EXPERT SYSTEM IN MEDICAL DIAGNOSIS AND TREATMENT OF MALARIA AND TYPHOID FEVER

BY

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reticulo-endothelial system. The organism then re-colonize the payer's patches which becomes the sites of inflamation, ulceration, bleeding and perforation.

The disease therefore is essentially a bacteraemia with system effects and with important local lessions in the illume. The severity of the diseases, and the speed at which it develops, depend on the size of the doses of organisms swallowed, (Levine, etal, 1978).

Salmonella typhi is excreted in the urine and in the stool from about the end of the first week of the disease.

SEASON VARIATION

According to Gendron, et,al (1981), in Zimbabwe, the incidence of typhoid rises at the end of the dry season when rural water supply is lowest and people congregate at sources of water when the rains comes in October to February the infection is prevalent, doubtless due to speed of infected water by the rains.

Similarly, in South Africa there are more cases in the hot months of the summer, the same patterns is seen in Egypt. Seasonal change is governed by the use of water, the congregation of people at water points during the dry season, and the potential disposal of infected water when the rain comes.

MORTALITY

In an untreated typhoid cases, about 10 – 25 percent of infected people die, but with the treatment the mortality is much less. However data from South Africa suggested that an initial fall in deaths after cholorompheniсol was introduced has been followed by a rise.

The reason for this recent rise is not understood. Mortality is much higher if there is intestinal perforation, but even this is reduced with skilled surgery, (Adams, 1978).

Contaminated with infected blood. Parasite remain viable in stored blood for up to two weeks. Occasional cases of transplacental infection have also been recorded. The erythrocytes cycle of P. falciparum, P, vivax. and P.vivax and P. ovale is completed approximately once every 48 hours, and that of P.malarie once every 72 hours. P. falciparum does not have a secondary liver circle and relapses cannot therefore, occur with this infection, but recrudence may occur following inadequate treatment; (lambo 1983).

2.2 DIAGNOSIS OF MALARIA.

A. CLINICAL DIGNOSIS.

While the microscopic examination of blood film is described to confirm the Clinical diagnosis of malaria, in most health facilities the provision of treatment will be based on clinical diagnosis alone.

Level of Health Care Delivery in Nigeria.

Level 1, Dispensary/ Health post without laboratory facility staffed by a village health worker or community health aid.

At this level the diagnosis of malaria will be based on symptoms, history and a few basic observations to determine the severity of the illness. Temperature may also be measured. The presence of a history of fever in the past 3 days or an auxiliary temperature of 37.5 in a child less five years of age will be regarded as suspected malaria.

Level II. Health centres staffed by a medical officer or a community Health officer

Level II (a). With laboratory for the microscopic diagnosis of malaria.

Level II (b). Without laboratory for the microscopic diagnosis of malaria.

2.3 SUMMARY OF TREATMENT OF MALARIA AT VARIOUS LEVELS OF HEALTH CARE DELIVERY

Level	Drugs Available	Management
I PHC facility without Laboratory	Chloroquine (CQ) (tablets, syrup)	Treatment with orals (CQ) if vomiting persists >3x/D or if the illness Is severe, refer the Patient to Level II or Level III
II (a) Health centre staff by Medical officer or Community	chloroquine (tablets, syrup (injectable) Sulfadoxine/pyri Methamine (sp) (tablets)	malaria diagnosis should be confirmed by microscopy. Treat With oral CQ. If vomiting persists >3x/D, refer to Level III. If fever persist for 2 days, treat with SP. For severe Illnesses, treat with Intramuscular (IM) Quinine and refer to level III.
II (b) Health centre Staffed by Medical office Or community Health officer	chloroquine (tablets, syrup, injectable)	treat with oral CQ. if vomiting persists >3x/D, initiate IM CQ. if vomiting ceases, if the illness persists 2

CHARPTER ONE

BACKGROUND INFORMATION

1.0 INTRODUCTION

The attainment of goal for "Health for all by the year 2000 and beyond" is been threatened in most African countries today, by some endemic diseases. For example, Wery and Coosemans (1993 – 94) reported in their study that every year, malaria causes clinical illness, often very severe, in over 100 million people and over 1 million people die from it.

It also threatened 200 million persons, about 40% of the World's population undermining the health and welfare of women and families, the survival of their children, debilitating the active population, and straining both countries and peoples scarce resources.

Furthermore, Lambo (1983) also stated that typhoid fever is far too common all over Africa, although its clinical severity and picture are changing in bigger cities, probably as a result of much partial early treatment with antibiotics.

According to him, it has become a tradition that when ever a patient has few signs and yet is ill with fever, typhoid is often one of the first diagnosis in clinics and hospitals throughout the continents.

Similarly, a Nigerian daily paper, Vanguard, issued Tuesday May 31, 1994, also reported that experts in this country are particularly worried about the current trend in our hospitals where every fever that fails to respond to anti-malaria are diagnosed as typhoid fever.

1.3 ORIGIN OF THE STUDY

This study evolved from the personal observation made by the author about the increase in the mis-diagnosis of malaria and typhoid fever as seen in most health care facilities in this Country. The only method used in diagnosing typhoid fever in this Country is widal test. And according to a consultant physician. Lateef Olopoenia, (1996), widal test, often relied by most doctors to diagnose typhoid has been found to be very unreliable. A patient, he said, requires to be tested at least twice before a doctor can begin to suspect typhoid. Even then he further stressed, that, it is not all the time that the test reveals a rising titre (usually the sign that the salmonella typhi germs which causes typhoid fever is present in the system) that one can conclude that it is a case of typhoid fever.

This is because, there are also other conditions such as tuberculosis, endocardiasis (a heart condition) or even malaria could also show an increase of the titre in widal test.

The author is therefore interested in applying expert system in the diagnosis and treatment of malaria and typhoid fever. It is therefore expected that this study will not only help in fast and accurate diagnosis of the said disease, but will surely reduce the work load usually experienced by doctors and other para-medical in clinics and hospitals in the study area.

1.4 JUSTIFICATION FOR THE STUDY

It has become a tradition that if one complains of fever, chills, malaise, abdominal pain and general weakness. A visit to hospital or clinic for evaluation of these problems, result in diagnosis of malaria.

A cause of routine anti-malaria medication is usually initiated, after which the symptoms persists without much improvement, at this point, a revisit to your doctor with

LIMITATION

It is a welcome fact, that any study undertaken in most developing countries (Nigeria inclusive) is bound to face a lot of problems. In most cases these problems are compounded when researchers initiates a pioneer study especially in bureaucratic organizations. The authors experiences during this study was not different from the aforementioned.

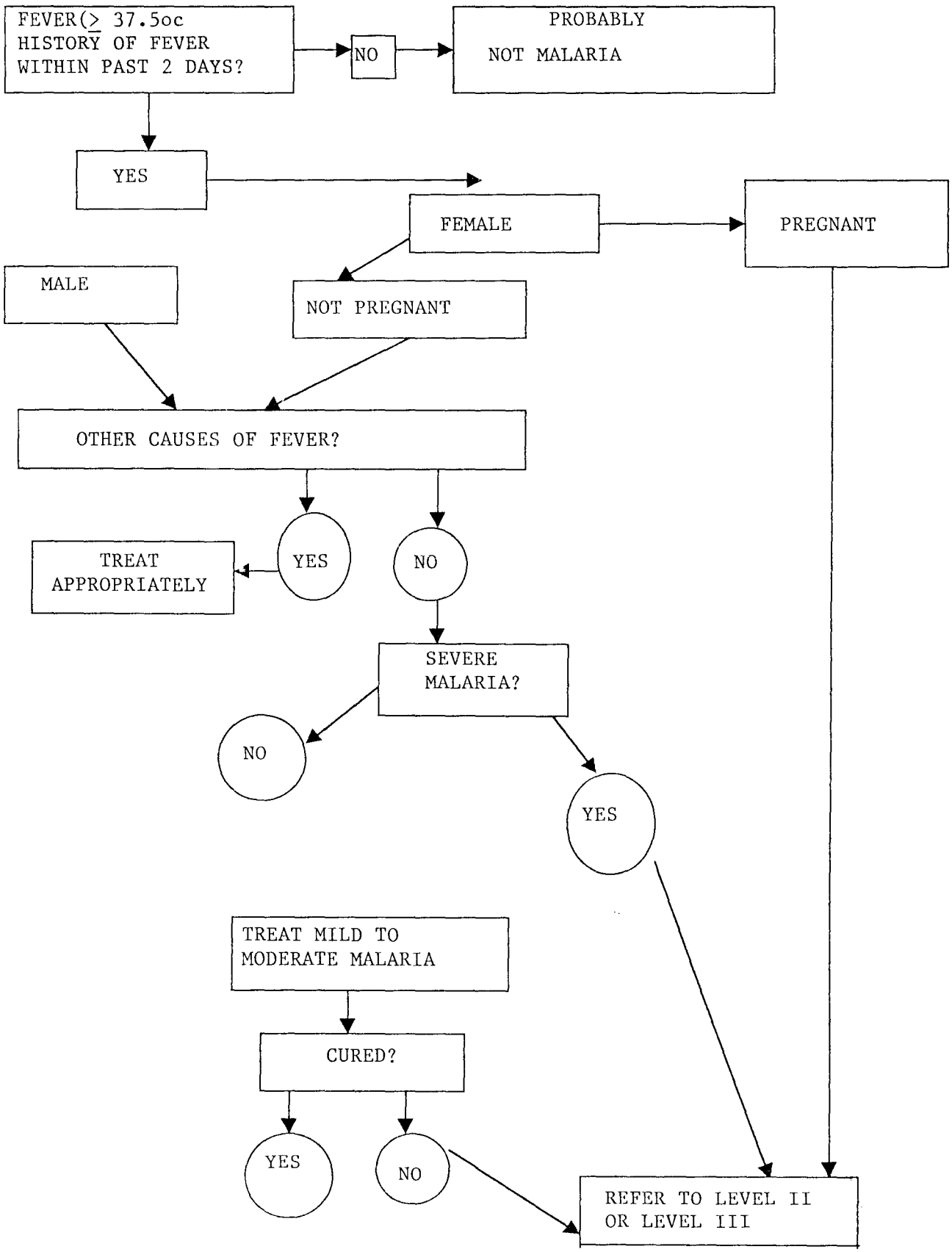
Major problems encountered in the study include, un-cooperative attitude of some staff, who always claim to be too busy to be interviewed or to have time to produce relevant records of their patients for the study.

