Falciparum Malaria in Vietnam: Clinical Manifestations and Nursing Care Requirements

MAJ Beverly A. K. Glor, ANC, USA*

MALARIA is not a new disease to mankind nor to military medicine. Throughout history, the significance of this health problem during military campaigns has been well documented in the sometimes overwhelming non-effective rates experienced by troops in the field. During World War II for example, attacks of malaria in US Forces in the South Pacific were five times that of combat casualties.[1] More recently, a rekindling of this age-old problem was seen with the introduction of non-immune American troops in the Republic of South Vietnam. In 1965, the number of troops evacuated from Vietnam as a result of malaria was equal to that evacuated because of wounds.[2] There is little doubt that expansion of our military commitment in South East Asia will see a proportionate rise in the incidence of malaria.

Concern over this increasing incidence in malaria is not limited to the military alone. The incidence of malaria in the United States as a result of returning troops has risen sharply in the last few years. Of the 678 reported cases in the United States in 1966, 563 were attributed to military personnel. As of April 1967, 712 cases of malaria had been reported in military personnel. It was estimated by the National Communicable Disease Center that the annual total for 1967 would be between 2,000 and 3,000 cases.[3]

The major responsibility for providing medical and nursing care for the increasing number of casualties from malaria lies primarily with the Army Medical Service. However, how many of those involved in providing this care have ever seen a case of malaria, or for that matter, have a well-founded working knowledge of the disease? Considering the number of young personnel in the Army Nurse Corps and the infrequent occurrence of the disease in this country, it would probably be safe to assume that relatively few have either experience or a depth of knowledge regarding malaria. While it would be very difficult to provide each and every member of the Army Nurse Corps with a desirable level of experience in malaria, it is possible to provide well documented descriptions of the disease and its existing requirements for nursing care. A review of the literature however, reveals a limited number of studies concerned with the natural history of the disease, and nursing studies of malaria are non-existant. Considering the magnitude and significance of malaria to the military, exploration of this health problem by Army nursing research is warranted.

The mission of the Army nursing research program is to systematically study and further develop the rationale underlying military nursing practice. Inherent in this mission is the responsibility for placing emphasis on those areas which are of significant military medical concern. The subsequent realization of this goal will also serve as another step in the formulation of a conceptual framework for military nursing, a conceptual framework from which will evolve increasingly effective means of control over factors adversely influencing the health and welfare of the soldier patient. The ultimate aim basic to the development of this conceptual framework is the improvement of patient care. To improve patient care, however, we must be able to identify those components of our profession which influence patient response and result in improved patient welfare.

There are countless social and physiological phenomena observable in the practice of nursing, and a great deal of what nurses do is dependent upon that which they observe. The clinical manifestations presented by a patient provide the nurse with the basis from which she can evolve a nursing plan of care. The resulting interpretations and judgments stem-

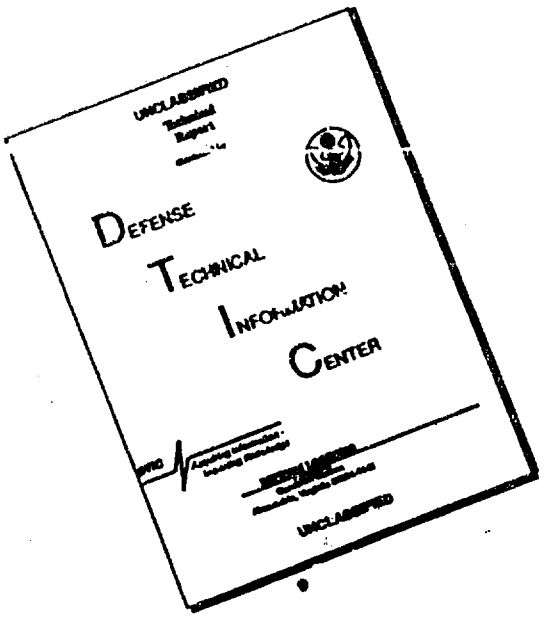
---

The 1967 Federal Nursing Service Award Essay.

* Department of Nursing, Walter Reed Army Institute of Research, Washington, D.C. 20012.

This is Contribution Number 322 to the Army Research Program on Malaria.

DISCLAIMER NOTICE



THIS DOCUMENT IS BEST QUALITY AVAILABLE. THE COPY FURNISHED TO DTIC CONTAINED A SIGNIFICANT NUMBER OF PAGES WHICH DO NOT REPRODUCE LEGIBLY.

