

# Post-Tsunami Malaria in Indonesia— The Pivotal Contributions of Permanente Physicians

By David Witt, MD

*Editor's introduction:*

## **Permanente in Banda Aceh!**

When I was providing care for tsunami survivors in a village in northern Indonesia in January 2005, I encountered patients with life-threatening *P. falciparum* malaria. (A 14-year-old had expired the day before we arrived.) For that reason, I went into the city of Banda Aceh to acquire antimalarial medicines. I was directed to the office of Malaria Emergency Technical and Operational Response (MENTOR) Initiative, a nonprofit organization overseeing the malaria and dengue fever programs. When I entered the office, I was amazed to see that it was a few of my infectious disease colleagues from The Permanente Medical Group (TPMG) who were in charge of the malaria program! These Permanente physicians taught medical volunteers how to diagnose and treat *falciparum* malaria and then, after they were certified, they were provided with testing kits and antimalarial medicines. David Witt, MD, presents this program, which he and his colleagues created—a model for disaster relief strategies.

—Lee D Jacobs, Editor

In response to the December 2004 tsunami, Kaiser Permanente (KP) sent physician teams and supplies to Sri Lanka and Indonesia. I spent a month in Banda Aceh, Indonesia as the Clinical Director of the Malaria Emergency Technical and Operational Response (MENTOR) Initiative Aceh emergency team. KP provided the entire medical contingent for this MENTOR activity, nine doctors total, who either were Infectious Disease specialists or had experience in malaria treatment and abatement. This program is a United Kingdom-based nonprofit; its goal is to strengthen existing structures within countries that support malaria prevention and treatment. MENTOR provides the necessary support for: health care delivery, public health infrastructure, sur-

veillance systems, funding for medications or pesticides, and for training. In the long term, the MENTOR goal is to have successfully supported a country's health care providers and governmental structures to enable them to continue the programs after MENTOR personnel have left, thus the double significance of the name "MENTOR."

## **Malaria—A Major Killer**

The impact of malaria may exceed that of all other infectious diseases, far surpassing even HIV.<sup>1</sup> The morbidity and mortality still exceeds all other infectious diseases except HIV.<sup>1</sup> Controlling this disease can be more effective and less costly than efforts directed at other diseases.

The *MENTOR Initiative* has successfully intervened during its short existence in several African countries, most notably Liberia, where after long-term political disruption some stability has been established. In cooperation with the existing governmental health care structure, a malaria prevention program was instituted and in three short years malaria has gone from the leading cause of death by disease to the ninth most frequent cause of death by disease in Liberia.

## **Malaria Following the Tsunami**

The tsunami in Indonesia led to the MENTOR Initiative's first efforts outside of Africa and to the organization's first emergency relief effort. The dramatic changes in the geography of Aceh, associated with the tsunami, created a public health emergency that would have compounded the devastation that this large area of Sumatra had already experienced.

After the tsunami, there were many factors that placed the population at great risk of severe malaria epidemic: extensive areas of standing salty water—a perfect environment for mosquito breeding; population displacements placed many people with active malaria in proximity to those uninfected and in the midst of the mosquito bloom; public health efforts had been im-

**David Witt, MD**, is an Infectious Disease Specialist at the San Rafael Medical Center in California. Dr Witt has teaching appointments at the UCSF Schools of Medicine and Nursing. E-mail: david.j.witt@kp.org.



paired during the civil conflict in Aceh and were now devastated by the tsunami; clinics, hospitals, labs and pharmaceutical stores were all devastated and the numbers of personnel killed were staggering; and over seven hundred people from the Ministry of Health were killed by the tsunami in Aceh province.

Although malaria has been endemic in Sumatra, the prevalence has been moderate. Although the most common type of malaria is *falciparum*, and the most lethal type, the mosquitoes that carry this agent there do not bite humans as their first choice.<sup>2</sup> This is in contrast to Africa, where the human preference is one of the reasons the disease is so catastrophic. Infected mosquitoes always have as their next meal another human, rapidly amplifying the infection prevalence. In addition, in Indonesia, malaria is seasonal, limiting amplification of infection and terminating outbreaks. On the other hand, malaria in this area is highly resistant to antimalarials (Ferdinand Laihah, MD, personal communication, 2005).<sup>4</sup>

### Our Role in Malaria Prevention and Treatment

In Indonesia, there were several facets of the MENTOR efforts. The most urgent was to coordinate all the malaria activities. We worked with the surviving Ministry of Health (MOH) personnel and later with personnel sent from other areas of Indonesia to plan malaria control activities and to mobilize available resources. These resources were either from the MOH's office or from the Non-Governmental Organizations (NGOs) such as *Save The Children* as well as governmental organizations such as foreign military contingents sent to aid the country.