It is worthy, to mention that while some staff of the hospitals and clinics were enthusiastic about the topic of the study, others exhibited an indifferent attitude towards the interview and patient records review, during the data gathering stage. This however, may not be unconnected with the impression some of them have on the study, many saw the study as an attempt to put them out of their jobs, if computerization system should be introduced in hospitals and clinics.

Without laboratory		days or if the illness is severe, treat with IM quinine And refer to Level III.
III		
General hospital, Specialist hospital And Teaching Hospital	Chloroquine (tablets, syrup, injectable)	Confirm diagnosis by microscopy. Treat with oral CQ. If vomitig persist >3x/D or if illness is severe,
	sulfadoxine/pyri methamine (tablets) quinine (injection)	treat with parenteral CQ or quinine until patient can tolerate oral CQ.

- Antipyretics, sponge baths and extra fluids should be given to all patients with fever.

2.4 Algorithm for Diagnosis and treatment of malaria at level I facilities



Children 0-4 years of age should also be treated for malaria.

2.5 Treatment of Non-severe Malaria

Antipyretics, such as paracitamol, sponge baths and extra fluids are recommended for all children and adult with fever.

Chloroquine

Oral chloroquine (CQ) is the drug of choice for mild to moderate malaria in all areas of Nigeria.

(150 mg base par tablet; 50mg base par 5ml syrup; 200mg base in 5ml ample).

Dosage: By body weight: 25mg base CQ/kg body weight over three days preferably after meals

1st day	10ml base/kg
2nd day	10mg base/kg
3rd day	5mg base/kg

Dosage: By Age:

Age (years)	D1	D2	D3
Dosage From			
Less than 1	75mg	75mg	37.5mg
Tablet	½	½	¼
Syrup	7.5ml	7.5ml	3.75
1-3	150mg	150mg	75mg
Tablets	1	1	½
Syrup	15ml	15ml	7.5ml
4-6	22.5mg	22.5mg	150mg
Tablets	1 – ½	1 – ½	1
7-11	300mg	300mg	150mg

Tablets	2	2	1
>12	600mg	600mg	300mg
Tablets	4	4	2

Chloroquine

Side effects: Toxicity is minimal at doses recommended for malaria chemotherapy and chemoprophylaxis. Side effects include dizziness, mild gestro-intestinal disturbance (e.g nausea, vomiting, abdominal discomfort and disrrhoea).

Pruritus may occur but usually disappears within 72 hours of withdrawal of drug. Rarely, ocular damage from severe retrinopathy may occur. It is assumed that this association is related to high affinity of malanin. Containing tissue for the 4 – aminoquinolines. A cumulative dosage of 100gm chloroquine base over a life time is probably the maximum total amount to be executed.

Contraindication: The only contraindication to the use of chloroquine is the history of severe chloroquine include pruritus. Alternatives to chloroquine for use in patient with a history of severe chloroquine induced pruritus are sulfadoxine/pyrimethamine and amodiaquine.

2. Sulfadoxine/pyrimethamine

(500 mg sulfadoxine + 25mg pyrimethamine per tablet) recommended for patients with contraindication to chloroquine use or patients with chloroquine treatment failure.

Dosage: By age: single dose

Age (years)	Dose (tablets)
0-3	½
4-8	1
9-11	1½

12-15	1 – ½
12-15	2
> 16	3

- Similarly for Sulfalene/pyrimethamine (500mg sulfalene 25mg pyrimethamine)

Sulfadoxine/Pyrimethamine

Side effects*: These include skin reactions in the form of erythema multi-form or Stevens –Johnson syndrome, which can be fatal. Very rarely borne marrow suppression and haemolysis occur in GGPD-deficient individuals.

Conindications*:

1. Not recommended for malaria prophylaxis either alone or in combination with other drugs. Fatal reactions are estimated to occur in 1/11,000 to 1/25,000 persons using SP for chemoprophylaxis.

2. Not recommended for individuals with history of sulfonamide its use in pregnancy.

- Similarly for sulfalene/pyrimethamine (Guideline for malaria control for physicians in Nigeria, 1990)

3. Amodaiquine

(200mg based par tablet; 50mg base par 5ml syrup) recommended as alternative therapy for patients with severe chloroquine pruritus and for patients with malaria apparently not sensitive to chloroquine.

Dosage: By body weight; 25mg base kg body weight

1st day	10mg/kg
2nd day	10mg/kg
3rd day	5mg/kg

Dosage: By age:

Age (years)	D1	D2	D3
Dosage Form			
Less than 1	50mg	50mg	25mg
Tablet	¼	¼	1/8
1-3	100mg	50mg	50mg
Tablet	½	¼	¼
4-6	200mg	200mg	50mg
Tablet	1	1	¼
7-11	200mg	200mg	100mg
Tablet	1	1	½
12-14	400mg	400mg	200ng
Tablet(s)	2	2	1
> 15	600	400	400
Tablets	3	2	2

Amodiaquine:

Side effects: In normal recommended doses for the treatment of malaria, side effect similar to chloroquine may be able to tolerate amodiaquine. Repeated administration may lead to severe luecopaenia and agranulytosis, which may be fatal. Use in the treatment of malaria requires careful monitoring of hematological parameters.

Contradiction: should not be used for malaria prophylaxis.

4. Oral Quinine

(300 mg salt per tablet; 300mg per ml injectable) recommended for therapy of severe malaria and cases of malaria not responding to chloroquine; sulfadoxine/pyrimethamine or amodiaquine.

Dosage: By Age:

Age (years)	Dosage to be given daily for 7days	Dosage form
Less than I	75mg	12hrly
Tablet	¼	12hrly
1-3	150mg	12hrly
Tablet	½	12hrly
4-6	150mg	8hrly

Tablet	½	8hrly
7-11	300mg	8hrly
Tablet	1 tablet	8hrly
12-14	450mg	8hrly
Tablet	1 ½	8hrly
>15	600mg	8hrly
Tablets	2	8hrly

Quinine

Side Effects: These include guddiness, ringing, in the ears, blurred vision and tremors ("cinchonism"). In the recommended dosages for the treatment of malaria these symptoms are not severe enough to stop treatment. The symptoms usually subside spontaneously when drug administration ends. Hypoglycaemia may be precipitated by quinine therapy.

Contraindication: the use of quine in pregnancy should be individually assessed by a physician. Untreated malaria may be more likely to induce abortion than quinine therapy.

5. Management of Multiple Drug-Resistant P. Falciparum Infections:

In adult patient with P. Falciparum infections, which appear to be resistant to chloroquine, sulfadoxine/pyrimethamine and amodiaquine, the following therapy is recommended:

Quinine 300mg tablet 8-hourly x 3days and
Tetracycline, 250mg tablet 6hrly x 7days .
Dose for children older than 7years of age with such infections may be adjusted according to the following:

8-11 years of age ½ to ¾ adult dose
12-15 years of age ¾ to full adult dose
due to the toxicity of tetracycline in children less than 8years of age, this regimen is not recommended for this age group. Additional antimalarial drugs now under investigation may become available for use in patients with multiple drug-resistant P. falcoparium infections in the near future (guideline for malaria control Federal Republic of Nigeria 1990)

Therapy of Severe Malaria in Children and Adults

Level of Health Care Delivery

	Level II	Level III
	First referral	First/second referral
CQ-Sensitive Malaria	Chloroquine 3.5mg base/kg Im 8hrly until patient can take oral therapy to complete Total dose of 25mg base/kg	chloroquine 5mg baser in 10ml/gk isotonic saline or 5% dextrose Iv infusion over 4hrs, Then 5mg base/kg in 10 ml/kg isotonic saline or 5% dextrose over 2-4hrs, 12-hrly to total dose 25mg base/kg

	or	
	Quine * 8.3 mg base/kg (10mg base in children) Im 8-hrly until patient can take oral therapy to complete 7days therapy	Quinine* 16.7 mg base in 10ml/kg isotonic saline or 5% dextrose iv infusion over 4 hrs, then 8.3mg base/kg 10mg base/kg in children/over 2-4 hrs 8-hrly until patient can take oral therapy to complete 7days therapy.
CQ-Resistant Malaria	Quinine* 8.3mgbase/kg (10mgbase/kg in children) Im 8hrly until patient can Take oral therapy to	Quinine* 16.7mgbase/kg (20mgbase/kg in children) in 10ml/kg isotonic saline or 5% dextrose iv infusion over Complete 7 days therapy 5hrs, hen8.3mgbase/kg(10mgbase/kg in children) in 10ml/kg isotric saline or 5% dextrose iv infusion over 4hrs, 8hrly until patient can take oral therapy to complete 7 days therapy (transaction of the Royal Society of the Tropical Medicine and Hygiene, 1986).

Children and Adult with Sickle Cell Disease.

Individuals, both children and adults, with sickle cell disease are widely recognized to be at increased risk of sickle cell crisis from malaria infections. It is recommended that children with known sickle cell diseases be given life time body weight per week or daily proguanil at 1.5mg/kg body weight per day. (chloroquine, prophylaxis of 5mg/kg body weight per week may also be considered but the duration of prophylaxis should be judiciously determined by clinician to prevent the risk of severe retinopathy and other side effects (guideline for malaria control for physicians in Nigeria, 1990).

2.6 TYPHOID FEVER IN NIGERIA

Typhoid fever is an insidious fabrile illness of prolonged duration primarily caused by samonella typi, and to some limited extent, para-typhi 1 and para-typhi 2. The disease is characterized by persistently high fever, rash, generalized pain, headache and severe abdominal pain that can lead to intestinal bleeding and even death. It is a common cause of morbidity and mortality all over the world, especially in communities with poor sanitation and living conditions.

Individuals with unsanitary personal habits, who harbor the organisms and hold position as looks or food attendants, can quickly aid in spreading the disease. It is thus major public health concern in these areas, where conditions exist that predispose them to acquisition of the infection. The organism (S.typhi), is essentially confined to humans either in a newly required disease state or as a carrier. As the organism gains access to the body through the gastro-intestinal route, the pathologic activities of the illness start along the intestinal tract. With a short period of multiplication and invasion of the small intestinal mucosal wall, the typhoid baccilli invades the blood system.

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DEDICATION

I dedicate this project work to Almighty God who saw me through his work and my late parents.

ACKNOWLEDGEMENT

I am very grateful to almighty God, who gave me the strength, grace and ability to cope with the demand of this programme.