TABLE I

SELECTED CHARACTERISTICS OF 50 PATIENTS WITH *P. Falciparum* MALARIA

Characteristic	Total	
	No.	Per cent
Age		
18–20	15	30
21–23	19	38
24–26	7	14
27–29	2	4
30–32	5	10
33–35	0	0
36–38	2	4
Totals	50	100
Mean (years)	23.4	
Ethnic Background		
Caucasian	43	86
Negro	5	10
American Indian	1	2
Puerto Rican	1	2
Totals	50	100
Months in Republic of Vietnam		
1–3	14	28
4–6	17	34
7–9	11	22
10–12	8	16
Totals	50	100
Mean (Months)	5.6	
Days Symptoms Present Prior to Admission to Hospital		
1	5	10
2	3	6
3	36	72
4	4	8
5	1	2
6	1	2
Totals	50	100
Mean (days)	2.9	

ming from observable symptomatology are directed toward the implementation of effective nursing intervention to alleviate or control this observable symptomatology. Basic to the implementation of effective nursing intervention, however, is the possession of a degree of skill, a depth of knowledge, and judgment; skill in knowing how and what to observe; knowledge of the underlying pathophysiology influencing the observable phenomena; and judgment to relate the knowledge and skill. The next step becomes one of exploration and evaluation of nursing methods, and their resulting influence on patient response.

This exploratory study was therefore designed to fulfill a dual purpose. First, to assist in the identification of a suggestive hypothesis for future nursing research and secondly, to convey information, primarily to nursing practitioners, concerning the present status of the disease malaria, so that nurses confronted by this disease for the first time will be aware of its clinical manifestations and existing nursing care requirements.

Method

Study sample

Fifty American male military patients with an initial *P. falciparum* infection were used in this study. While 81 case studies were originally initiated over the nine-month study period, 13 patients were deleted on the basis of incomplete data and eighteen as a result of

TABLE II

SYMPTOMS EXPERIENCED BY 50 PATIENTS WITH *P. Falciparum* MALARIA PRIOR TO ADMISSION TO HOSPITAL

Symptoms	No. of Patients	% of Patients
Fever	50	100
Chills	45	90
Anorexia	22	44
Malaise	40	80
Myalgia	23	46
Nausea	20	40
Vomiting	12	24
Dizziness	17	34
Cough	10	20
Headache*	47	94
Backache	10	20
Arthralgia	7	14
Diarrhea	1	2
Weakness	7	14
Abd. Discomfort	4	8
Generalized Aches and Pains	4	8
Fatigue	2	4
Sore Throat	1	2
Diaphoresis	1	2

* 16 complained of frontal headache 2 retro-orbital

being transferred prior to completion of the 21 days of observation arbitrarily established as part of the research protocol. Table I shows selected characteristics of the study group being reported.

All patients selected for study had been direct admissions demonstrating positive blood smears within a 24 hour period prior to, or following, their admission to the hospital. Thirty-seven patients were hospitalized at the Third Field Hospital in Saigon, and the remaining 13, at the Thirty-Sixth Evacuation Hospital in Vung Tau, Republic of South Vietnam. The average hospitalization for patients in this study was 30 days.

The medical regimen, including chemotherapy, was standard for all patients in the study group. General medical orders included: Diet as tolerated, bed rest, sponge for temperature over 103 degrees Fahrenheit, Darvon compound for headache, Compazine for nausea, quinine sulfate, 10 grain tablets every eight hours for 42 doses, and Daraprim, 25 milligram tablets ever eight hours for nine doses. Observations and recordings of the clinical manifestations and nursing care activities were accomplished for a minimum of 21 days.

TABLE III

DURATION OF SYMPTOMATOLOGY IN 50 PATIENTS WITH *P. Falciparum* MALARIA DURING HOSPITALIZATION

Symptom	No. of Patients	Per Cent of Patients	Total Days	Mean Duration Days
Fever	50	100	177	3.5
Chills	45	90	90	2.0
Anorexia	50	100	453	9.1
Malaise	50	100	582	11.6
Nausea	44	88	129	2.9
Headache	50	100	205	4.1
Backache	38	76	172	4.5
Myalgia	45	90	183	4.1
Cough	28	56	110	3.9
Vomiting	32	64	49	1.5
Arthralgia	50	100	246	4.9
Diarrhea	7	14	17	2.4
Thirst	42	84	105	2.5
Abd. Discomfort	30	48	65	2.2
Dizziness	50	100	382	7.6
Weakness	50	100	626	12.5
Flushed	38	76	86	2.3
Diaphoresis	28	56	50	1.8
Dehydration	20	40	31	1.6
Depression	43	86	83	1.9

Technique

Data for this study were obtained by four means: Clinical nursing rounds, interrogation, medical records, and observation. The use of multiple means was considered advantageous for two reasons. First, none of the aforementioned means, in itself, was capable of amassing all the desired data. Secondly, the overlapping and repetition of assessed information could serve to substantiate the ultimately recorded data.

Forms for recording the data included a graphic record, laboratory flow sheet, a general information form, and a clinical checklist. To facilitate transposition of data relative to vital signs and laboratory results, the laboratory flow sheet and graphic record were similar in design to standard clinical forms. The general information form was used to record pertinent personal information such as age, ethnic background, nationality, serial number, rank, name, months in Vietnam, admission history and physical, past medical history, and malarial control measures utilized while in Vietnam. The clinical checklist was used to record the presence and category of intensity of the signs and symptoms, and the nursing care activities. A review of the literature served as the source for the listed clinical symptomatology.

