RESTRICTED - ***IMPORTANT***

To be kept in personal possession at all times

MALARIA MOSQUITOES AND MEN

MALARIA TRAINING MANUAL NO. 3
NAVMED 143

(ALL PERSONNEL)

Prepared by Training and Educational Division
Malaria and Epidemic Disease Control
South Pacific Area

The Information in This Manual is not to be Communicated Either Directly or Indirectly to the Press nor to Any Person not in the Armed Forces (Allied)

UNITED STATES
GOVERNMENT PRINTING OFFICE
WASHINGTON : 1944

MALARIA, MOSQUITOES AND MEN*

The purpose of these questions and answers is to provide simple information on malaria and its control for instructional purpose and for wide distribution.

1. What is Malaria?

Malaria is a disease caused by very small parasites. These parasites live in red blood cells and destroy them.

2. When should a man suspect he has malaria?

A man should suspect malaria when he has a chill followed by fever and sweating. The chills and fever may come at regular intervals, sometimes every day, sometimes every second day, and sometimes every third day, depending on which kind of malaria parasite is in the blood.

3. Does malaria always behave the same way?

No. The symptoms of malaria vary greatly in different persons and at different times. The symptoms of malaria may be anything from a headache to a delirious fever, or even sudden unconsciousness. In places where malaria is common any fever or severe headache should suggest the possibility of malaria.

4. How can a man be sure whether or not he has malaria?

The only way to be certain that one has malaria is to have a drop of blood examined under a microscope for parasites. Sometimes medical officers can recognize malaria from symptoms alone without examining the blood.

5. Is malaria a serious disease?

Yes. Malaria destroys a man's blood and makes him weak. In combat, that may cost him his life. At any time it may keep him in the hospital for ten days or longer. It may make him a chronic invalid for a year or more. It may kill one or two out of every hundred persons if not properly treated.

---

* From War Dept. Circular Letter No. 44, Revised and Extended.

6. Is malaria serious for armies?

Yes. Malaria may be more serious for an army than the enemy. In the last world war the British and German armies faced each other in Macedonia for three years unable to advance because of malaria. In the South Pacific Area malaria has caused over eight hospital cases for every one caused by battle.

7. How does a man catch malaria?

Man catches malaria from mosquito bites. The mosquito carries the malaria parasite from one man to another. This is the only way in which malaria spreads.

8. Do all mosquitoes carry malaria?

No. Fortunately, only certain kinds of mosquitoes, called anophelines, can carry malaria.

9. How does the Anopheles mosquitoes carry malaria?

Anopheles mosquitoes suck up a drop of blood which they need for food, and then fly away. If there are malaria parasites in that drop of blood these are taken with the blood into the mosquito's stomach. Then the malaria parasites raise a large family in the mosquito's body.

10. How soon can an Anopheles mosquito infect another man after it has fed on someone who has malaria?

Usually in about ten days. By this time the young family of malaria parasites has grown up and is waiting in the mosquito's spit or saliva glands for a chance to infect a man.

11. How does the Anopheles mosquito infect a man?

Every time the mosquito drills a hole into a man's skin for blood it drools some saliva into the hole and if malaria parasites are in the saliva they go into the hole and so into the man's blood.

12. How soon after a mosquito's bite does malaria show up in a man?

Usually in from eight to fourteen days.

13. How is malaria cured?

There are drugs called quinine and atabrine, either of which when given by a medical officer for a week will often cure malaria. Other drugs, one of which is called plasmochin,

are also used to treat malaria in some cases. But sometimes, even though a man feels well after treatment, the drugs have not destroyed all the parasites. Some may hide away in the internal organs. Then, after ten days or a month or sometimes longer, the disease appears again. There may be several such attacks (called relapses) which have to be treated each time like a new infection.

14. Can malaria be prevented by keeping fit?

No. Malaria is one of the diseases that will hit the strong as well as the weak.

15. What is Malaria Control?

There are two kinds of malaria control. One kind is known as mosquito control and is directed against anopheline "malaria" mosquitoes. This work is carried out for us by Malaria Control Units. The other kind includes measures which each man must do for himself, and which no one else can do for him.

16. How is mosquito control work done?

The "mosquito experts," called entomologists and the engineers, control malaria by attacking and outwitting the mosquito. They know that the anopheline mosquito must spend the first week or ten days of its life swimming in certain kinds of water collections, such as streams, ditches, ponds and pits. Whenever possible this water is eliminated by draining or filling. They know that oil and paris green will kill the young mosquito wrigglers in water. Therefore, when filling or draining is not advisable, one or the other of these poisons is spread where it will do the most harm to mosquitoes. They also know that adult mosquitoes cannot pass through screens; so the right size screening is put on tents and huts. They know that certain sprays will kill adult mosquitoes; so there is a program for spraying places where the mosquitoes are resting. Finally, they know that most malaria mosquitoes can fly only a mile or two; so camp sites are chosen which, if possible, are not near mosquito breeding places, and not near native villages.

17. What can each man do to prevent malaria?

There are some very simple but extremely effective things which each man can do. The man who carefully uses a bed net, who keeps his body covered with clothing and regularly rubs repellent liquid on exposed skin has by far the best chance of avoiding malaria. In addition he must stay out of native villages and get behind screens at night. He must know how and when to use sprays for killing mosquitoes.

18. When is it most important to do these things?

With rare exceptions the anopheline, "malaria mosquito", bites from dusk until sunrise. Malaria is not carried by pest mosquitoes which bite in the daytime. Therefore, we should do everything possible to avoid mosquito bites from sunset until sunrise.