I wish to express my sincere gratitude to my supervisor, Mallam Isah Audu, for his interest, critical review and thorough guidance throughout the conduct of this study.

I also like to thank Prof. K.R Adeboye, and the entire members of the Maths/Computer Department of the Federal University of Technology Minna, for all their contributions to the success of this programme.

Lastly, I thank Mallam Suleiman Agboola of the Educational Resource Centre Ministry of education Niger State, whose initial input, personal interest and useful suggestions formed the foundation for this study.

ABSTRACT

This project is solely on the application of expert system in medical diagnosis and treatment of typhoid and malaria fever .

The work is in two phases: The consultation process in the diagnosis of the diseases, and the personal data storage of each patient that has undergone such consultation.

The process of the diagnosis of the diseases is based purely on the signs and symptoms manifested, and the laboratory result of each patient blood test. Based on this factors prescriptions will then be given accordingly.

At this level more detailed histories, clinical observations and physical examination will be undertaken. Three categories of patient may be anticipated at this level: those attending a health provider for the first time for this illness, those attending for follow up of previous visits for this illness and those referred from level I for this illness. Patients referred from other facilities should be examined by a medical officer or a community health officer/assistant.

Level III: General Hospitals: Specialist Hospitals: Teaching Hospitals.

At this level an experienced physician or specialist may complete a full clinical assessment with support from laboratory and other diagnostic services. Patient may be presenting for the first time for this illness, may be visiting for follow-up of the same illness or may be referrals from level I or level II facilities. Here, severe cases and complicated malaria including patients who fail to respond to therapy in level I & II will be managed.

B. Laboratory Diagnosis

The laboratory diagnosis of malaria infections may not be necessary at Level I facilities. Level II and Level III facilities (I) should train competent staff, (2) should maintain supplies of reagent and equipment and (3) should utilize standard techniques for the laboratory diagnosis of malaria, (Guideline for malaria Control, Federal Ministry of Health, 1990).

A Consultant Physician and Paediatrician based in Washington D.C. U.S, Lateef Olopoenia (1996), said that there are several other diseases which could present with same symptoms as typhoid fever, most worrying, he said, is the treatment of typhoid fever with Cholorom phenicol, the most common drug often prescribed for typhoid fever by doctors, has a side-effect said to be more fatal than typhoid fever itself, bone marrow depression.

He further stressed that a patient with bone marrow depression often suffer a severe anaemia and usually requires a bone marrow transplantation to survive. Of course, with such mis-diagnosis as seen in several hospitals in this country real ailment suffered by the patient may go on being ignored for a long time while he is being treated for typhoid until it lead to a more serious complication or even death.

From the aforementioned, it can be observed that mis-diagnosis of malaria and typhoid fever is the common practice in most clinics and hospitals in African countries today. This problem therefore, requires expert system in medical diagnosis and treatment of the above mentioned diseases.

1.1 MAGNITUDE OF THE PROBLEM

It has been documented that malaria and typhoid fever is still a very big public health problem in most African countries. This course may not be unconnected with the inadequate portable drinking water and poor environmental sanitation in most African countries.

DISTRIBUTION OF MALARIA

According to Lambo (1983), the distribution of malaria within tropical Africa which has changed a little in the past 20 years, is governed by two factors.

A suitable vector species of anopheline mosquitoes vector species are found in most area of tropical Africa, but in semi-desert areas mosquitoes may be unable to survive in any numbers and transmission may be limited to the period of the short wet season. One beneficial effort of the Sehelian drought has been a reduction in the prevalence of malaria in some affected area.

PATTERN OF MALARIA INFECTION

The pattern of malaria infection seen in community is determined by the duration of malaria transmission in that area, the infectivity of the vectors, the extent man-mosquitoe control and the degree of immunity of the population. Mathematical models have been constructed which can predict what will happen when any one of the variable is changed.

Malaria endemically varies from high endemic (holo-endemic) areas, such as the costal regions of West Africa, to area in which there are only occasional epidemics (Fountaire, et,al, 1961).

1.2 TYPHOID – ORGANISM AND IT'S DISTRIBUTION

Classical typhoid is caused by Salmonella typhi, a Gram-negative baccillus with flagella (H) and Somatic (O) antigens. The organism is ingested in contaminated food or drink; it reaches the terminal ileum where it causes hyperplasia of the payer's patches and passes through their lymphoid cells to reach the system circulation. The bacteraemia which follows persits until treatment eradicates salmonellae or they are removed in the

the same complains. A widal test is ordered and you are notified after a day or two by your doctor that you have a case of typhoid fever.

The truth is that, you may have had one of the several other diseases, for example, malaria, rheumatic fever, miliary TB, infectious hepatitis, brucellosis, and so on, which according to Lateef Olapoenia (1995), equally test positive by widal agglutination test.

It is hoped that the findings from the present study will throw more light on the diagnosis and treatment of malaria and typhoid, and also aid clinicians to delineate typhoid from other fever causing agents.

1.5 THE SIGNIFICANT OF THE STUDY

In most malaria endemic regions of Africa Serologic differentiation between typhoid fever, malaria and other infectious processes based on widal agglutination is very unreliable and non-diagnostic.

As stated earlier in this paper, other bacteria, viral and ricketsial diseases with similar clinical presentation as malaria or typhoid, have elevated titre of both O and H antigens of widal agglutination.

A consultant physicaian (Olopoenia 1995) warned that to initiate treatment, particularly with chloromphenicol in such a patient, with only a single positive widal test, as practiced in clinics and hospitals is most unfortunate.

The finding from this study is likely to have far reaching implications for clinicians and other para-medicals in this State.

ORGANIZATION OF TEST

This brief introduction to the study problem serves as the first chapter of the text. Chapter two reviews literature on malaria and typhoid fever, with emphasis on the diagnosis and its treatment.

The problem identification and definition, feasibility study, the existing system, fact finding method and input and output specification are presented in this chapter. Chapter four explains the software development and implementation, the choice of software package and programming language and then the report of the output.

Chapter five focuses on hardware and software requirement for setting up computer centre followed by conclusion and recommendation based on the findings.

1.6 OPERATIONAL DEFINITION OF TERMS.

A rising titre: A sign that the salmonella typhi germs which causes typhoid fever is present in the blood system.

Endocardiasis: A diseases of the heart (inflamation)

Mortality: Death rate

Plasmodium: A parasite that causes malaria

Erythrocytes : Red blood cells

Antipyretic: Drugs given to reduce high fever

Chemoprophylaxis: Drugs taken for prevention of disease.

Erythema: Redness of the skin

Haemolysis: Destruction of the red blood cells

Abortion: Expulsion from the uterus of the product of conception before the 24^{th} week of pregnancy.

Still birth: Expulsion from the uterus of the product of conception after the 24^{th} week of pregnancy.

1.7 THE OBJECTIVE OF THE STUDY

The objective of this study is to assess the method of computerizing the diagnosis and treatment of typhoid and malaria fever, and suggest cost and benefit analysis of the system.

SCOPE

The study covers only the process involved in the diagnosis and treatment of typhoid and malaria fever in the hospitals and clinics in Niger State.

A visit to some urban and rural hospitals and clinics (Secondary and Primary health care facilities) was carried out during this study, and the author also reviewed patients record and interview doctors and other health professional involved in the diagnosis and treatment of typhoid and malaria fever in the hospitals and clinics visited in the State.

Chemoprophylaxis for pregnant women

Although malaria infection during pregnancy may have severe effects on the pregnant and her fetus, it appears that low birth weight is the major risk factor with regard to neonatal and infant mortality.

Effective weekly malaria prophylaxis have been demonstrated to prevent malaria infection during pregnancy but comprehensive evaluations on the impact of prophylaxis on outcome measures such as birth weight and infant mortality have not been completed. Concern has been expressed that chemoprophylaxis may result in reduced maternal.

Immunity which might decrease the transfer of anti-malaria immunity which might decrease the transfer of anti-malaria immunity to the fetus and to infant during their first six months of life.

In this country, even though chloroquine resistance has recently been documented, it is still recommended that all pregnant women be given a curative treatment dose of 1500mg of chloroquine base over three days (600-600-300) at the time of first attendance at a health facility. This initial curative treatment dose is recommended because a symptomatic malaria infection has been dictated in substantial proportions of pregnant women and curative treatment dose may be helpful to eliminate parasitaemia.

Laboratory-confirmed cases of symptomatic malaria in pregnant women should be initially treated with 1500mg of chloroquine base over 3 days. If clinical symptoms or parasitaemia continue, treatment with 30mg/kg body weight of quinine for 7days is recommended. Suspect cases of acute malaria in pregnant women at institutions within the resource or staff to confirm the diagnosis should be referred to the appropriate health facility. Treatment of pregnant women with sulfadoxine/pyrimethamine, tetracycline or anrocliaquine during pregnancy is not recommended (guideline for malaria control, Federal republic of Nigeria).

CHAPTER TWO: LITERATURE REVIEW

This chapter begins with a brief outline of the status of malaria and typhoid fever in Nigeria, its epidemiology and diagnosis and it conclude with the treatment.

2.0 Status of Malaria in Nigeria

Malaria represents one of the major causes of mortality and morbidity through out Nigeria (Guideline for malaria control in Nigeria, 1990). Although the risk of malaria exists through the country, the endemicity of malaria is generally holoendemic in rural areas and mesoendemic in urban areas. These levels of endemicity are remarkably stable,

The plasmodium species responsible for malaria infections in Nigeria are P. Falciparum, P. Malaria, and P. Ovale. Greater than 80% of malaria infection are caused by P. Falciparum, while up to 15% are caused by P. Malaria and less than 5% are caused by P. Ovale infections. Mixed infections with P. Falciparum are common.

The major vector of human malaria are Anopheles gambiae sensu stricto (S.S), A. arabiensis, A. Funestus, and A. arabiensis are most dominant in the savanna areas and cities while A. gambiae (S.S) are highly dense in the forest areas. A. Funestus has an uneven distribution and the salt-water forms of A. melas are essentially coastal species.

The actual incidence and mortality rates of malaria are unknown due to incomplete reporting. However, available data indicates that malaria is the most common cause of the outpatient visits in Nigeria. Malaria consistently ranks among the five most common causes of death for all ages and represents 8-12% of childhood deaths under ages of five. Estimates indicate that approximately 50% of the population experience at least one episode of malaria each year.

