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## Artesunate Suppositories Are Cost-Effective Intervention for Severe Childhood Malaria

*Giving emergency artesunate suppositories to children with suspected severe malaria before referring them for treatment is a cost-effective intervention that can substantially improve the management of childhood malaria in remote African settings, according to a new study led by Boston University School of Public Health [BUSPH] researcher Yesim Tozan, PhD,*

The study, which appears online Nov. 29 in *The Lancet*, builds on previous research that found that the administration of one dose of rectal artesunate by a community health worker to a child with suspected severe malaria significantly reduced the risk of death and permanent disability. In addition to endangering the lives of young children, severe malaria has been associated with a range of developmental deficits.

Rectal artesunate interrupts disease progression by rapidly reducing parasite density, but should be followed by further anti-malarial treatment. Because of this, the team led by Tozan, assistant professor of international health at BUSPH, said: "The success of interventions in the community ultimately depends on whether formal health systems can provide front-line health workers with drugs and other necessary health commodities, regular monitoring and supervision, and linkages to referral systems" for follow-up treatment.

The research team studied a hypothetical cohort of 1,000 newborn babies through five years of age in high malaria transmission settings. The team assessed the costs and cost-effectiveness of artesunate treatment, followed by referral to a health facility, under a variety of intervention uptake and referral compliance scenarios.

The researchers estimated that the full uptake of artesunate treatment and full compliance with referral advice would avert 37 child deaths and 967 disability-adjusted life-years [DALYs] -- a measure which combines years of life lost because of premature death, with years of life lived with disability -- over five years. Across all intervention uptake and referral compliance scenarios, the study reported that the intervention could avert each DALY at a cost of \$77 to \$1,173.

"Compared with the interventions that target key childhood

illnesses, in sub-Saharan Africa, pre-referral artesunate treatment are among the most cost-effective, especially if the intervention uptake is moderate or higher," the researchers concluded.

In remote settings in which the start of anti-malarial treatment with injectable drugs is substantially delayed, the 2010 World Health Organization guidelines for treating malaria recommend the use of artesunate or artemisinin suppositories for emergency treatment of patients suspected to have severe malaria, before transfer to a health facility. The use of this intervention remains low, however, in part because of questions about costs and cost-effectiveness.

"This study shows that rectal artesunate is highly cost-effective for saving lives of severely ill patients with malaria living not only at the end of the road, but where there is no road," said Joel G. Breman, MD, senior scientific advisor at the Fogarty International Center of the National Institutes of Health and a co-author on the study.

"There is now full justification to provide community health workers with life-saving rectal artesunate suppositories, training, and instructions for their use and referral follow-up, as part of the essential drug package," he said.

Tozan, who has done extensive research on the social and economic aspects of malaria, said artesunate suppositories are a needed addition to community health workers' arsenals in areas, where malaria is a frequent childhood disease.

"Pre-referral artesunate suppositories, if deployed appropriately in communities, address an important treatment gap, due to the weak state of the health-care systems in many malaria-endemic countries," she said.

She said the study's findings "provide strong economic

evidence to policy makers who decide which interventions to adopt in resource-constrained areas. Pre-referral artesunate treatment has the potential to get us closer to child-survival targets set by the United Nations and other international agencies.”

A 2010 report on the United Nations’ Millennium Development Goals notes that “prompt and effective treatment” is critical for preventing life-threatening complications from malaria, particularly in children. The Millennium Development Goals set a target of halting and beginning to reverse the high incidence of malaria by 2015.

The report notes that in the last seven years, many countries have shifted their national drug policies to promote artemisinin-based combination therapies -- a more effective, but also more expensive, treatment course for malaria. Global procurement of these medicines has risen sharply since 2005.

But antimalarial treatment coverage varies widely across African countries, ranging from 67 percent in some areas, to just 1 percent of children under five with fevers receiving any type of antimalarial drug in other regions, the

report says. In fact, the proportion of febrile children under five receiving any antimalarial medication exceeded 50 percent in just eight of 37 African countries that provided data from 2005 to 2009.

Half of the world’s population is at risk of malaria, with an estimated 243 million cases leading to nearly 863,000 deaths in 2008. Of those, 767,000, or 89 percent, occurred in Africa.

Funding for the new study came from The Disease Control Priorities Project, Fogarty International Center, the US National Institutes of Health; and the Peter Paul Career Development Professorship at Boston University, awarded to Tozan in 2008 to pursue her research into the consequences and treatment of childhood malaria.

Besides Tozan and Breman, other authors of the study include: Eili Y. Klein, Sarah Darley, Rajashree Panicker and Ramanan Laxminarayan of the Center for Disease Dynamics, Economics and Policy.

**Editor’s Note:** This article is not intended to provide medical advice, diagnosis or treatment.