MENTOR provided a prevention program that had two main parts. The first and most important was "Interior Residual Spraying." Since the malarial vector, *Anopheles sundaicus*, only travels a small distance after feeding on an infected person and then rests for a day, spraying the walls of dwellings with a pesticide that has residual activity will break the chain of transmission. It requires approximately 85% of the dwellings to be sprayed to be successful. This technique for pesticide application also limits exposure of the environment to the pesticides. We provided pesticide and "spraymen" as well as sprayers. MENTOR had 181 sprayers who were trained in the safe and effective use of the pesticides employed. These teams sprayed all structures in Banda Aceh (a city the size of Oakland, California) by the second week of February and areas with outbreaks of malaria outside of Banda Aceh as they were identified. These efforts also helped provide a

small element of economic recovery for the 200 or so Indonesians employed by the effort. We also trained military personnel from the German and Australian armies as well as local citizens provided by local municipalities or NGOs. We supplied them with sprayers and pesticide as well.

We also provided 37,000 Insecticide Treated Plastic Sheets to use as tenting in the homeless camps, which had a benefit similar to the interior spraying of houses.

The drugs previously used in Indonesia were ineffective against the prevalent strains of malaria in Sumatra. A worldwide effort to use combined treatment following the same rationale for combined therapy for tuberculosis has been proposed by the World Health Organization and had been planned for future introduction in Indonesia by the MOH. However, the costs of the new regimen had impeded the rollout and had not been in place at the time of the tsunami.

The necessity for training in the use of these medications was a priority since inappropriate use would select for drug resistance. As part of the relief effort, the MENTOR Initiative shipped and distributed 275,000 treatment courses of effective malaria medications. The training needed was developed and provided to all personnel in the region who might be involved in clinical care or public health. We also developed a curriculum that the MOH can continue to use and provided equipment for their future training sessions.

### The New Malaria Rapid Test Kit

A new testing capability for malaria has recently been developed, which is superior to the long-standing diagnosis by microscopy. The new Rapid Test Kit is similar to the rapid pregnancy tests available in this country and has a high sensitivity and specificity rate for



Malaria *Plasmodium falciparum* Rapid Diagnostic Test by Orchid. Photo for MENTOR Initiative by D Scott Smith, MD.

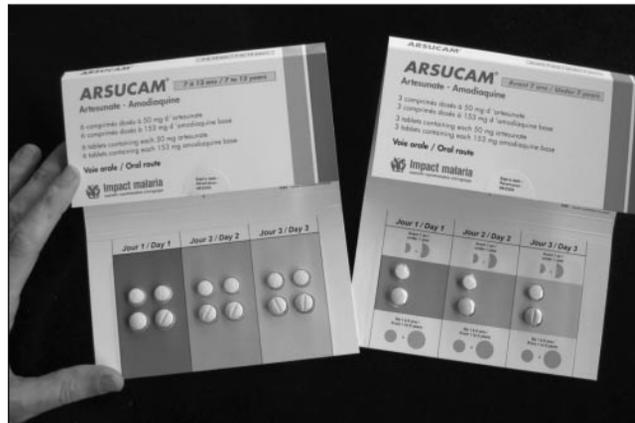
*falciparum* malaria. It permitted deployment of the new effective medicine regimens only to proven cases of malaria and thus prevented inappropriate use. MENTOR provided 500,000 of these kits and trained those receiving them.

### The Busy Team

One impressive aspect of this effort was how compact the organization was. KP provided the entire medical contingent for this effort by the MENTOR Initiative. There were three teams of three physicians each working in Banda Aceh for about a month. Since the total expatriate MENTOR team was only ten people, including the KP physicians, we worked long days. Physicians were able to fill broad task capabilities. We could wrap boxes of medications for delivery from a helicopter, substitute for the entomologist in supervising the spraying efforts, and could review a failing case of *falciparum* malaria. The initial team worked 18-hour days for virtually the entire month. As the weeks passed, the workload eased a bit, although the jobs changed somewhat to meet the evolving needs of the relief efforts.

### Closing

The MENTOR activities in Aceh were self-limited by design. A three-month grant might be extended to six months, but the goal was to have established a viable malaria program in the area by this time. So far there has been limited malaria in Aceh, probably less than that of a normal year. There is hope that these successes will provide the basis for extending the program to other areas of Indonesia. The MENTOR Initiative can take significant credit for this. All the donors who contributed,



Artemisinin-based Combination Treatment (ACT) from MENTOR Initiative. Photo by D Scott Smith, MD.

as well as the MOH who will direct and operate all malaria programs in the future in Indonesia, must take great pride in the joint efforts. ❖

<sup>a</sup> Malaria Subdirector, Directorate General of Communicable Diseases Control, Ministry of Health, Jakarta, Indonesia.

### References

1. World Health Organization. The world health report, 2002: reducing risks, promoting healthy life [monograph on the Internet]. Geneva: World Health Organization; 2002 [cited 2005 Sep 12]. Available from: [www.who.int.whr/2002/en/index.html](http://www.who.int.whr/2002/en/index.html).
2. Dusfour I, Harbach RE, Manguin S. Bionomics and systematics of the oriental *Anopheles sundaicus* complex in relation to malaria transmission and vector control. *Am J Trop Med Hyg* 2004 Oct;71(4):518-24.

## Battles

Pick battles big enough to matter, small enough to win.

—Jonathan Kozol, b 1936, writer, educator, and activist