19. How are sleeping nets used?

Sleeping or bed nets are used to protect a man when he is sleeping. It is important to use them properly. They must be tucked in so that the mosquitoes cannot get inside; the net should be so arranged that a man does not sleep up against the side and thus allow the mosquitoes to feed on him through the meshes of the net. After getting under a net, one should search for mosquitoes and kill them before going to sleep. This should be done with a flashlight if possible. There are places in the tropics where a single night of sleeping without a bed net may result in an infection rate of 20 per cent among unprotected troops. Bed nets must be carried in each man's pack to be available on the first night ashore.

20. What is meant by protective clothing?

Protective clothing is any clothing which gives protection against mosquito bites. Trousers must be tucked into shoe tops, and socks drawn up outside trouser bottoms to protect the ankles. Shirts must be worn after sunset. Sleeves must be rolled down to protect the arms and collars must be buttoned. There are also gloves and headnets which, although sometimes hot and uncomfortable, will keep mosquitoes from drilling holes in the skin of the neck and face. Don't wear shorts at night or at any time in the jungle. Do not sit around with your shirt off at night. Do not go swimming, or take a shower in an unscreened bath house at night.

21. What are repellents?

Repellents are chemical solutions which when spread over the skin will keep the mosquitoes from biting for three or four hours. When men are sweating a repellent must be applied more often. A repellent should also be put on the clothing wherever this is thin enough or tight enough so that the mosquito can drill through it (for example, at the shoulders or seat). Eight or ten drops rubbed on cheeks, back of neck, hands, and wrists are enough. Be careful to keep it out of your eyes.

22. How important are repellents?

Each man should remember that there may be times, particularly in combat, when the use of a repellent is the best

way to protect himself. If repellents are used regularly and faithfully, a man can go through the most malarious jungle and have better than a fair chance to avoid the disease. Repellent should be used during night air raid alerts.

23. How and when should spray killing of mosquitoes be done?

The quartermaster or supply officer has sprays which will kill mosquitoes. A new "bomb" sprayer, known as a freon-pyrethrum aerosol dispenser is available. No spray gun is necessary as the freon produces the necessary spraying pressure and the pyrethrum is left suspended in the air as a cloud of fine droplets. This mist persists for some time and will protect small groups of men in fox holes, gun positions, jungle shelters and other front line situations. This spray is highly concentrated. Eight seconds of spraying is enough for a pyramidal tent; smaller tents and bed nets require smaller amounts. Larger amounts do not increase effectiveness and are wasteful. The dispenser should be carefully closed after using. In rear areas the hand sprayer will also be useful. Tents and nets should be sprayed at dusk and before going to bed. If bombing forces men to leave their nets, a supply of spray and repellent should be taken to the fox hole. All screened quarters should be sprayed regularly. The repellent aetivity of the Aerosol is of such low value that its use as a spray for clothing is unwarranted and wasteful.

24. What is meant by "Man-Made Malaria"?

Mosquito breeding requires water naturally present as ponds, swamps, and streams. In addition, men make many new breeding pools by driving jeeps and trucks all over a field or coconut grove, thus forming ruts and holes which fill with water. This is a part of what is called "Man-made Malaria". Truck and jeep drivers should stay on roads and thus avoid making unnecessary ruts.

25. Is it necessary to take care of your anti-mosquito equipment?

Yes. Recently troops landed on a Jap island, in the dry season and found few mosquitoes and no malaria. Many of them concluded that the talk about malaria was overdone and some discarded their repellent. Meanwhile, increasing numbers of mosquito larvae were found in water in ruts and holes, warning of malaria to come. What would have happened if

these same troops had thrown away their guns and ammunition because they did not meet the enemy during the first few days?

26. Are native villages dangerous?

Yes. Stay out of native villages after dark. Most natives in malarious places have malaria parasites in their blood, even if they look fairly healthy. The mosquitoes in such places are full of malaria. This is also true of captured enemy camps. When necessary to occupy these places, they should be sprayed frequently.

27. What about taking atabrine to prevent malaria?

Atabrine in small doses will postpone the chills and fever of malaria. But even large doses of this drug will not prevent the mosquito from infecting a man. Sometimes it is very necessary to keep fit in places where it is not possible to get sufficient protection from bed nets, clothing and repellents. Under these conditions, atabrine is taken in small doses to postpone any attacks of chills and fever. When the mission is completed, and the men return to a rear base, the atabrine doses are stopped. Then, in about ten days or so, if a man was bitten by an infected mosquito, the chills and fever will show up and he can be given a regular treatment in the hospital. Since the best hospital facilities for treating malaria are located at the rear bases, this postponing malaria until a man is back at such a base insures him of good medical care.

28. Does atabrine always suppress symptoms of malaria?

No. Even when atabrine is taken regularly a small percentage of troops during combat in a highly malarious area will develop symptoms of malaria each week. However, without atabrine, under similar conditions, a very high percentage develop symptoms each week. When this happens one or more of the following factors is usually responsible: not taking the atabrine regularly, unusual fatigue, or lack of sleep.

29. Must all these things be done on every malarious island?

No. The need for these measures differs on every island and changes from time to time on the same island. The only rule is that each man must know all the measures to protect himself from malaria. On each island orders will be issued telling what measures are to be used. These measures are not complex or difficult. They are simple and easy.

30. Is all this talk about malaria important?

Yes. You can be as dead from malaria as from s[hell]nel. You can be made an invalid from malaria for prolonge[d] riods. Malaria can make you weak, puny and good for not[hing] Malaria in an army can spoil a campaign. This is fact, not fi[ction] The Japs know it and so do the Germans. They try to pr[event] malaria. Whenever they do a better job of malaria control t[han] we do, they stand a good chance of winning a battle. In ma[ny] larious places it is just as necessary to beat the mosquito as to beat the enemy. The mosquito's brain is smaller than a pinhead. We should be able to outsmart a mosquito if we use the brains we were born with.