Two military physicians and three Army Nurse Corps officers assisted the investigator in the collection of data. The per cent of agreement for observations and clinical assessments between the investigator and the physicians was higher than those between nurses and investigator. However, in both instances it was greater than 70 per cent. The major differences appeared in the assessment of the category of intensity for presenting symptomatology. This was anticipated, owing to the judgment factor involved in assigning quality and quantity to observations. Also, the length of experience for the three nurses assisting in the study was, on the average, less than three

years, and perhaps they had a limited basis for expectations concerning patient response.

Clinical nursing rounds in this setting differ from traditional nursing rounds. Primary emphasis is placed on research as well as patient assessment for therapeutic planning. Nursing rounds in the traditional setting are ordinarily for evaluation and nursing care strategies, or, in the academic setting, as a means of instruction. In this study, clinical nursing rounds conducted daily by the investigator encompassed the following: (1) Palpation of the liver and spleen; (2) observation of skin tonus, color, and the presence of absence of cutaneous abnormalities; (3) muscle strength (if not expressed by the patient, routine tests of push, pull, holding, and grasp were employed); (4) presence or absence of hypotension (determined by placing the patient in an erect position for two minutes following the maintenance of a supine position for 30 minutes, and taking blood pressure readings prior to assumption of the erect position and immediately following the two minute stance).

Interrogation of the patient was usually accomplished in conjunction with the clinical medical and nursing rounds. The nurse-patient and doctor-patient interaction that accompanied clinical rounds usually facilitated voluntary expression of existing symptomatology by the patient. If, however, information was not volunteered, lead cues, were used to elicit a response. For example, if a patient had not made any statement concerning his appetite, the dialog would go something like this: "The 'Chow' looked pretty good this morning!" At this point, the patient would usually pick up the conversation and eventually reveal the state of his appetite. Of course, you often received a lengthy dissertation along with it concerning the attributes of home cooking or what is wrong with Army "chow." Patient interrogation was usually concerned with pertinent personal information and medical history. Both the clinical checklist and general information form were used during clinical nursing rounds.

Medical records served as a source for various data. Vital signs, intake and output measurements, and laboratory reports were transcribed directly from the patient's medical records. Nurses notes, progress reports, history and physical sheets and doctors order forms served as supplemental sources of data.

The major portion of the study was concerned with the observation of the presenting symptomatology and the required nursing care. Originally, it had been decided that observations would be made continuously throughout each 24 hour day for the total 21 days of study. However, insufficient personnel as well as the medical and nursing demands of the combat situation did not permit this. In some instances, it was necessary to rely solely on the medical records and the recordings of personnel unfamiliar with the research to obtain data over a given 24 hour period. The average number of patients under study at one time was four. The greatest number of patients followed at one time was seven. Fortunately, these seven patients were all located on the same ward.

A special code for both the nursing care activities and the categories of intensity of the presenting symptomatology was devised to facilitate recording of data on the clinical checklist. Categories of intensity for the symptomatology were designated as severe (++++), moderate (+++), and mild (+). The observer made a judgmental decision based upon his or her interpretation of the observation; or employed the predetermined objective measures; or recorded the intensity actually stated by the patient. For example, a patient often

TABLE IV

ABNORMAL LABORATORY FINDINGS DURING THE ACUTE PHASE OF *P. Falciparum* MALARIA IN 50 PATIENTS

Laboratory Test	No. of Patients	Per Cent of Patients
Bilirubin Total (Elevated)	27	54
Bilirubin Direct (Elevated)	2	4
BUN (Elevated)	7	14
Hematocirt (Less than 38 Per Cent)	29	58
SGOT (Elevated)	21	42
WBC (Less than 5000)	31	62
Proteinuria	11	22
Urine Specific Gravity (Increased)	8	16

stated he had a severe headache, or a mild headache, using those exact words. Objective measures were those such as found with fever. Severe fever was considered any elevation of temperature over 103 degrees Fahrenheit, moderate temperature was an elevation of 101 to 103 degrees, and 100 degrees to 101 degrees was considered mild fever. The category of intensity for anorexia was determined by the amount of food returned by the patient following each meal. A tray returned with two-thirds of the original portions remaining was designated as being indicative of severe anorexia. A half empty tray indicated moderate anorexia, while a tray two-thirds eaten was designated as an indication of mild anorexia. As three meals were routinely served daily, an average was derived from the three assessments.

To assist the observer and to minimize bias in assessment, when objective measures were not available or applicable clues were devised by the observer group based upon a consensus of opinion. Past experience of the observer group served as the primary source in the selection of the clue patterns to be used. Subsequent practice sessions utilizing these clue patterns demonstrated acceptable consistency within the observer group. The use of clues was necessary for such symptoms as myalgia, arthralgia, headache, nausea, and depression. In the case of headache, duration of pain, facial expression, rubbing of eyes and head, and requests for medication were used as the clues. Nausea was determined by the frequency of "dry heaves," refusal of fluids and food, and requests for medication. As previously stated this area presented the largest percentage of disagreement between observers.

