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MALARIA AS UNDERSTOOD BY SOLDIERS

BY

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## Malaria as Understood by Soldiers\*

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WHEN, in 1965 and early 1966, malaria began to occur in the combat components of the American, Australian and Korean troops serving in Vietnam, questions arose about malaria discipline, soldiers' understanding of the disease and the adequacy of supply of the items necessary for the proper practice of malaria prevention. In an attempt to answer these questions, a survey was organized to collect information from a questionnaire administered to troops. This report presents and compares the findings of surveys conducted in American, Australian and Korean soldiers serving in Vietnam.

### Method

A multiple choice questionnaire was used to collect information from soldiers in combat units. It listed questions on the availability of insect repellent, insecticide in aerosol dispensers (spray cans), mosquito bed nets, head nets and standard issue antimalarial tablets. Further questions were designed to assess the quality of instruction to which soldiers had been exposed, their knowledge of the correct use of the protective items, the correct wearing of protective clothing, and the cause, nature and prevention of malaria. The questionnaire was so arranged that usually three possible responses followed each question. Soldiers were instructed to select only one of these responses by making a mark in the space provided.

Three surveys were conducted: in the first, 194 American infantry soldiers completed questionnaires in November, 1965, the second

\* The cause, nature, and prevention as understood by American, Australian and Korean soldiers studied by U. S. Army Medical Research Team (WRAIR) Vietnam.

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comprised a group of 182 Australians, studied in March, 1966 and the third consisted of 280 Korean infantry soldiers who completed the questionnaire after translation into Korean in July 1966.

### Results

Table I gives the age distribution of each of the three groups of soldiers that completed questionnaires. The age distributions of the American and Australian groups are similar and tend to differ slightly from that of the Koreans because in the latter non-commissioned officers were not included in the survey.

Since data derived from questionnaires are at best crude and subject to bias, only those responses that represent at least two-thirds of the group are treated as representing the opinions and impressions of the majority (marked with an asterisk in the Tables).

Table II lists responses to questions on insect repellent and spray cans of insecticide. Insect repellent was stated to be available in all units and can be obtained as needed. It was considered to be of value during combat operations, and commanders permitted its use in combat situations. The majority of soldiers have at some time received instruction in its correct use. Only the Korean soldiers appear to apply it in base camp. However, the failure of 30 per cent of the Americans and 16 per cent of the Koreans to apply repellent during operations points to a significant reach in

TABLE I  
AGE DISTRIBUTION OF SOLDIERS COMPLETING THE MALARIA QUESTIONNAIRE

Age Group in Years	American		Australian		Korean	
	%	No.	%	No.	%	No.
18-	7.2	14	8.2	15	0.0	0
20-	20.1	39	35.5	61	3.9	11
22-	27.8	54	18.7	34	29.6	83
24-	13.4	26	10.4	19	45.7	128
26-	3.6	7	8.2	15	13.2	37
28-	2.6	5	3.8	7	3.6	10
30-	3.6	7	4.4	8	0.4	1
32-	6.7	13	2.7	5	0.4	1
34-	4.1	8	2.2	4	0.4	1
36-	2.1	4	3.8	7	0.0	0
38-	3.1	6	2.2	4	0.0	0
40+	4.6	9	1.6	3	0.4	1
No age recorded	1.0	2	0.0	0	2.5	7
Total		194		182		280

