

Ramping up treatment of parasitic worm disease cost-effective, researchers find

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Millions of people in the developing world could be spared from lifelong disability—or possible death—from parasitic worm diseases under a vastly expanded treatment program that is cost-effective, according to a new analysis led by Stanford University School of Medicine researchers.

The modeling analysis suggests that current World Health Organization guidelines may need to be revised to more effectively combat parasitic worm disease, which afflicts some 1.5 million people across the globe. It points the way to a sweeping new program in which more than 1 billion doses of two low-cost drugs—often donated—could be dispensed in sub-Saharan Africa to largely knock out these infections.

Using prevalence and cost-effectiveness models, the researchers found it would be economically worthwhile to make these drugs available to schoolchildren every year in communities where as few as 5 percent have schistosomiasis, as opposed to the 50 percent threshold now recommended by WHO. It would also be feasible to expand treatment to adults and preschool-aged children, who often aren't included in WHO guidelines, and to combine treatment in areas heavily afflicted by the two most common types of worm infections, which are caused by schistosomes and the soil-transmitted helminths, said Nathan Lo, a Stanford MD-PhD student and lead author of the study.

"If we incorporate this new evidence, we can start to consider elimination of this as a public health problem," Lo said. "Substantial populations are not receiving treatment under current guidelines that

could benefit under a cost-effective program."

A prevalent ailment

Based on the analysis, it would make economic sense to increase treatment for schistosomiasis by six times the current estimated needs and twice current estimates for soil-transmitted helminth infections in sub-Saharan Africa, said Jason Andrews, MD, assistant professor of medicine and the senior author of the study.

"These worms cause an array of health effects from anemia, malnutrition and growth stunting to infertility, cancer of the urinary tract and liver cirrhosis," Andrews said. "Mass drug administration of the scale we've proposed could prevent many of these problems. Our analysis indicates that this would not only be effective but also a cost-effective investment when compared alongside other health interventions."

The study will be published online June 1 in *The Lancet Infectious Diseases*.

Parasitic worm diseases are among the most prevalent ailments in the developing world, with documented transmission in 78 countries, according to WHO. About 150,000 people die of complications every year from these parasitic infections.

The two major categories of parasitic worms are the Schistosoma worms and the soil-transmitted helminths. The Schistosoma parasites reproduce in freshwater snails and can penetrate the skin of people who swim in contaminated lakes or rivers or who walk in muddy fields. The helminth worms, such as roundworm, whipworm and hookworm, are mainly found in soil. These worms may produce small eggs in the body that are expelled in human feces and can be transmitted to others through

ingestion of this material in soil or water supplies.

Low-cost treatments

Both diseases are easily treated with low-cost drugs that have relatively few side effects, Lo said. Schistosomiasis is typically treated with praziquantel, which costs about 21 cents a pill and can reduce egg production by 98 percent, he said. The helminths can be readily treated with albendazole, which costs about 3 cents a pill and can reduce the number of worm eggs by as much as 95 percent.

In the past 15 years, there has been a significant reduction in the global prevalence of these infections and greater access to medication, with 15 to 45 percent of those who need it getting treatment, according to WHO. Yet these diseases remain a persistent problem in many parts of the world, including Africa, South America and South Asia.

In February, WHO issued a press release urging further expansion of treatment where the disease is most endemic, with a goal of reaching 75 percent coverage in preschool- and school-age children by 2020. However, the WHO guidelines were written a decade ago and have not been updated to address changing goals and information.

"The guidelines were based on the best judgment of experts at the time, but I think there's fairly broad agreement that it's time to revisit these in view of new data, analyses and priorities," Andrews said.

He and his colleagues decided to take a systematic look at how best to control these infections, using a variety of models to examine prevalence and transmission patterns across Africa, as well as a cost-effectiveness model to determine what made the most economic sense.

They found that it would be most cost-effective to treat *Schistosoma*

worm infections annually when prevalence among children was as low as 5 percent—well below WHO's current threshold of 50 percent prevalence. In the case of helminth infections, they found it would be economically worthwhile to treat school-age children when prevalence was 20 percent—the same level currently recommended by WHO.

Their analysis also shows that it would be feasible to include preschool-age children and adults in the treatment program, as both age groups may experience the disabling symptoms of parasitic infection but have not been traditionally included in these treatment programs. Moreover, adults can easily reinfect children through fecal contamination in the household environment, Lo said.

Finally, the researchers found that it would save money to treat the two diseases at the same time, rather than as separate programs because most of the cost is involved in delivering the treatment, not in the pills themselves.

"It makes sense to work together to treat multiple diseases when they are in a single setting," Lo said. "If you have health-care workers who go into a village to do one treatment, they will have to go back to the village for a different treatment, and the second visit costs just as much."

If these proposed recommendations for sub-Saharan Africa were followed, it would require a sixfold increase in treatment for *Schistosoma* infections—from about 120 million to more than 750 million doses annually—and a doubling of the number of doses for helminth infections from 335 million to nearly 660 million a year, the researchers estimate.

Question of affordability

The scientists did not calculate the cost of the total proposed program,

and it's unclear whether current funders would be willing to increase their support. These programs are currently funded by the U.S. Agency for International Development, local ministries of health and various nonprofits, as well as pharmaceutical companies that donate the drugs.

In scaling up [treatment](#), it would also be important to be mindful of the potential for drug resistance, although the proposed guidelines meet the best practices for avoiding the emergence of resistance, Lo said. He said resistance with these drugs has been documented in animals, though not in human populations.

Provided by Stanford University Medical Center

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