The nursing care requirements were coded as to the activity the nurse employed to alleviate the symptomatology. Observers placed the appropriate symbols in the second column of the clinical checklist adjacent to the appropriate listed manifestation. As was the case with the various clues utilized in the categories of intensity, the code symbols for nursing activities are too extensive to list in totality and therefore only examples are given. In many instances, standard medical abbreviations were used, such as ASA for aspirin, NPO for nothing by mouth, and so forth. The remainder of the code was developed using initials of the activity. For instances, F.T. indicated fever therapy, S.B. was sponge bath, P.A. denoted physical assistance, O.C. meant oral care, and B.C. indicated back care. To assist in the computation of data relative to these activities, nursing care was grouped under the headings of supportive and therapeutic nursing measures. Sample time studies were done to determine the proportion of nursing time spent in each of these areas during three designated phases of illness. The first seven days of illness were considered the acute phase, the eighth to the 14th day as the intermediate phase, and the recovery phase was designated from the 15th day through discharge from the hospital and subsequent return to duty status.

Findings and Discussion

The results of this study are presented in two parts: First, those concerned with the recorded clinical manifestations; then, those concerning the nursing care requirements.

V

Duration of Symptomatology for the Three Study Groups as to the Category of Intensity

Symptom	Duration in Days								
	Remission Group			Over 25 Years of Age Group			All Others Remaining Group		
	Severe	Moderate	Mild	Severe	Moderate	Mild	Severe	Moderate	Mild
Fever	2.2	3.7	1.8	2.0	2.0	2.3	1.7	1.7	1.8
Chills	0.0	1.6	2.5	0.0	1.7	1.3	1.3	1.5	1.3
Headache	1.0	3.0	2.8	2.0	2.8	2.1	1.2	2.2	2.9
Dizziness	0.0	5.0	3.0	2.0	4.6	4.1	1.0	3.7	4.9

Clinical Manifestations

The data obtained relative to selective characteristics of the study group did not result in any significant findings. The average patient was a male Caucasian, 23 years of age, who had been in the Republic of South Vietnam approximately five and one-half months, and who had experienced symptoms three days prior to his admission to the hospital. The symptoms experienced by the study prior to hospitalization were consistent with textbook descriptions of pre-admission symptomatology.[4-7] Table II shows the incidence of symptoms experienced by this group prior to admission to the hospital.

An attempt had been made to summarize data relative to nationality, and the location of the patient in the Republic of South Vietnam prior to illness. However, the demographic responses were so diverse that no meaningful relationships could be identified. As an item of interest, one predominant pattern was identified in regard to nationality. A large percentage of this study group (64 per cent) had either a German or English derivation, or a combination of both. As the breakdown on the total troop population in Vietnam with regard to national derivation was not available, no comparisons could be made.

The data relative to malarial control measures employed by the study sample showed that 42 (84 per cent) used weekly chloroquine-primaquine prophylaxis, and 8 (16 per cent) took chloroquine-primaquine and dapsone prophylactically. Only one subject reported a missed dose subsequent to initiation of the drugs before leaving the United States. The use of topical repellants varied from occasional application to use all the time, the majority (64 per cent) falling in the "most of the time" category. Several patients commented on the futility of using the repellant when they were, of necessity, in and out of water at frequent intervals. Eighty-two per cent of the study group stated that head and bed nets were never used on military operations. Of those who did have bed nets available in base camp, only eleven (22 per cent) made frequent use of them.

Table III lists the symptomatology recorded for the entire study group, as well as the average duration of symptoms from the day of admission. The symptoms listed and their incidence are representative of textbook descriptions, with the exception of cough.[9-11] This symptom was not described in the resources consulted for the formulation of the checklist. The findings demonstrated in the duration of symptomatology, however, do not correspond with a previously reported research.[12] The explanation for these differences may lie in the methodology used. As reflected in Table III, the symptoms of fever, anorexia, malaise, headache, arthralgia, dizziness, and weakness were experienced by the entire study group for varying durations. It is also evident from these data that the majority of symptoms were present during the acute phase of illness (first seven days), with anorexia, malaise, and weakness extending through the intermediate phase (eighth to 14th day). The predominance of presenting symptomatology during the acute phase was an anticipated finding, based upon the dynamics of the disease process and the therapeutic effects gained by rapidly instituted chemotherapy.