In addition to its importance as a cause of mortality, malaria infections represent substantial social costs due to school absenteesium and radical economic productivity. Malaria during the first and second pregnancy may result in low birth weight infants and may be associated with increased rates of abortions and stillbirths (guideline for malaria control 1990).

The future problem of malaria in Nigeria is likely to be complicated by the existance of drug-resistant P. falciparum. Although reports of chloroquine-resistance P. falciparum (CRPF) were published in 1970's it was not until January 1987 that a confirmed case of CRPF was reported in an expatriate visitor to Nigeria additional studies conducted by the National Malaria Surveillance network have documented the presence of CRPF in children 0-4 years of age in all four primary Health Care Zones of the country. Although chloroquine is still currently clinically effective throughout the country, the existance of parasitologic resistance to chloroquine indicates that alternative drugs will need to be evaluated for the maintenance of effective recommendations (Federal Republic of Nigeria Guideline for Malaria Control for Physicians in Nigeria, 1990).

2.1 EPIDEMILOGY

Infection with plasmodium falcipamim P. malariae, and P. ovale occurs throughout most of the tropical Africa. Plasmodium vivax can effect only blood cells possessing surface membrane receptors related to Duffy blood group antigens. These antigens are found rearly in Negroes; this is the probable reason for the infrequent accurance of P. vivax malaria in West Africa (Miller, 1977).

THE PARASITE

Malaria in man is rearly always due to infection with plasmodium falciparum, P. malariae, P. vivax or P. ovale Malaria is usually spread by the bite of an infected female anopheline mosquitoe but may follow transfussion of infected blood or use of a syringe

CERTIFICATION

I certify that this work was carried out by Ahmed G. Bawa, Reg. No PGD/MCS/416/97 in partial fulfillment of the requirement for the award of Post Graduate Diploma in Computer Science, of the Federal University of Technology, Minna, Niger State.

---------- Date----------

Mallam Isah Audu
Supervisor)

---------- Date----------

r. S.A. Reju
ead of Department

---------- Date----------

xternal Examiner

2.7 EPIDEMIOLOGY OF TYPHOID FEVER.

As stated earlier, typhoid is transmitted faeco-orally by water or food contaminated by salmonella typhi. As it is water borne, a small infection dose can cause the disease in some one who drinks polluted water .As so many water supplies all over Africa are inadequately protected, the disease is always common, particularly among overcrowded urban migrants who often live in wretched condition.

It can also be described as water-washed . this term is used if a water supply is inadequate so that a fecal or urinary carrier can contaminate food because he can not wash adequately after passing urine or stool,(Feachem, etal, 1980).

2.8 LABORATORY EVALUATIONS/DIAGNOSIS

A critical determination of the infection in the inoculun size. Where as 109 bacilli (size of pin head) will produce disease in 95% of healthy individuals, a 103 rarely will cause any symptoms.

Culturing or isolating the organism from the blood when the numbers of bacteria present in the blood is small, is usually difficult in most of the suspected typhoid infected patients. Contrary to prior teaching that positive stool culture for S. typhi does not occur until the third week of infection, report have shown that indeed positive stool culture for S typhi can be obtained throughout all stages of illness, (Olopoenia).

Definitive diagnosis of typhoid fever rests upon isolation of the organisms from either blood, stool, urine or tissue. However, making such expensive diagnosis test is usually a major economic undertaking in Africa, where must countries in Africa faces severe economic hardship. Thus sustaining such laboratory procedures tests for making diagnosis of typhoid fever both in private and public hospitals and clinics are always a big problem.

It is on the basis of the above that a consultant physician (Olopoenia, 1996), stated that practicing doctors are always left in dilemma, particularly the young doctors with very little clinical experience in making diagnosis of typhoid fever without laboratory studies. The old serologic widal agglutination test, which lacks sensitivity, specificity for S. typhi and at times difficult for the test result to be reproduced, has become the main ancillary laboratory diagnosis test available to the doctors.

The diagnostic value of widal agglutination is very limited, particularly in Africa where several other infectious agents share common antigens with S. typhi and causes false positive results. It is not uncommon to have patients with pyrexia, presenting at doctors office to be diagnosed as having typhoid fever on the basis of one single false positive sorologic widal test. Total dependance on the widal test have created a significant problem of over utilization of chloramphenicol. several cases of plastic anaemia due to chlorophenicol toxicity have also been reported, as well as bone marrow destroduction. In addition, several other cases of S. typhi resistant to chlorophenicol have been reported (Olopoenia 1996)

A new diagnostic kit for typhoid

A newly developed diagnostic kit for USA called " rapid salmonella Dipstick Kit" has the capability of diagnosing salmonella. The kit only uses stool sample from patient and test is done in the doctors office while the patient waits. A negative or positive result is available to the patient in 20 minutes. A highly efficient kit with a sensitive of 99.5% and specificity of 90%.

Unlike the widal test, the typhoid test is specific for salmonella, with very high sensitivity as well. According to Olopoenia (1996), its introduction and utilization in several health care facilities and clinical settings have been highly applauded in several areas in Africa because of its accuracy, simplicity, affordability. The typhoid check is

pre-package to perform test per kit and to be disposed of after usage. It is simple and can be done at the doctors office while patient is in the waiting room.

This product if made available in clinics and hospitals, will surely improve the quality of health care, and furthermore, aid clinicians to delineate typhoid from other fever causing agents.

Treatment

The antibiotic of choice is chlorophenicol it is cost-effective and always available, and highly effective because it penetrates microphages and reaches a high concentration in the hymphatic system. The dose of chlorophenicol is 50mg/kg/daily in adults or children, which is conveniently given as 3x250mg every 6hours to the average adult: the total daily doses of 3g can be given till the temperature becomes normal and then 2g daily for 19days to a total dose not exceeding 42g (snyder, etal, 1976).

The patient begging to feel better after 2 to 3 days and his temperature can be expected to have fallen to normal at the fifth day (range 4 -7 days), when S. typhi should have disappeared from the stool; blood cultured become sterile after two days (Bircaire, etal 1981).

Other antibiotics are, Amoxycillin, the dose in adult is 1g 6 hourly and for children it is 100mg/kg/daily for 14 days. Trimethoprim-Sulfamothoxazole, Ciprofloxacin, and augment are drugs that have shown significant improvement against clinical isolates of typhoid baccilli with minimum side effect (Afifi, etal 1976).

Olopoenia, (1996) caution that, while chlorophenical may remain standard therapy because of its high activity against most clinical isolates of typhoid bacilli, the rampant use of this drug for suspected and unproven cases of typhoid fever requires urgent address. According to him, several cases of chlorophenical induced aplastic anaemia, bone marrow destruction, and hepatitis have been reported by several doctors.

General measures

It is essential to restore any fluid deficit quickly; this is critical in those who need surgical treatment those who develop rapid severe muscle wasting must have added care with their skin and pressure areas.

Psychosis can be controlled with chlopromazine but electroconvulsive therapy may be necessary in sever catatonia (Pillary, etal, 1975).

CHAPTER THREE

DIAGNOSTIC AND TREATMENT SYSTEM DESIGN.

3.0 INTRODUCTION

This chapter will focus on system analysis and design. System analysis can be define as process of gathering facts, interpreting facts and using the information to recommend improvement to a system.

System analysis consist of series of stages. They are often called system life cycle. These stages are:

i. Problem definition/identification
ii. Feasibility studies.
iii. Investigation and facts recording
iv. Analysis
v. System design

These are the stages that will be used in this study. The design stage of this study will be based on the full description of the expert system. Here effort will be made to discuss the system requirement and system specification.

While diagnostic and treatment is said to be procedures of identifying a particular disease and how to overcome it in the body.

3.1 Problem Definition and Identification

One of the greatest problem and commonly featured in most of our hospitals in this country is the long time usually spent by patient waiting to be attended to by a doctor. More so, there is always delay in records retrieving and sometimes records

are even lost completely, and that may have adverse effect on the diagnosis and the treatment of a patient.

3.2 Feasibility study

The main purpose of feasibility study is to carry out preliminary investigation on the problem and look at possible alternative solution. Under the feasibility study, focus will be made on the analysis of the benefits for each alternative solution before recommendation will be made to establish the best alternative solutions.

In carrying out the feasibility study, the principle of procedures will be used to determine the strength and weakness of the existing system. These principles are:-

i. Purpose:- the purpose behind the present system was to properly differentiate the diagnosis of the malaria & typhoid in man and treat them within limited time, and also cope with rapid growth in number of patients in our hospitals and clinics against the present high ratio of patient per doctor in this country i.e, (1 to 200). The present manual system is not meeting the system demands.

ii. Work Flow:- the present system does not allow satisfactory workflow since it involve many stages before the real treatment is done.

iii. Specialization and Standardization:- It allow for other health workers other than doctors to properly differentiate the diagnosis of malaria & typhoid fever in the hospitals and clinics. For example, Nurses, Community health officers and Community health extension workers, who are always engaged in the diagnosis and treatment of the patients.

iv. Flexibility:- The current system is not flexible against the ratio of patient per doctor in this country. The present system is faulty i.e. the misdiagnosis and treatment of

patient for malaria and typhoid fever in most hospitals and clinics, make the system inflexible.

v. Reliability:- The system is reliable if doctors along with other health professional, i.e., Nurses, Community Health Officers and Community Health Extension Workers in the hospitals and clinics are involve in making diagnosis and treatment of malaria and typhoid fever. This will go along way in reducing the workload experience by the doctors in the hospitals.

vi. Time:- Because of the high ratio of patient per doctors, most patients spent the whole day waiting to take their turn to see the only available doctor on duty. The time spent waiting to be attended to may worsen the patients ill-health or may even lead to his/her death.

3.3 The Existing System

The existing system of diagnosing malaria and typhoid fever in man is as follows:-

i. Clinical diagnosis
ii. Laboratory diagnosis

In Dispensary/Health post without laboratory facilities staffed by a village health worker or community health aids at this level the diagnosis of malaria and typhoid fever will be based on symptoms, history and a few basic observations to determine the severity of illness. Temperature may also be measured the presence of a history of fever in the past 3days or an elevated temperature (> 37.5) will be regarded as suspected malaria/typhoid fever.

This procedure is referred to as "Clinical diagnosis of malaria/typhoid fever"

Laboratory diagnosis is usually carried out in hospitals or clinics where laboratory for the microscopic diagnosis of malaria/typhoid is available. At this level more detailed historic clinical observations and physical examinations will be undertaken, (specimen of blood is taken for laboratory examination). This is to be carried out by the laboratory scientist using some reagents. After which the result is sent back to the medical doctor for prescriptions or treatment for the patient.