TABLE II  
USE OF INSECT REPELLENT AND SPRAY CANS OF INSECTICIDE

	Number and Per Cent of Affirmative Responses					
	American Soldiers		Australian Soldiers		Korean Soldiers	
	%	No.	%	No.	%	No.
<i>Insect Repellent</i>						
a) Present in unit	79.9*	155	95.1*	173	77.6*	237
b) Available as needed	79.4*	154	97.3*	177	71.0*	224
c) Received instruction in use	68.0*	132	86.8*	158	79.6*	223
d) Used in base camp	52.6	102	49.5	90	83.9*	235
e) Used during operations	70.1*	136	99.5*	181	83.6*	234
f) Of value during operations	71.7*	139	93.4*	170	Omitted from Questionnaire	
g) Commanders permit use during operation	72.7	141	96.2*	175	82.8*	232
<i>Spray Cans of Insecticide</i>						
a) Present in unit	54.1	105	20.9	38	67.9*	190
b) Available as needed	50.5	98	23.1	42	19.3	54
c) Received instruction in use	55.1	107	51.0	93	72.5*	203
d) Used to spray inside mosquito net in camp	32.0	62	17.6	32	77.1*	216
e) Used to spray inside of tent in camp	42.8	83	22.0	40	68.2*	191
f) Used during operations	22.7	44	5.5	10	58.9	165
g) Of value during operations	34.0	66	22.5	41	37.5	100
g) Commanders permit use during operations	43.8	85	19.8	36	61.1	171
Total Surveyed		194		182		280

\* Represents responses of the majority.

malaria discipline. The spray can of insecticide (aerosol "bomb") is far less popular. The Koreans' responses suggest that it is available in their units, although apparently it cannot be obtained very freely. They also declare that they have received instruction in its use, and that they spray their mosquito bed nets and the interior of their tents in base camp. At the time of the questionnaire, the Australians appeared to make little use of this item.

Table III records the responses to questions on mosquito bed nets, mosquito bars (poles for supporting mosquito bed nets) and head nets. Mosquito nets were issued to nearly every soldier, the majority of whom still possess them. Instruction in the use of a mosquito net had apparently not been given to a majority of American soldiers. The Australians alone consider the net to be of value during operations. A majority of all three groups use

it correctly. Mosquito nets are regularly checked for holes by both their owners and non-commissioned officers in Australian and Korean units. No information is available on similar inspections in American units because pertinent questions had not, at that time, been incorporated in the questionnaire. Mosquito bars appear to have been issued to only some of the American soldiers, although the majority seem to be in possession of bars improvised from local materials. Head nets were issued to the American and Korean troops, most of whom still have them in their possession. Only the Koreans claim to have received instruction in their use; they further state that the nets are worn in base camp. The Australians seem not to have or use head nets, though it would appear that a few of their soldiers would find them helpful in the field. The head net does not find favor for use during operations in

TABLE III  
USE OF MOSQUITO BED-NETS AND BARS, AND HEAD-NETS

	Number and Per cent of Affirmative Responses					
	American Soldiers		Australian Soldiers		Korean Soldiers	
	%	No.	%	N	%	No.
<i>Mosquito Bed-Net</i>						
a) In possession of net	92.3*	179	99.5*	181	89.6*	251
b) Issued a net	91.2*	177	100.0*	182	86.8*	243
c) Received instruction in use	62.9	112	74.7*	136	69.6*	195
d) Used in base camp	86.0*	169	97.8*	178	83.9*	235
e) Of value during operations	43.3	84	85.7*	156	50.0	140
f) Fringe tucked under sleeping-bag etc. when in use	73.2*	142	91.2*	166	77.5*	217
g) Regularly inspected for holes by owner	—		97.8*	178	81.8*	229
h) Regularly inspected for holes by NCO	—		72.5*	132	75.0*	210
<i>Mosquito Bars</i>						
a) In possession of bars	76.8*	149	39.6	72	41.4	116
b) Issued bars	58.2	113	9.9	18	40.4	113
<i>Head-Net</i>						
a) In possession of net	81.4*	158	1.6	3	77.9*	218
b) Issued a net	85.2*	160	1.1	2	75.4*	211
c) Received instruction in use	61.3	119	7.7	14	65.4*	183
d) Used in base camp	11.9	23	0.0	0	69.6*	195
e) Of value during operations	46.9	91	12.1	22	45.0	126
Total Surveyed		194		182		280

\* Represents Responses of the Majority.

general. Spontaneous comments on the questionnaire, and during interviews with patients, condemn the standard head net for restricting vision, being "hot," and getting caught on foliage.