TABLE VI

DURATION OF SYMPTOMATOLOGY FOR THE THREE STUDY GROUP AS TO SEVERITY

Symptom	Duration in Days								
	Remission Group			Over 25 Years of Age Group			All Others Remaining Group		
	Severe	Moderate	Mild	Severe	Moderate	Mild	Severe	Moderate	Mild
Abd. Discom	0.0	0.0	3.0	0.0	2.0	1.7	0.0	1.0	2.4
Nausea	0.0	0.0	2.2	0.0	0.0	2.6	0.0	2.0	2.8
Vomiting	0.0	0.0	3.6	0.0	1.6	1.1	0.0	1.3	1.2
Anorexia	2.5	4.8	5.6	0.0	4.3	3.8	1.5	3.5	4.7

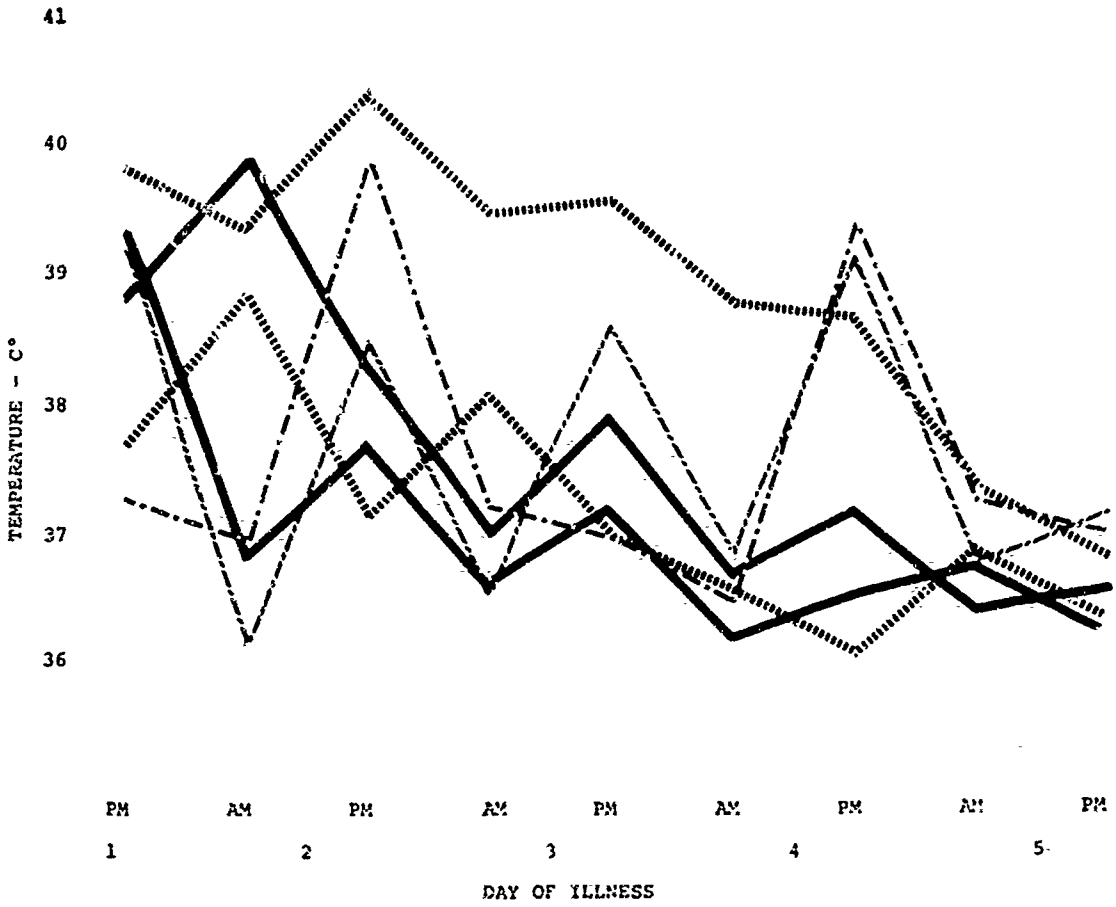


Fig. 1. Representative Temperature Patterns of Six Patients with *P. Falciparum* Malaria.

Headache was generally severe during the first 24 hours, with gradual lessening of the intensity and duration over the next two days. Over 90 per cent of the patients identified the location of pain as being either frontal or retro-orbital, with occasional photophobia. Myalgia, frequently intense and often localized in the lower back, neck, and legs, was a common complaint.

Physical findings recorded during clinical nursing rounds and from medical records showed 59 per cent of the patients to have splenomegaly, 42 per cent demonstrated hepatomegaly, 88 per cent had hypotension, and 18 per cent displayed jaundice. Again differences were noted between these findings and a previously reported study,[13] and again these differences may be related to methodology. Temperature curves showed no deviation from textbook and published research descriptions. All three basic types of fever (continuous, intermittent, and remittent) were displayed by patients in this study. Figure 1 shows representative temperature patterns recorded. Pulse rates on the other hand did not show the anticipated tachycardia.[11-16] In this study, only 16 (32 per cent) of the patients had tachycardia (pulse rate over 100) at some point during their illness. Of this group of sixteen patients, nine had tachycardia during temperature spikes. These findings are very similar to those of Glasser.[16]

Clinical relapse occurred in five (10 per cent) of the patients in the study group. In all five cases, the relapse was experienced between the third and fourth week of hospitalization. The symptomatology demonstrated by these patients during relapse was not as intense as that which they had initially experienced.