3.4 Fact finding method

The information regarding this study were obtained from the following sources:-

i. Literature review, this include reading from books, journals and lecture notes.

ii. Record searching and observations, patients bed head tickets and other records were made available for the author to study in the hospital and clinic.

iii. The author visited six hospital to find out what was happening about the current system. Some of the hospitals visited include, Minna, Bida, Suleja, Kontagora, Kagara and Beji Primary Health Care Clinic, interview was another source of facts findings of this study. (Urban and rural hospitals). Experts responsible for the diagnosis of malaria/typhoid fever in the hospitals visited like the doctors and laboratory scientist were interviewed in relation to the objectives of this study and satisfactory response were received.

The above method of facts finding were choosing and used for this study because this study was limited to the diagnosis of malaria/typhoid fever in hospitals and clinics, it is therefore more of field work than using questionnaires.

3.5 Cost and benefit analysis of the new system.

Initially, the purpose of the new system might look so costly because of the need to purchase the computer system and its installation. The estimated cost of the new system is hereby giving below:-

The cost can be broken down into cost of equipment and the running cost or operating cost.

i. The cost of equipments:-

a. Five (5) computer at N150,000 per I = N750,000
b. Printer 1 Dot-matrix printer and 1 laser printer = N60,000 laser printer LHS about N80,000
c. UPS/Stabilizer N10,000
d. Soft ware, i. Word perfect N12,000 ii. Dbase IV or III plus N12,000 iii. Installation cost N15,000
e. Grand total cost N129,000

2. Operating cost

i. Five (5) operators at salary of N3,000 per month
ii. Training of six (6) doctors and ten (10) Nurses for 4 weeks at the cost of N15,000 per week amounting to N60,000.
iii. Purchase of stationary e.g. Diskettes, Printing papers, printing ribbons N20,000
iv. Overall total N16,000.

However, the long cost term benefits and other advantages supercede the initial cost.

(A) the cost benefits could be discussed under the following headings:-

i. Reduction in the number of medical personnel:- with the introduction of computer systems, there will be reduction in the ratio of patient per doctor. This will however, save the organization some huge amount of money, in esense, there will be reduction in money use for salaries and other fringe benefits of doctors.

ii. Reduction in stationary:- The stationary such as patients bed head ticket, filing cabinet will be eliminated or reduced, this will again aid the organization to save huge amount of money.

Other benefits

i. Time:- With the new system, there will be reduction in time spent at the out patient department in hospitals and clinics, waiting to be attended to by the doctor.

ii. Life saving:- With the new system, emergency and serious cases could be attended to in good time, thereby saving the life of many patients, because of the prompt diagnoses and treatment of their cases.

iii. Elimination of loosing patient records:- With the new system, there will be reduction in the lost of patient records hence, the patients are entered into the diskettes which will be stored and saved and can be called when ever the need arises.

3.6 Input and output specification

Output specification:- Is necessary to consider what is required for the system before deciding how to set about producing it. For the purpose of determining the output requirement, considera on will need to be made on the form, types, volumes and frequency of report and documents.

Since the main concern of this study is on the diagnoses and treatment of malaria/typhoid fever, emphases will be the registration of patients particulars, processing the data or particulars to identify the particular sickness the patient is suffering from. Updating of the patients file and report producing.

A copy of the report (prescription) will be required to be produced to be used by patient for his/her own treatment (tablets or injection) as the case may be. Therefore, our output file will serve also as an output file where reports will be generated.

3.7 Input specification

Consideration of the input will be influenced by the need of the output. In determining the output, the following need is to be considered:-

i. Data collection method and validation.
ii. Type of input media available.
iii. The volume of the input documents
iv. Design of input layout.

In designing the input layout for the convenience and better understanding there will be one input file and this file will contain all the patients records that will be used in this project work. The file will be named PAT.DBF. For the purpose of this project the file will contain twenty (20) patient records.

CAHPTER FOUR

4.0 Software development and Implementation.

Introduction

This chapter will concentrate on software development and implementation. Hence discussion will be focused on choice of software packages, the element of the software packages, programming languages and work station requirement.

The chapter also, include the data structure for some of the input and output files and programme development. The implementation aspect talk of operational manual, change over procedures and documentation.

4.1 Choice of software packages and programming

Some of the criteria used for the choice of software packages and programming language are:-

i. The effectiveness and efficiency of the packages with regards to the functions of the programmes.
ii. The facilities for differentiating type of file processing.
iii. The security of the records in the file.
iv. The facilities for maintaining, adding new records, updating, modifying and easy retrieval of records.
v. The flexibility of the packages.
vi. Users friendliness.

Based on the above outlined criteria and the types of files that will be required for processing, two application software packages will be adopted for this project or study. These are word perfect 6.0 and Dbase IV packages.

4.2 Software Requirement and Its Features

In addition to the operating system, there are other two categories of software that are required for this project these are:-

i. Generalized applications packages and
ii. Users application programs

Application packages are suits of programms with associated documentation used for particular type of problem or variety of similar problems.

A generalized application packages, therefore is the one which provides, a completely general set of facilities which are of use in dealing with similar type of task which arise in a wide variety of different application problems.

The generalized application packages required for this project work are:-

i. Data base management System Packages – Dbase IV, and
ii. Word processing packages – Word perfect 6.0.

The users application program are application specifically written by the user, and are aimed at providing all the facilities required for a particular class of application problem, such as pay roll of the users organization.

The users application program are the main task of this project. The development and testing of these program is the next sub-heading.

4.3 FILE DESIGN

Once data is completed the next step is to make the final organization of it into files. This is of key importance because once you entered data into a database and decide to add fields, you must go to all existing records and enter the new field values.

The method adopted in this design is to group the data into logical class and according to the output requirement. The following factors are considered for the designing of all the database files used in the package written.

1. Accessing the file
2. To many file fields in each file are avoided
3. The main objective of integration of Dbase file is strictly persued. For the purpose of this project one master file is used and this will be more of a permanent and reference file. It contains all the data of each patient and new records can also be entered and the output produced.

4.4 PROGRAMS

This part of the chapter discussed briefly the functions of the modular programs that were written for this study. The programs code are in appendix A.

i. Main title Programs: Program on executive display the title, the programmer and the supervisor on the screen, and it will also lead the user to the main menu program.

ii. Menu Program: The function of this program is to enhance the display of the main menu. The main menu contains the following.

a. Append Program:- this enable the user to enter new record into any of the master file.

b. Modify Program:- This enable the user to modify any of the record in the file for example after the result of a patient from the laboratory, it is the modify program that will change the patient given data and simultaneously his diagnosis and treatment.

c. Report:- The report program, enable us to produce report for the individual patient, and yearly report, given the list of the patients treated in that hospital for typhoid and malaria fever.

4.5 Database structures for the patient file

F/NO	DISCRIPTION	F/NAME	F/TYPE	F/WID	DEC
1	NAME	NAME	C	15	-
2	INDEX NO	INDEX	C	5	-
3	ADDRESS	ADDRESS	C	20	-
4	SEX	SEX	C	1	-
5	AGE	AGE	N	2	-
6	MARITAL STATUS	M/STATUS	C	6	-
7	OCCUPATION	OCCUP	C	10	-
8	DATE	DATE	D	8	-
9	WEIGHT	WEIGHT	C	3	-
10	DATE OF L/ VISIT	L/DATE	D	8	-
11	LAST COMPLAIN	L/COMP	C	15	-
12	COLD	COLD	C	3	-
13A	HEADACHE	HEAD	C	6	-
13B	RUNNING TEMP	R/TEMP	C	3	-
14	LOSS OF APPT	L/APPT	C	3	-
15	VOMITTING	VOM	C	3	-
16	G/BODY W/NESS	W/BODY	C	3	-
17	PULSE RATE	P/RATE	C	11	-
18	DIARRHOEA	DIAR	C	3	-

19	ABD/ PAIN	ABD/P	C	3	-
20	HEART BEAT	H/BEAT	C	10	-
21	URINARY O/PUT	U/O/PUT	C	9	-
22	P/APPEARANCE	P/APP	C	9	-

MINSTRY OF HEALTH
NIGER STATE

PATIENT PRESCRITION CARD

INDEX NO. 28 FULLNAME: shehu mallam

ADDRESS: bosso road minna SEX: m AGE: 40

MARITAL STATUS married OCCUPATION: c/servant DATE 12/13/9
DATE OF LAST VISIT: 12/04/98