Table IV reports the responses to questions on the epidemiology of malaria, the use of antimalarial chemoprophylaxis and the use of protective clothing. The majority of all soldiers appear to have received instruction at some time in malaria and the practice of malaria discipline. Knowledge of the disease

itself is adequate, except that American and Korean soldiers do not, in general, realize that malaria is most frequently contracted between sunset and sunrise. This is an important omission in the soldier's understanding of the practical epidemiology of the disease, and defines a specific area for troop instruction.

Important lapses in protective clothing discipline occur in both the Americans and the Koreans during operations—the very time when sleeve and trouser protection is most critical.

TABLE IV  
MALARIA INSTRUCTION AND STANDARDS OF MALARIA DISCIPLINE

	Number and Per cent of Affirmative Responses					
	American Soldiers		Australian Soldiers		Korean Soldiers	
<i>Instruction in Malaria</i>	%	No.	%	No.	%	No.
a) Prior to arriving in Vietnam	64.4	125	94.0*	171	95.0*	266
b) Within one week of arriving in Vietnam	70.6*	137	83.5*	152	90.3*	253
<i>Instruction Anti-Malarial Chemoprophylaxis</i>						
a) Prior to arriving in Vietnam	73.7*	143	89.0*	162	81.8*	229
b) Within one week of arriving in Vietnam	88.7*	172	79.9*	145	88.2*	247
<i>Knowledge of Malaria</i>						
a) Disease contracted by mosquitoes	96.4*	187	98.4*	179	76.4*	214
b) Disease generally contracted between sunset and sunrise	49.0	95	79.7*	145	37.1	104
c) A potentially dangerous and important disease	88.1*	171	99.5*	181	84.6*	237
<i>Protective Clothing</i>						
a) Arms covered after dark in camp	89.2*	173	99.5*	181	81.4*	228
b) Arms covered during operations	75.8*	147	97.3*	177	81.1*	227
c) Legs covered after dark in camp	95.9*	186	99.5*	181	86.8*	243
d) Legs covered during operations	85.6*	166	97.8*	178	63.6*	178
e) Mosquitoes bite through clothing			96.7*	176	82.1*	230
<i>Anti-Malarial Chemoprophylaxis</i>						
a) Tablets-readily available	89.7*	174	99.5*	181	84.6*	137
b) Tablet/week(day) taken regularly in base camp	89.2*	173	98.9*	180	82.1*	230
c) Tablet/week (day) taken regularly during operations	80.9*	157	96.2*	175	75.4*	211
d) Tablet/week (day) taken on given day (time of day) in camp	88.7*	172	92.3*	168	69.3*	194
e) Tablet/week (day) taken on given day (time of day) during operations	76.8*	149	89.0*	162	68.2*	191
Total Surveyed		194		182		280

\* Represents response of the majority.

The data on malarial chemoprophylaxis suggest problems in distribution of the tablets in American and Korean units. It is disappointing to note that 10 per cent of Americans and 18 per cent of Koreans fail to take tablets regularly in base camp, and discouraging to find a further fall to 19 per cent and 25 per cent failure during operations.

On reviewing the responses in Tables II to IV, it is evident that the Australians have the best understanding of malaria, and maintain superb standards of malaria discipline. Comparing the Americans with the Koreans, the latter appear to have had somewhat greater exposure to instruction in malaria and the practice of malaria discipline. If the Australian standards are used as criteria, overall malaria discipline is less than adequate in American and Korean troops.

#### Summary

Questionnaires about malaria were administered to 194 American, 182 Australian, and 280 Korean soldiers serving in Vietnam. Anal-

ysis of their responses indicate that the Australians had the best understanding of malaria and very high standards of malaria discipline. Although over two-thirds of American and Korean troops are adequately instructed about malaria and practice good malaria discipline, there is room for significant improvement if the malaria attack rates current at the time of this report continue to occur.

Such improvement might be achieved by a better understanding of practical epidemiology by the troops; correction of lapses in protective clothing discipline; and assiduous attention by commanders to the logistics of antimalaria chemoprophylaxis, particularly during operations.

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