medical Center. "Now that many programs are in place, the potential gains from improved planning are great, especially given the high cost of antiretroviral drug therapy."

Another important, looming problem in resource-limited settings, the authors write, is the lack of sufficient health care workers to diagnose and treat the millions of people living with HIV.

Beginning in 2005, the Weill Cornell and the Clinton Foundation researchers created a series of computer simulations to estimate resource requirements and treatment capacity scale-up at an HIV clinic. This year they used a simulation model to predict the amount of physician person-hours saved by shifting some duties to nurses for HIV clinics in Rwanda. This model suggests that if task-shifting were scaled up from a pilot program in three health centers to the national level, it could reduce the demand on public-sector physicians for HIV services by up to 78 percent.

"The analysis suggested that implementation of such a program could allow the government of Rwanda to scale-up HIV treatment without overburdening its existing health-care system," Dr. Xiong comments.

According to the new paper, another area ripe for improvements is the management of laboratory resources, which are often underutilized or not maintained. When there is an equipment breakdown, it often takes a prohibitively long time to get replacement parts or qualified repair

technicians.

"The unique advantage of operations research is that it gives us the ability to evaluate and optimize outcomes of various scenarios -- such as determining the best approach for the management of lab equipment repair -- without impacting patients," explains Dr. Xiong. "Once we have the evidence for a new approach, a good case can be made that it should be implemented as policy, although any initiative should take into account the environments in which the projects are to be carried out, with all necessary ethical, cultural and political considerations."

The need for better resource planning in HIV treatment has been noted by the President's Emergency Plan for AIDS Relief (PEPFAR) program, which writes of the importance of "placing greater emphasis on long-term strategic planning and increasing the attention and resources directed to capacity building for sustainability."

Approximately 95 percent of patients with HIV/AIDS live in developing countries. It is estimated that close to 3 million people, or 31 percent of those living with HIV in resource-limited nations, have access to antiretroviral treatment, a substantial improvement from 5 percent coverage just five years ago.

"While laudable progress has been made, the great majority of HIV patients are still under-treated or untreated," says Dr. Hupert. "We feel that operations research provides one of the tools to make sure progress continues."

"This area of research -- and specifically this and other projects led by Drs. Hupert and Xiong -- shows how fields such as the engineering sciences can contribute to solving medical and public health problems," says Dr. Alvin I. Mushlin, chairman and Nanette Laitman Distinguished Professor of Public Health at Weill Cornell Medical College, and Public

Health Physician-in-Chief at NewYork-Presbyterian Hospital/Weill Cornell Medical Center.

Source: New York- Presbyterian Hospital/Weill Cornell Medical Center/Weill Cornell Medical College