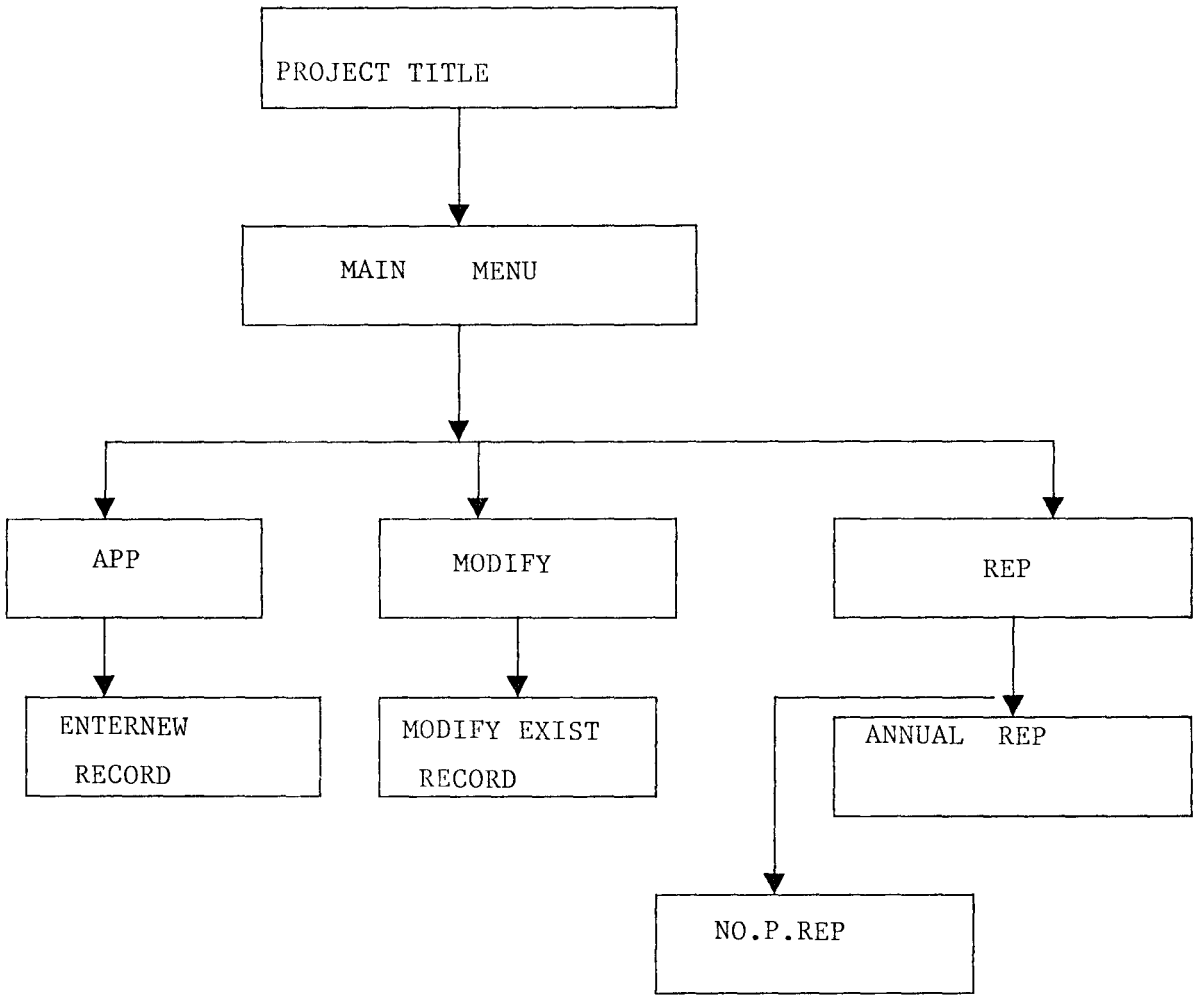
LAST COMPLAINT: headche

PRESENT DIAGNOSIS RESULT TYPHOID FEVER

TREATMENT

DOCTOR'S NAME

4.6 FLOW CHART FOR THE MODULAR PROGRAMS



4.7 OPERATIONAL MANUAL

Software development will be incomplete until the programs have been written, thoroughly tested for a substantial period of time and documented.

The operational manual is an important part of the documentation as earlier stated. Dbase IV programming environment is used for this project. However, it is worth noting that the project programs can run on Dbase III plus, environment. Below are simple instruction to be followed by the user of the developed software.

Step I:- Booting the system from the hard disk. A successful booting will lead the user to C prompt. C!

Step II:- At CI: type CD Dbase IV, this will lead the user to control panel.

Step III:- At control panel, press C key and you are at dot prompt.

Step IV:- Now at this prompt, insert the following diskette that contains the project programs into A- drive of the system and type SET DEFAULT to and press ENTER KEY.

Step V:- For the user to run the programs sequentially starting from the main title program, the following sub-steps will be followed:-

(a) Type DO PROJ. and press ENTER KEY. The title of the project work will appear on the screen, followed by instruction at bottom part of the screen.
(b) Carrying out the instruction will display the main menu on screen.
(c) At this point, the user will simply continue to carry out the instructions display on the screen base on whatever he/she wants to do.

4.8 CHANGE OVER PROGRAMS.

There are three methods of change over from old system to a new system and they are:-

a. Parallel
b. Direct and
c. Pilot

Parallel:- Here the old and new system are run currently, using the same inputs. Output from the old system will continue to be distributed until the new system has proved satisfactory. At this point the old system is discontinued and the new one take place.

Some of the features of the parallel methods of change – over are:-

i. It is costly method because of the amount of duplications involved.
ii. This method will need the employment of extra staff or over time working for the existing staff. This can create difficulties over the period of the change – over.
iii. It is only possible where the output from old and new system are easy to reconcile and where the system are similar.
iv. Its use does give management the facility of fully testing the new system whilst retaining the existing system.

Direct:- Here the old system is discontinued immediately. Some of the features are:-

i. If the new system has no resemblance with the old, then a direct change – over is probably inevitable.
ii. There must be complete confidence in the new system's reliability and accuracy before the method is used.

Pilot:- A pilot change-over would involve the changing over of part of the system either in parallel or directly. Use of the variation of the first two methods is possible when part of the system can be treated as a separated entity. Therefore, with the understanding of the three system mentioned above, the pilot system will be must suitable among the three system because it will definitely reduce the work load usually experienced by a medical doctors in the diagnosis and treatment of diseases in hospitals and clinics. Furthermore, it will also minimize time spent by patient waiting to see doctor for consultation and will create more time for doctors to attend to more serious and emergency cases in the hospitals and clinics.

The problem of accuracy has been taken care of with the testing of the new system during the development period. Couple with the fact that computer system is one of the most reliable and efficient system for data and information storage and processing.

Hardware and software requirements for setting up computer centre in a hospital

The requirement for setting up a PC centre for the purpose of diagnosis and treatment of typhoid and malaria patients can be divided into two:-

i. Hardware:-
   - 4 Computer PC IBM Compatible
   - Memory 1.44 MB
   - Disk-drive 1 floppy disk-drive 3.5 inches
   - Hard-disk 1.2 GB
   - 2 Laser printers
   - Stabilizer/UPS

ii. Software:-
   - Disk operating system (DOS), MS DOS 6.0
   - Dbase IV
   - Windows 96.

CHAPTER FIVE

5.:0 CONCLUSION AND RECOMMENDATIONS

This study will be incomplete if the review of the research is not carried out. The significant of the study is to help in reducing the work load on medical doctors in diagnosis and treatment of disease, usually experienced by them in the out patient department in the hospitals and clinics. A situation which normally causes patient to spend several hours in the queue waiting to be attended to by a doctor in many of our hospital and clinics.

This system if adopted in our hospitals and clinics, will very much ease and hasten the work of medical doctors, as well as eliminating congestion of patients seen in most hospitals and clinics. Furthermore, it will provide ground for other health professionals i.e., Nurses and even non health professionals like computer operators to diagnose and treat patient accurately using the information fed into the system.

The study introduce us to the life history of the different signs and symptoms of typhoid and malaria fever in human being, how to arrive at the diagnosis of the said ailments and its treatment. Therefore, this research is a complete and efficient system in itself. It is open for use by both doctors, Nurses and community health workers in the government and private hospitals and clinics.