Laboratory results recorded during the acute phase of illness are shown in Table IV. Anemia generally persisted through the intermediate phase of the disease, and during the third week of hospitalization supplemental therapy in the form of folic acid was instituted for seven (14 per cent) of the study

sample. Other laboratory findings demonstrated were: Changes in urinary pH (particularly to neutral), increase in total solids of urine, and elevation of the blood sugar. Figure 2 shows the pattern of the white blood count determinations through the three phases of illness. These findings are consistent with textbook descriptions and reported research reports. Of those patients who demonstrated leukocytosis during the acute phase of illness, three were from the group who had relapse. These three patients continued to have elevations in white blood count determinations throughout the course of their illnesses.

An additional segment of the study was concerned with assessing the category of intensity of the presenting symptomatology. In an attempt to glean more meaningful data, the study sample was divided into three distinct groups; namely, those patients who had remissions(5), those 25 years of age or older (13), and all others remaining (32). Tables V, VI and VII show the average duration of symptomatology, by category of intensity, for each group. All patients in the remission group were under 25 years of age. The remission group displayed a longer duration of symptomatology in all three categories of intensity for the majority of symptoms. Similarly, the average duration of all symptoms recorded for the group 25 years of age or older was longer than that of the remaining group.

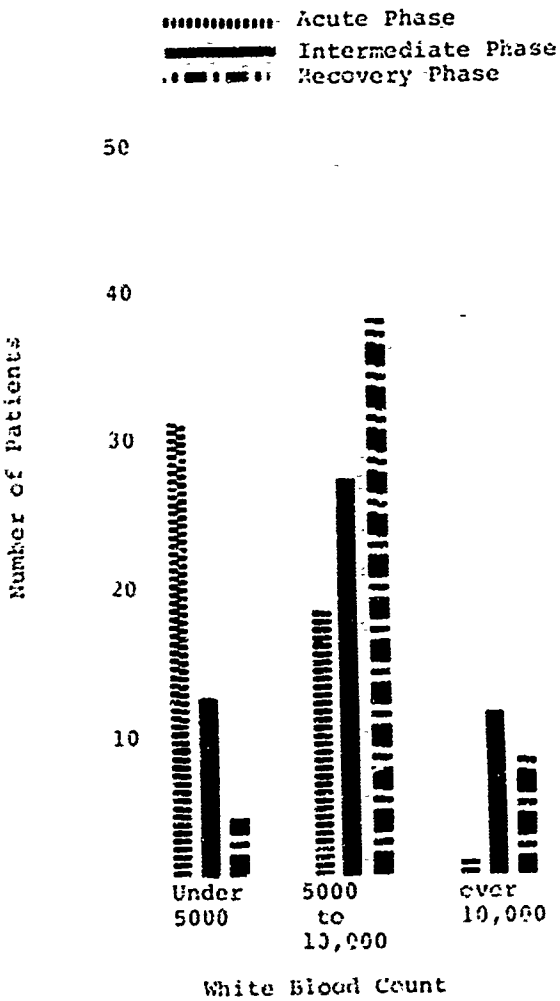


Fig. 2. White Blood Count Determinations for the Three Phases of Illness as Demonstrated in 50 Patients with *P. Falciparum* Malaria.

A Case in Point

The following case example gives a more detailed account of the character of the disease.

A 23 year old Army specialist was admitted following a three day history of chills, fever (to 104.8°F), malaise, headache, weakness, and myalgia. Physical examination on admission showed slight cervical adenopathy, spleen easily palpable and quite tender, and liver two cm and tender. Temperature was 102.4°F, pulse 88, and blood pressure 124/30. He appeared pale and quite warm. Complaints offered at the time of examination included: severe frontal headache, nausea, weakness, thirst, dizziness upon assuming erect position, and pain in the lower back, neck, and legs. Chemotherapeutic treatment was started within two hours following admission. His temperature continued to rise following admission and reached a peak at 104.6°F. Two hours and 20 minutes later, his temperature was recorded at 99.4°F. He complained of severe weakness, nausea, and continued to have intermittent pain in the back, legs, and neck. All offers of food and fluid were refused. During the remainder of the day, he slept most of the time. Additional symptomatology experienced included: Vague abdominal pain, dizziness and vertigo with sudden movement, arthralgia, chilly sensation, non-productive cough, and one episode of diarrhea. He was given 1740 ml of intravenous fluid in the first 18 hours. Laboratory studies on admission showed a WBC of 4,450, Hct 36 per cent, +1 albuminuria, SGOT of 74, and a positive thick smear for *P. falciparum* malaria. During the second 24 hours, he experienced two temperature spikes within a seven hour interval, the highest peak registering 104.8°F. Intravenous fluids were continued as a supplement to frequent small amounts of oral fluids. He experienced one episode of vomiting, and continued to have nausea, weakness, frontal headache (in varying degrees of severity), dizziness, arthralgia, myalgia, anorexia, and malaise. Again he slept most of the day. On the third hospital day, he experienced

one elevation of temperature and continued to complain of weakness, anorexia, dizziness, headache, myalgia, arthralgia, and malaise. Laboratory results on the third day showed a WBC of 3700 and a positive malaria smear. By the sixth hospital day, physical examination was normal, and the majority of acute symptomatology abated. He continued to have weakness, malaise, dizziness (at intervals) and anorexia. Backache continued, but it was felt to be as a result of an old injury. His remaining hospital course was essentially uneventful. Anemia persisted until the 17th hospital day, and weakness and malaise were recorded through the fifteenth hospital day. Librium was initiated on the 21st hospital day for symptoms of depression and was continued for eight days. He was discharged on the 31st hospital day.

