Defining the Necessary Next Steps for Effective Control of Helminthic Infections

Charles H. King
Center for Global Health and Diseases, Case Western Reserve University School of Medicine, Cleveland, Ohio

(See the Major Article by Chami et al on pages 200–7.)

Keywords. helminthiasis; prevention and control; drug therapy; organization and administration; patient adherence.

Community-based mass treatment with antihelminthic drugs remains one of the most effective ways of controlling and preventing disease caused by chronic parasitic infections such as filariasis, onchocerciasis, schistosomiasis, and intestinal worm infections within highly endemic areas. This approach, sometimes referred to as deworming, involves annual or biannual delivery of broad-spectrum antihelminthics, most often albendazole or mebendazole, praziquantel, and diethylcarbamazine or ivermectin. Public-private partnerships, facilitated by the World Health Organization, have provided substantial quantities of donated drugs to national control programs in Africa, Asia, Oceania, and South and Central America. With assistance of nongovernmental developmental organizations and of governmental programs such as the US Agency for International Development and the United Kingdom’s Department for International Development, the prevalence of helminth infections and of other “neglected tropical diseases” has been systematically mapped across these regions, and national or regional mass treatment programs have been implemented in most high-risk areas. This approach, termed preventive chemotherapy, aims to prophylactically limit the prevalence of helminth-associated diseases by regularly suppressing infection in areas where transmission can remain ongoing [1].

The logic behind mass treatment is that the drugs are each given as a single dose, they can be given together, and they have limited side effects, and because their cost is minimal and field diagnostics are imperfect, broad-based treatment is the most effective means of reaching all infected persons, as compared with clinic-based or individual screen-and-treat strategies. For some parasites (eg, lymphatic filariasis), widespread drug treatment can reduce or eliminate local transmission of infection, but for others, particularly the Schistosoma species and the soil-transmitted helminths hookworm Ascaris and Trichuris, transmission continues despite broad-based therapy, meaning that repeated rounds of treatment are necessary to maintain suppression of infection and disease [2, 3]. This is not the ideal situation in terms of prevention, but pending full implementation of sanitation and good hygiene practices, continuing mass drug administration (MDA) remains the pillar of helminthic disease control.

Implementing and maintaining a mass treatment campaign is not simple or easy. Many locations are difficult to reach or are even “beyond the end of the road” [4]. Because of this, it has been found to be highly effective to employ teachers or community health workers to serve as local drug distributors to schools, villages, or other defined administrative locations within an affected area. This approach was pioneered in onchocerciasis (river blindness) control programs in West Africa and has been adapted to lymphatic filariasis (elephantiasis) control, schistosomiasis control, and intestinal worm control. Integration of control campaigns has led to economies of scale and economies of scope that have provided significant savings in terms of costs of delivery for participating programs [5]. That said, MDA program effectiveness depends strongly on the performance of the community drug distributor and the consequent rates of treatment uptake by the target population [2, 3].

In the current issue of Clinical Infectious Diseases, a new research article by Chami et al [6] reports on an important analysis of the factors associated with patient nonparticipation in a long-term ongoing MDA program in Mayuge District in Uganda. Uganda was one of the first nations in sub-Saharan Africa to implement national-level MDA programs for schistosomiasis and intestinal helminth infections (2003), and it has had good initial successes in morbidity control [7]. However, adherence to treatment has been uneven [8], and problem areas persist where transmission remains at high levels and where MDA coverage is incomplete. The analysis of patient participation reported in the Chami et al article has a number of strengths. It identifies individual-level patient characteristics for participation and nonparticipation during
a later, sustaining phase of a multiyear mass treatment campaign for schistosomiasis and soil-transmitted helminth control, at a time when ‘program fatigue’ can begin to erode program performance. Notably, overall participation rates were found to be only approximately 56% in the communities targeted in this study. The study’s evaluation of uptake was based on a preplanned, predetermined, cluster-based survey design in which target households were selected prior to implementation and surveys were performed by independent assessors. Study size permitted extended analysis of patient factors relating to treatment uptake and to nonparticipation in the MDA program. Finally, because transmission risk for these infections is known to be heterogeneous across endemic regions, the analysis appropriately included multilevel modeling to reflect the impact of village-level, household-level, and individual-level factors in MDA participation. The findings point to persistent gaps in standard implementation of MDA control: Lack of adequate drug delivery and lack of sensitization via health education were given as the two most common reasons. Age, gender, and high-risk occupations did not signal likelihood of nonparticipation, but more subtle factors elucidated by this study included the fact that lower household socioeconomic standing was associated with reduced participation and the fact that head of household’s membership in a religious or ethnic minority also reduced uptake. Longer residence in a location and lack of household latrine also signaled a lower probability of treatment. Most unfortunately, individuals with heavier intensity Schistosoma mansoni infection and communities with higher prevalence of hookworm were significantly less likely to receive treatment.

There is little question about the clinical efficacy of anthelmintic drugs, but there remain significant questions about how we can improve and maintain the effectiveness of helminth control campaigns. We know how to treat individuals infected with these helminth infections, but we are still learning how best to treat communities at risk. This is where implementation science research is most valuable. The basic sciences can take us only so far in this endeavor, and it is clear that quality implementation of public health programs must take into account patient knowledge and fears, as well as the context of patient social standing, nutrition, and his or her personal interactions with friends, family, and drug distributors [8, 9]. The next step for MDA programs is to use this newfound knowledge about specific social drivers in redesigning and reinforcing the training of drug delivery personnel and in the development and refocusing of informational and motivational messaging to encourage public awareness and inclusion before, during, and after MDA campaigns.

Note

Potential conflict of interest. Author certifies no potential conflicts of interest. The author has submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest. Conflicts that the editors consider relevant to the content of the manuscript have been disclosed.

References