The system is further design and tested on a PC IBM compatible brand of computer. The software have therefore been made users friendly since the programs are structured in such a way that changes can easily be effected, if the user like computer operators i.e., Nurses and community health workers are provided with necessary training

```
* ------------------------------------------------------------ *
* Program Name : Project                                       *
* Function     : Main Program for Title Display                *
* Author       : Alh. Ahmed Bawa                               *
* Date         : November, 1998                                *
* ------------------------------------------------------------ *


        Set talk off
        Set scoreboard off
        Set status off
        DO WHILE .T.
            Set color to w/b+
        @ 3,24 say "EXPERT SYSTEM ON MEDICAL DIAGNOSIS"
        @ 4,38 say "AND"
        @ 5,31 say "TREATMENT OF MALARIA"
        @ 6,38 say "AND"
        @ 7,33 say "TYPHOID FEVER"
        @ 10,39 say "BY"
        @ 13,32 say "ALH. AHMED BAWA"
        @ 14,33 say "PGD/MCS/97/416"
        @ 16,35 say "SUPERVISED"
        @ 18,39 say "BY"
        @ 20,33 say "MAL. ISAH AUDU"
        @ 2,22 to 21,60 double
        wait
        @ 1,0 clea to 23,79
        ch = space(1)
        @ 10,15 say "PRESS Y FOR MAIN MENU AND N TO QUIT"
        @ 10,55 get ch pict "@!"
        read
            DO CASE
                case ch = "Y"
                    do mmenu
                case ch = "N"
                    quit
            ENDCASE
        ENDDO
        RETURN
```

```
* ------------------------------------------------------------ *
* Program Name  : Mmenu                                        *
* Function      : Main Program for Menu                        *
* Author        : Alh. Ahmed Bawa                              *
* Date          : November, 1998                               *
* ------------------------------------------------------------ *

        Set talk off
        Set scoreboard off
        Set status off
        Set color to w/n+
        DO WHILE .T.
            @ 1,0 clea to 23,79
            @ 2,32 say "M A I N   M E N U"
            @ 3,32 say replicate ("=",16)
            @ 4,24  o 15,56 double
            @ 5,26  ay "TASK CODE" + space(7) + "task"
            @ 6,30  ay "A" + space(6) + "ENTER NEW RECORD"
            @ 8,30 say "B" + space(6) + "MODIFY RECORD"
            @ 10,30 say "C" + space(6) + "PRINT RECORD"
            @ 12,30 say "D" + space(6) + "EXIT"
            ch = space(1)
            @ 14,26 say "ENTER TASK CODE"
            @ 14,42 get ch pict "@!"
            read
                DO CASE
                    case ch = "A"
                        do app
                    Case ch = "B"
                        do mod
                    case ch = "C"
                        do rep
                    Case ch = "D"
                        exit
                ENDCASE
           ENDDO
             clea
           RETURN
```

```
* ------------------------------------------------------------ *
* Program Name : App                                           *
* Function     : For Data Entry                                *
* Author       : Alh. Ahmed Bawa                               *
* Date         : November, 1998                                *
* ------------------------------------------------------------ *

        Set status off
        Set scoreboard off
        Set echo off
        Use Pat
        clea
        DO WHILE .T.
        @ 1,3 say "PATINET PERSONAL DATA"
        append blank
        @ 3,3 say "FULL NAME:" get name
        @ 5,3 say "INDEX NO.:" get index
        @ 7,3 say "ADDRESS:" get address
        @ 9,3 say "SEX:" get sex
        @ 11,3 say "WEIGHT:" get wgt
        @ 13,3 say  "AGE:" get age
        @ 15,3 say "MARITAL STAUS:" get mstatus
        @ 17,3 say "OCCUPATION:" get occup
        @ 19,3 say "DATE:" get date
        @ 21,3 say "DATE OF LAST VISIT:" get ldate
        @ 23,3 say "LAST COMPLAINT:" get lcomp
           read
       wait
       clea
@ 1,5 say "DIAGNOSIS, ANSWER YES/NO EXCEPT WHERE INDICATED"
        @ 3,5 say "DO YOU HAVE COLD?" get cold
        @ 5,5 say "HEADACHE(SEVERE OR ACUTE)?" get head
        @ 7,5 say "DO YOU HAVE FEVER?" get fever
        @ 9,5 say "LOSS OF APETITE?" get Lapet
        @ 11,5 say "DO YOU VOMIT?" get vom
        @ 13,5 say "DO YOU HAVE BODY WEAKNESS?" get wbody
        @ 15,5 say "PULSE RATRE(LOW OR HIGH)?" get prate
@ 17,5 say "FREQ. WATERY STOOL 3 OR MORE DAILY" get diar
        @ 21,5 say "DO YOU HAVE ABDOMINAL PAIN?" get abdm
        @ 23,5 say "HEART BEAT (LOW OR HIGH)?" get hbeat
       read
       wait
       clea
     @ 3,5 say "URINARY OUTPUT (SCANTY OR MUCH)" get urin
 @ 5,5 say "PATIENT APPEARANCE ( TOXIC OR NORMAL)" get patapp
     @ 7,5 say "ANY CONVULSION?" get conv
     @ 11,5 say "WAIT FOR YOUR INITIAL PRESCRITION"
     @ 13,5 say "YOU WILL NEED TO DO L;AB. TEST"
     @ 15,5 say "PLS COLLECT THE LAB. FORM AND"
     @ 15,5 say "SUMMIT THE RESULT ON" get ndate
   read
   wait
   clea
   If HEAD = "ACUTE" .AND. PRATE = "HIGH"
```

```
        @ 11,5 say "PATIENT LIKELY SUFFERING FROM MALARIA"
        @ 13,5 SAY "FEVER OR CEREBRATE MALARIA"
        If VOM = "YES" .AND. CONV = "YES"
        @ 15,5 say "INITIAL DIAGNOSIS INDCATE THAT PATIENT"
        @ 17,5 say "IS SUFFERING FROM CEREBRATE MALARIA"
        Repl sickness with "CEREBRATE MALARIA"
        Else
        @ 15,5 say "INITIAL DIAGNOSIS INDICATE THAT PATIENT"
        @ 17,5 say "IS SUFFERING FROM MALARIA FEVER"
        Repl sickness with "MALARIA  FEVER"
        If AGE <1
        REPL treat with "Paracetamol syrup 7.5ml/6hrly/daily x5/7; ì
 Chloroquine syrup 7.5ml D1, 7.5ml D2 &3.7ml D3"
        Endif
        If Age > 1 .AND. Age <= 3
         REPL treat with "Paracetamol syrup 7.5ml/6hrly/daily x5/7; ì
  Chloroquine syrup 15ml D1, 15ml D2 & 7.5ml D3"
        Endif
        If Age >= 4 .AND. Age <= 6
        REPL treat with "Paracetamol syrup 7.5ml/6hrly/dasily x5/7; ì
  Chloroquine tab 2/daily x 2/7 & 1 D3"
        Endif
        If Age >= 12
        Repl treat with "Paracetamol 300mg/6hrly/daaily x 5/7; ì
Chloroquine tab 4/daily x2/7 & 2tab D3"
        Endif
        Endif
        Else
        @ 11,5 say "INITAL DIAGNOSIS INDICATE THAT PATIENT"
        @ 15,5 say "IS SUFFERING FROM TYPHOID FEVER"
        REPL sickness with "TYPHOID FEVER"
        If DEHY = "YES" .AND. AGE < 12
        REPL treat wit  "Intravenous fluid; Paracl 5mg/6hrly/daily ì
x5/7; Chlorophemical 2 mg/6hrly/daily x2wks"
        Endif
        If DEHY = "YES" .AND. AGE = 12
        REPL treat with "Intravenous fluid; paracel 10mg/6hrly ì
x5/7 Chloromphemical 50mg/6hrly/daily x 2wks"
        Endif
        If DEHY ="YSE" .AND. AGE > 12
        REPL treat with "Intravenous fluid; Paracel ì
300mg/6hrly/daily x 5/7; Chloromphemical 250 -500mg/6hrly/daily x ì
2wks"
        Endif
        If ANAEM = "YES" .AND. AGE < 12
        REPL treat with "Blood transfussion; Paracel ì
5mg/6hrly/daily x 5/7; Chloromphemical 25mg/6hrly/daily x 2wks"
        Endif
        If ANAEM = "YES" .AND. AGE = 12
        REPL treat with "Blood transfusion; Paracel ì
10mg/6hrly/daaily x 5/7; Chloromphemical 50 mg /6hrly/dail x ì
2wks"
        Endif
        If ANAEM = "YES" .AND. AGE = 12
```

```
        Repl treat with "Blood transfusion; Paracol 1
300mg/6hrly/dailt x 5/7; Chlorompemical 250-500mg/6hrly/daily x 1
2wks"
        Endif
        ch = space(1)
        @ 10,10 say "ANY OTHER PATIENT (Y/N)?"
        @ 10,40 get ch pict "@!"
        read
            Do case
                Case ch = "Y"
                    loop
                Case ch = "N"
                    Exit
            Endcase
            ENDDO
            close database
            clea
        RETURN


    * ------------------------------------------------------------ *
    * Program Name : Mod.Prg                                       *
    * Function     : For Data Modification                         *
    * Author       : Alh. Ahmed Bawa                               *
    * Date         : November, 1998                                *
    * ------------------------------------------------------------ *

            Set status off
            Set scoreboard off
            Set echo off
            Use Pat
            STORE 0 TO  mindex
            Set color to w/b+
            *@ 3,3 say "ENTER PATIENT INDEX NO.:" get mindex
            *read
            DO WHILE .T.
                Clea
    @ 1,3 say "MODIFY SCREEN FOR PAT. PERSONAL DATA AND DIAGNOSIS"
            @ 2,3 say replicate ("=",53)
            @ 3,3 say "ENTER PATIENT INDEX NO.:" get mindex
            read
          go top
            Locate for INDEX = mindex
          IF FOUND()
            @ 5,3 say "FULL NAME:" get name
            @ 7,3 say "INDEX NO.:" get index
            @ 9,3 say "ADDRESS:" get address
            @ 11,3 say "SEX:" get sex
            @ 13,3 say "WEIGHT:" get wgt
            @ 15,3 say  "AGE:" get age
            @ 17,3 say "MARITAL STATUS:" get mstatus
            @ 19,3 say "OCCUPATION:" get occup
            @ 21,3 say "DATE:" get date
            @ 23,3 say "DATE OF LAST VISIT:" get ldate
```

```
          read
          @ 5,3 clea to 23,79
         @ 5,3 say "LAST COMPLAINT:" get lcomp
        @ 7,5 say "DIAGNOSIS, ANSWER YES/NO EXCEPT WHERE INDICATED"
         @ 9,5 say "DO YOU HAVE COLD?" get cold
          @ 11,5 say "HEADACHE(SEVERE OR ACUTE)?" get head
          @ 13,5 say " DO YOU HAVE FEVER?" get fever
          @ 16,5 say "LOSS OF APETITE?" get lapet
          @ 17,5 say "DO YOU VOMIT?" get vom
          @ 19,5 say "DO YOU HAVE BODY WEAKNESS?" get wbody
          @ 21,5 say "PULSE RATE (LOW OR HIGH)?" get prate
    @ 23,5 say "FREQ. WATERY STOOL 3 OR MORE DAILY" get diar
          read
          @ 5,3 clea to 23,79
          @ 5,5 say "DO YOU HAVE ABDMONIAL PAIN?" get abdm
          @ 7,5 say "HEART BEAT (LOW OR HIGH)?" get hbeat
          @ 3,5 say "URINARY OUTPUT (SCANTY OR MUCH)" get urin
     @ 5,5 say "PATIENT APPEARANCE (TOXIC OR NORMAL)" get patapp
        @ 7,5 say "ANY CONVULSION?" get conv
        @ 9,3 say "LAB. TEST RESULT" get lab
        @ 13,5 say "DIAGNOSIS" get sickness
          read
       If LAB = "MALARIA PARASITE"
       Repl sickness with "MALARIA  FEVER"
       If AGE <1
       REPL treat with "Paracetemol syrup 7.5ml/6hrly/daily x5/7; ì
Chloroquine syrup 7.5ml D1, 7.5ml D2 &3.7ml D3"
       Endif
       If Age > 1 .AND. Age <= 3
        REPL treat with"Paracetamol syrup 7.5ml/6hrly/daily x5/7; ì
 Chloroquine syrup 15ml D1, 15ml D2 & 7.5ml D3"
       Endif
       If Age >= 4 .AND. Age <= 6
       REPL treat with "Paracetamol syrup 7.5ml/6hrly/daily x5/7; ì
 Chloroquine tab 2/daily x 2/7 & 1 D3"
       Endif
       If Age >= 12
       Repl treat with "Paracetamol 300mg/6hrly/daily x 5/7; ì
Chloroquine tab 4/daily x2/7 & 2tab D3"
       Endif
      Endif
       If LAB = "SALMONELLA TYPHI"
       Repl sickness with "TYPHOID FEVER"
       If Dehy = "YES" .AND. AGE <12
       Repl treat with "Intravenous fluid; paracel ì
5mg/6hrl/dailyx5/7; Chlorophenical 25mg/6hrly/daily x 2wks"
       Endif
       If Dehy = "YES" .AND. AGE = 12
       Repl treat ith "Intravenous filuid; Paracel ì
10mg/6hrrly/daily x5/7; Chlorophenical 50mg/6hrrly/daily x 2wks"
       Endif
       If Dehy = "YES" .and Age > 12
       Repl treat with "Intravenous fluid; Pacracel ì
300mg/6hrly/daily x 5/7; chlorphenical 250-500 mg/6hrly/daily x ì
```

```
2wks"
        Endif
        If Anaem = "YES" .AND. AGE < 12
        Repl treat with "Blood transfusion; Paracel 5mg/6hrly/dal ì
y x5/7; Chlorophenical 25mg/6hrly/daily x 2wks
        Endif
        If Anaem = "YES" .AND. AGE = 12:
         Repl treat with "Blood transfusion; Paracel ì
10mg/6hrly/daily x5/7; Chlorophenical 50mg/6hrly/daily x 2wks"
        Endif
        If Anaem = "YES" .AND. AGE > 12
        Repl treat with "Blood transfusion; Parcel ì
300mg/6hrly/daily x5/7; Chlorophenical 250-500mg/6hrly/daily x ì
2wks"
        Endif
      Endif
    ELSE
        @ 10,10 say "RECORD NOT FOUND"
    ENDIF
        CH = Space(1)
        @ 23,5 say "MODIFY ANOTHER RECORD (Y/N)?"
        @ 23,40 get ch pict "@!"
        read
            Do case
                case ch = "Y"
                    loop
                case ch = "N"
                    Exit
            Endcase
        ENDDO
            CLOSE ALL DATABASE
            CLEA
           RETURN

    * ------------------------------------------------------------ *
    * Program Name : Rep.Prg                                       *
    * Function     : For Report Menu                               *
    * Author       : Alh. Ahmed Bawa                               *
    * Date         : November, 1998                                *
    * ------------------------------------------------------------ *


            Set status off
            Set talk off
            Set scoreboard off
            DO WHILE .T.
            CLEA
            @ 2,32 say "REPORT MENU"
            @ 3,32 say replicate ("=",16)
            @ 4,24 to 15,54 double
            @ 5,26 say "TASK CODE" + space(7) + "TASK"
            @ 6,30 say "P" +space(6) + "PAT. DIAGNOSIS"
            @ 8,30 say "R" + space(6) + "LIST OF PATIENTS"
            @ 10,30 say "E" + space(6) + "EXIT"
```

```
        CH = Space(1)
        @ 16,26 say "ENTER TASK CODE"
        @ 16,42 get ch pict "@!"
        read
             DO CASE
                  case ch = "P"
                  do rep1
                  case ch = "R"
                  do rep2
                  case ch = "E"
                  EXIT
             ENDCASE
             ENDDO
             RETURN

* ------------- ------------------------------------------ *
* Program Name : Rep1.Prg                                  *
* Function     : Prints Report of Each Patient             *
* Author       : Alh. Ahmed Bawa                           *
* Date         : November, 1998                            *
* ------------------------------------------------------- *

        Set status off
        Set talk off
        Set scoreboard off
        USE PAT
        Store 0 to   mindex
        dname = space(15)
        @ 1,5 say "ENTER PATIENT INDEX NO." get mindex
        Read
        CLEA
    *Set device to printer
    GO TOP
    DO WHILE .NOT. EOF()
    Locate for index = mindex
        IF FOUND()
    @ 2,31 say "MINSTRY OF HEALTH"
    @ 3,34 say "NIGER STATE"
    @ 5,29 say "PATIENT PRESCRITION CARD"
    @7,5 say "INDEX NO."
    @ 7,16 say index
    @ 7,30 say "FULLNAME:"
    @ 7,42 say name
    @ 9,5 say "ADDRESS:"
    @ 9,15 say address
    @ 9,40 say "SEX:"
    @ 9,48 say sex
    @ 9,60 say "AGE:"
    @ 9,68 say age
    @ 11,5 say "MARITAL STATUS"
    @ 11,23 say mstatus
    @ 11,35 say "OCCUPATION:"
    @ 11,49 say occup
```

```
 @ 11,64 say "DATE"
 @ 11,73 say date
 @ 12,5 say "DATE OF LAST VISIT:"
 @ 12,27 say ldate
 @ 14,5 say "LAST COMPLAINT:"
 @ 14,25 say lcomp
 @ 16,5 say "PRESENT DIAGNOSIS RESULT"
 @ 16,31 say sickness
 @ 18,5 say "TREATMENT"
 @ 18,16 say treat
 @ 22,5 say "DOCTOR'S NAME" get dname
 read
 @ 22,39 say "SIGN/DATE ..........................."
 Endif
 *Set device to screen
 *wait
clea
 ch = space(1)
 @ 15,5 say "ANY OTHER RECORD TO BE PRINTED?(Y/N)"
 @ 15,60 get ch pict "@!"
 read
     DO CASE
          case ch ="Y"
 @ 1,5 SAY "Enter Patient Index No.:" get mindex
 read
 clea
 *Set device to printer
 loop
          case ch = "N"
               exit
     Endcase
 ENDDO
     CLOSE ALL DATAABASE
     CLEA
 RETURN
```

```
* ------------------------------------------------------------ *
* Program Name : Rep2.Prg                                      *
* Function     : Prints Number of Patients Treated             *
*                in a given Period                             *
* Author       : Alh. Ahmed Bawa                               *
* Date         : November, 1998                                *
* ------------------------------------------------------------ *

      Set status off
      Set talk  off
      Set  scoreboard off
      Use  pat
      *Set device to printer
      @ 1,31 say "MINISTRY OF HEALTH"
      @ 2,34 say "NIGER STATE"
      @ 3,29 SAY "GENERAL HOSPITAL MIINA"
 @ 5,7 say "LIST OF PATIENTS TREATED FOR MALARIA AND TYPHOID FEVER
  @ 7,3 say "INDEX NO." + space(2) + "FULL NAME" + space(7)
  @ 7,32 say "ADDRESS" + space(15) + "SEX" + space(2)
  @ 7,61 say "AGE" + space(2)+ "DIAGNOSIS"
  R = 7
      GO TOP
      DO WHILE .NOT. EOF()
      R = R + 1
           @ r,3 say index
           @ r,14 say name
           @ r,32 say address
           @ r,55 say sex
           @ r,61 say age
           @ r,67 say sickness
    skip
    ENDDO
     WAIT
 close all database
    RETURN
```