Nursing Care Requirements

To facilitate the presentation of data relative to nursing care requirements, nursing activities were classified under the two headings; supportive, and therapeutics nursing measures. Grossly, supportive measures were considered nurse-controlled and included personal care such as bathing, oral care, back care, linen change, personal hygiene measures (maintaining bowel habits, etc.), diet, human relations (teaching, counseling, socializing, and so forth), and recreational and occupational therapy. Therapeutic nursing measures included administration of prescribed medications and treatments, and prescribed measures dictated by the medical plan of care. Partial results of the incidence of the two major categories of nursing care measures observed, can be seen in Table VIII. Data revealed that the majority of activities observed throughout the three phases of illness were supportive in nature. Over 90 per cent of the therapeutic measures were provided during the acute phase. There were only eight occasions during the recovery phase requiring therapeutic nursing care measures. These findings are consistent with the incidence and category of intensity of symptomatology experienced during the acute phase. A sample time study taken during the acute phase revealed an average of 3.7 hours for therapeutic measures and 2.4 hours for supportive nursing care measures, within each 12 hour period. The extended time reflected in therapeutic nursing care measures was attributed to the variations in sponging techniques employed by various personnel to reduce elevated body temperature. Procedure time for sponging varied from 20 minutes to 90 minutes. During the acute phase, supportive nursing measures consisted primarily of those activities directed towards relieving discomfort, insuring an adequate intake and output, and maintaining morale and personal hygiene. Frequent sponge baths, linen change, and back care were necessary as a result of the persistently warm environmental temperature and intermittent elevations in body temperature as a result of the disease. Insuring adequate intake and output required repeated encouragement and the offering of frequent fluids and small feedings. Persistent nausea and episodes of vomiting necessitated frequent oral care.

During the recovery phase, boredom and depression were frequently encountered and as a result, the majority (78 per cent) of the activities were concerned with human relations, recreational therapy, and occupational ther-

TABLE VII

DURATION OF SYMPTOMATOLOGY FOR THE THREE STUDY GROUP AS TO SEVERITY

Symptom	Duration in Days								
	Remission Group			Over 25 Years of Age Group			All Others Remaining Group		
	Severe	Moderate	Mild	Severe	Moderate	Mild	Severe	Moderate	Mild
Malaise	5.0	5.8	7.0	3.0	5.1	5.4	3.2	4.9	6.5
Weakness	5.0	4.8	5.8	3.5	5.4	5.7	3.9	5.8	7.0
Myalgia	0.0	0.0	5.0	1.0	2.0	3.6	1.0	2.6	3.5
Arthralgia	0.0	0.0	5.2	0.0	3.0	4.5	0.0	2.3	4.6
Backache	0.0	3.0	4.0	0.0	3.5	4.0	0.0	2.0	3.9

apy. Conversation served as the principal vehicle nurses employed to cope with depression. Nurses also participated in recreational activities, time and opportunity permitting.

Observation of both the therapeutic and supportive nursing care measures employed by various nursing personnel revealed ingenuity in approach and method. While no attempt was made in this study to measure the effectiveness of the nursing care employed, recorded temperatures taken at intervals during sponging procedures suggested that differences might be found between the various sponging techniques. A small pilot study gave further evidence to confirm this finding. It seems reasonable to conclude that further exploration, developing and then using precise measurements, would yield reliable evidence of the effectiveness of the various sponging techniques used by nurses, and for that matter by physicians.

Implications

There are a number of limitations apparent in this study, more prominently those inherent in observer judgment. However, it is felt that the purpose relative to identifying a possible hypothesis for future study has been met. Several questions have emerged from the data pertaining to both the clinical manifestations and the nursing care requirements. For purposes of clarity and continuity, the implications for study will be presented in two parts. First, those concerned with the clinical manifestations, then, those related to nursing care requirements. No attempt will be made in this paper to explore each implication in depth or its ramifications; rather, each question will be presented simply as a question or as a broad problem area.

Clinical Manifestations

Information relative to select personal characteristics was recorded as an adjunct to that portion of the study concerned with presenting symptomatology. While no meaningful relationships were identified in reviewing these data, predominant patterns suggest one area which might possibly merit further exploration. One might pose the question, are there patterns in host similarities such as body build, coloring, and so forth?

