ACTs may achieve malaria transmission reductions comparable to insecticide treated nets

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In low-transmission areas, if widely used, artemisinin combination therapy (ACT) may reduce malaria transmission as effectively as the widespread use of insecticide-treated bed nets, says a new study published in next week's *PLoS Medicine*.

The study also finds that the use of longer-acting anti-malarial regimens with or without artemisinin components may be an effective way to reduce transmission in high-transmission areas, provided the development of parasite resistance can be avoided. Lucy Okell and colleagues from the London School of Hygiene & Tropical Medicine present a mathematical model that predicts the impact on Plasmodium falciparum malaria transmission of the introduction of ACT and alternative first-line treatments for malaria in six regions of Tanzania with different levels of malaria transmission.

Using data from a survey of 5700 residents in Tanzania prior to the introduction of ACT, the model predicts that the relative reduction in malaria prevalence and incidence associated with a 100% switch to a short-acting ACT would be greater in areas with low initial transmission rates than in areas with high transmission rates. For example, in the area with the lowest initial transmission rates, the model predicted that the prevalence of infection would drop by 53%, but in the area with the highest initial transmission rate, the drop would be only 11%.

However, because more people get malaria in high-transmission areas, the total number of malaria illness episodes prevented would be ten times higher in the area with highest transmission than in the area with lowest transmission. Using a long-acting ACT is predicted to have more effect on transmission than using a short-acting ACT, particularly in the high transmission areas. For example, the drop in the prevalence of infection in the area with highest initial transmission rates is estimated to be 36% with a long-acting ACT.

The authors say that with the renewed interest in minimizing transmission and moving toward malaria elimination, "it is increasingly important to evaluate the ability of antimalarial treatments not only to cure disease, but also to reduce transmission," as well as to maximize available resources. Their findings suggest that best public health control measures should take the properties of anti-malarial drugs into account together with the levels of transmission in the area when designing treatment policies in order to achieve the highest impact on malaria transmission.

In a related Perspective article, Maciej Boni from Oxford University and colleagues (not involved in the research) describe the importance of mathematical modeling for long-term planning of malaria control and elimination, but caution that future predictive models must take account of the potential for drug resistance. "If we can secure sustained adequate funding, and overcome all the political and operational obstacles," the authors say, "then the evolution of mosquito resistance to current insecticides and parasite resistance to current ACTs are the greatest dangers we face in our current attempts to control malaria. Mathematical modeling is an important tool for developing strategies to contain the threat of resistance."

Citation: Okell LC, Drakeley CJ, Bousema T, Whitty CJM, Ghani AC (2008) Modelling the impact of artemisinin and long-acting therapies on malaria transmission intensity. PLoS Med 5(11): e226. doi:10.1371/journal.pmed.0050226
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