EXPERT SYSTEM ON MEDICAL DIAGNOSIS
AND
TREATMENT OF MALARIA
AND
TYPHOID FEVER

BY

ALH. AHMED DAWA
FGD/MCS/97/416

SUPERVISED

BY

MAL. ISAH AUDU

ress any key to continue...

M A I N M E N U

TASK CODE	task
A	ENTER NEW RECORD
B	MODIFY RECORD
C	PRINT RECORD
D	EXIT

ENTER TASK CODE

PATINET PERSONAL DATA

FULL NAME:

INDEX NO.:

ADDRESS:

SEX:

WEIGHT:

AGE:

MARITAL STAUS:

OCCUPATION:

DATE: / /

DATE OF LAST VISIT: / /

LAST COMPLAINT:

DIAGNOSIS, ANSWER YES/NO EXCEPT WHERE INDICATED

DO YOU HAVE COLD?

HEADACHE(SEVERE OR ACUE)?

DO YOU HAVE FEVER?

LOSS OF APETITE?

DO YOU VOMIT?

DO YOU HAVE BODY WEAKNESS?

PULSE RATRE(LOW OR HIGH)?

FREQ. WATERY STOOL 3 OR MORE DAILY

DO YOU HAVE ABDOMINAL PAIN?

HEART BEAT (LOW OR HIGH)?

URINARY OUTPUT (SCANTY OR MUCH)

PATIENT APPEARANCE (TOXIC OR NORMAL)

ANY CONVULSION?

WAIT FOR YOUR INITIAL PRESCRITION

YOU WILL NEED TO DO L:AB. TEST

SUBMIT THE RESULT ON / /

INITAL DIAGNOSIS INDICATE THAT PATIENT

IS SUFFERING FROM TYPHOID FEVER

MODIFY SCREEN FOR PAT. PERSONAL DATA AND DIAGNOSIS

ENTER PATIENT INDEX NO.: 5

FULL NAME: SANI IBRAHIM

INDEX NO.: 5

ADDRESS: KONGILA ROAD, MINNA

SEX: M

WEIGHT: 67KG

AGE: 45

MARITAL STATUS: MARRIED

OCCUPATION: TRADING

DATE: 11/16/98

DATE OF LAST VISIT: 01/12/98

MODIFY SCREEN FOR PAT. PERSONAL DATA AND DIAGNOSIS

ENTER PATIENT INDEX NO.: 5

LAST COMPLAINT: MALARIA FEVER

DIAGNOSIS, ANSWER YES/NO EXCEPT WHERE INDICATED

DO YOU HAVE COLD? YES

HEADACHE(SEVERE OR A[illegible]PTE)? SEVERE

DO YOU HAVE FEVER? [illegible]YES

LOSS OF APETITE? YES
DO YOU VOMIT? YES

DO YOU HAVE BODY WEAKNESS? YES

PULSE RATE (LOW OR H[illegible]GH)? HIGH

FREQ. WATERY STOOL 3 OR MORE DAILY NO

MODIFY SCREEN FOR PAT. PERSONAL DATA AND DIAGNOSIS

ENURINARY OUTPUT (SCANTY OR MUCH) MUCH

PATIENT APPEARANCE (TOXIC OR NORMAL) NORMAL

ANY CONVULSION? NO HIGH)? HIGH

LAB. TEST RESULT MALARI[illegible]

DIAGNOSIS MALARIA

REPORT MENU

TASK CODE	TASK
P	PAT. DIAGNOSIS
R	LIST OF PATIENTS
E	EXIT

ENTER TASK CODE

MINSTRY OF HEALTH
NIGER STATE

PATIENT PRESCRITION CARD

INDEX NO. 5 FULLNAME: SANI IBRAHIM

ADDRESS: KONGILA ROAD, MINNA SEX: M AGE: 45

MARITAL STATUS MARRIED OCCUPATION: TRADING DATE 11/16/98
DATE OF LAST VISIT: 01/12/98

LAST COMPLAINT: MALARIA FEVER

PRESENT DIAGNOSIS RESULT MALARIA FEVER

TREATMENT Paracetamol 300mg/6hrly/daily x 5/7: Chloroquine tab 4/daily x2/7 & 2t.

DOCTOR'S NAME

SIGN/DATE .....

MINISTRY OF HEALTH
NIGER STATE
GENERAL HOSPITAL MINNA

LIST OF PATIENTS TREATED FOR MALARIA AND TYPHOID FEVER

INDEX NO.	FULL NAME	ADDRESS	SEX	AGE	DIAGNOSIS
1	SHEHU IBRAHIM	BOSSO ROAD MINNA	M	35	MALARIA FEVER
2	SULE IBRAHIM	BOSSO ROAD, MINNA	M	34	MALARIA FEVER
3	YAHAYA IBRAHIM	BOSSO ROAD MINNA	M	43	TYPHOID FEVER
4	SHEHU SANI	BOSSO ROAD, MINNA	M	34	TYPHOID FEVER
5	SANI IBRAHIM	KONGILA ROAD, MINNA	M	45	MALARIA FEVER
6	FATI IBRAHIM	BOSSO ROAD, MINNA	F	34	MALARIA FEVER
7	ABDU SHEHU	BOSSO ROAD, MINNA	M	35	TYPHOID FEVER

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