Numerous avenues for investigation were suggested in the examination of the data concerned with the presenting symptomatology and the categories of intensity. Some of the possible areas of study might be concerned with identification of the underlying mecha-

TABLE VIII

FREQUENCY OF THERAPEUTIC AND SUPPORTIVE NURSING CARE MEASURES USED IN THE THREE STAGES OF ILLNESS FOR SELECTED SYMPTOMATOLOGY

Symptomatology	Stage of Illness					
	Acute		Intermediate		Recovery	
	Therapeutic Nursing Measures	Supportive Nursing Measures	Therapeutic Nursing Measures	Supportive Nursing Measures	Therapeutic Nursing Measures	Supportive Nursing Measures
Anorexia	3	331	7	113	2	11
Backache	7	151	5	18	0	2
Chill	6	88	0	4	0	0
Dehydration	27	27	0	0	0	0
Depression	0	74	7	98	4	103
Fever	156	103	19	7	0	0
Headache	227	46	31	19	2	1
Nausea	126	41	12	34	0	0
Vomiting	67	68	2	5	0	0
Totals	595	929	83	298	8	117

nisms producing the presenting symptomatology; more specifically, cough, hypotension, and bradycardia. Is cough produced as a result of increased pulmonary vascularity? Why are relatively normal respiratory rate and bradycardia present during periods of high fever? Do relationships exist between presenting symptomatology? Could duration and intensity of symptomatology serve as a means of identifying patients prone to relapse? While a number of these areas are related primarily to pathophysiology, nursing's concern lies in the fact that the provision of effective nursing measures is dependent, at least in part, upon an understanding of the underlying pathophysiology producing the presenting symptoms.

Nursing Care Requirements

A major area for future study, identified from data relative to observed nursing activities, is that of evaluation of current nursing methods. Evidence from the small pilot conducted on the sponging procedures indicates that there are differences in the ability of the various procedures to produce a decrease in elevated body temperature. How effective, then, are other nursing methods? Do present nursing methods improve patient welfare? Is there a need to develop new methods, new tools, and guides for patient care, more precise methods for evaluating the effects of our activities on patient response? Is there a need to develop observational skills in all levels of practitioners? If so, what methods can we employ to raise skill level in observation? Can nursing intervention influence patient response? The questions appear seemingly endless, and yet, each in itself is significant to the identification of that which is uniquely nursing, and in the realization of the ultimate goal of improved nursing care to patients.

Another vast and significant problem area is the patient, himself, and his ability to cope with illness in a combat situation. Are there clues which will assist the nurse in the field in the identification of depression, morale problems, and other psychological phenomena? Do guilt feelings develop in combat casualties from disease, which in turn affect behavior and response to illness? How can the nurse expand her responsibilities to cope with behavior of illness? Again the avenues for exploration are expansive and seemingly endless.

Summary

This exploratory study has described the observed clinical manifestations and nursing care requirements of 50 patients with *P. falciparum* malaria in the Republic of South Vietnam. Based upon the observations and findings, possible suggestive areas for study were identified. The significance of the malaria problem to our present military commitment imposes urgency upon the need for expanding our current research efforts. Because of the complexity of this problem, it calls for an intra-disciplinary approach, not only in the clinical area, but also in the laboratory.

References

[1] Belding, D. L.: Textbook of Parasitology. 3rd ed. New York, Appleton-Century Crofts, p. 308, 1965.
[2] Tigertt, W. D.: Present and Potential Malaria Problem. Milit. Med. Suppl., 131:855, 1966.
[3] Schechter, M.: Vietnam Sending Malaria Back With Veterans. The Washington Post, April 30, 1967.
[4] Felsenfeld, O.: Synopsis of Clinical Tropical Medicine. St. Louis, The C. V. Mosby Co., p. 199, 1965.
[5] Russell, P. F. *et al.:* Practical Malariology. New York, Oxford University Press, pp. 379-380, 1963.
[6] Boyd, M. F., Ed.: Malariology. Philadelphia, W. B. Saunders Co., pp. 997-998, 1949.
[7] Faust, E. C. and Russell, P. F.: Craig and Faust's Clinical Parasitology. Philadelphia, Lea and Febiger, p. 271, 1964.
[8] Felsenfeld: *op. cit.*, p. 199.
[9] Faust: *op. cit.*, p. 271.
[10] Russell: *op. cit.*, p. 385.
[11] Bartelloni, P. J. *et al.:* Combined Therapy for Chloroquine-Resistant Plasmodium Falciparum Infection. J. Amer. Med. Ass., 199:174, 1967.
[12] *Ibid:* p. 174.
[13] Felsenfeld: *op. cit.*, p. 199.
[14] Russell: *op. cit.*, pp. 380-381.
[15] Faust: *op. cit.*, p. 270.
[16] Glasser, S. P.: The Pulse Rate in Falciparum Malaria: A Clinical Note. Milit. Med., 132:186-187, 1967.

Reprinted from *Military Medicine* Vol. 134; March 1969, Number 3
Printed in the U.S.A.