Middle Articles

Medical Services to the Aborigines in West Malaysia

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Left to themselves in the jungle of West Malaysia, the aborigines lived in a world of their own until they became politically important as pawns in the Malayan emergency. For military reasons a medical service for the aborigines was started by the Colonial Administration in 1955. This service has been expanded as part of the independent Malaysian Government's big rural development programme.

Introduction

There are 45,000 aborigines in the southern Malay Peninsula (West Malaysia). Most live on the jungle slopes of the central mountain range of northern Malaya, and the remainder are scattered over the rest of the peninsula. The aborigines are a miscellaneous collection of ethnic groups whose common factor is that they are all descendants of the original inhabitants of Malaya. Speaking at least 12 different languages, they can, however, be divided into three main groups:

(1) The Negrito tribes are typically small, dark-skinned people with woolly hair. They are related to the Negrito tribes in the Philippines and the Andaman Islanders. Numbering 1,800, they are the only aborigines who are nomadic. Staying only a few days in one place, they sleep in temporary lean-to leaf shelters and live on jungle roots and small animals.

(2) The Senoi group of 25,000 belong chiefly to two tribes, the Semai and the Temiar, and are related to hill tribes in Vietnam. Each group of Senoi has a hereditary area of jungle and practises shifting cultivation, growing cassava, hill rice, maize, and millet on the steep slopes of the mountain range. They hunt with blowpipes and poisoned darts, trap animals, and fish.

(3) The Aboriginal Malay group are the Jakun, the Temuan, and the Orang Laut. These people live in small groups in lowland forest areas and mangrove swamps. Some own rubber or coffee smallholdings, but the majority are economically indigent and dependent on the jungle for their livelihood.

In addition, there are smaller tribes—the Semelai (3,200), Jahut (1,700), Che Wong (180), and Semok Beri (1,200)—which do not easily fit into any of the above groupings.

Origin of the Medical Service

Until 1955 no special medical service was provided for the aborigines, and the vast majority remained out of contact with the medical service of the country. In 1950 many deep jungle aborigines became politically important, as they were sharing the jungle with Communist forces operating against the

Government. These aborigines were forcibly resettled by the Government and put into camps on the edge of the jungle. In these camps they were provided with food but deprived of their natural jungle pursuits and interests. For the first time they lived in close contact with one another. Under these conditions there was the alarmingly high mortality of 90 per 1,000 per annum with a birth rate of 23 per 1,000 per annum.¹

In 1953 the Malayan Government opened 12 fortified police posts in the deep jungle. The aborigines from the camps were allowed to return to the jungle and were settled close to one of these police posts. At first medical officers from local hospitals paid occasional visits to these posts, but from 1955 two medical officers were appointed to visit them and treat the aborigines. Medical orderlies were appointed to be stationed at each post. Medical aid was thus brought to these deep jungle aborigines for the first time, and air support was available to fly out any sick who were willing to leave the jungle for treatment. Medicines were popular with the aborigines. Many came into the police posts to have their skin lesions painted, to take tablets for malaria; some were even willing to have injections. Dramatic though the response to medicine was, usually it was literally only skin deep. The aborigines willingly had their manifold skin fungus diseases treated, but were very reluctant to allow any of their number who was seriously ill to go to hospital. Living always near to death, they do not fear death, but they do passionately want to die at home, so that their spirit after death can pass into a near relative. Many of them feared the unknown world outside the jungle and when sick refused to leave home. Thus in those days it was rare for a sick aborigine to consent to be flown out of the jungle for hospitalization.

Medical Problems

The chief problems in developing the medical services for the aborigines were and are:

- (1) Educating the aborigines to believe in the value of modern medicine.
- (2) Training of medical staff.
- (3) Communications.
- (4) Control of diseases with a high incidence or mortality.

Spirits Versus Antibiotics

The traditional indigenous method of treating disease—removing from the body the evil spirits causing the disease—has many advantages for the sick aborigine. It is in accord with the traditional belief in spirits which the aborigine, an animist, is brought up to believe in. The treatment consists

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Aerial view of Gombak
Hospital.

A patient arrives by
helicopter at Gombak
Hospital.

Carrying a patient to the helicopter.

Aborigines start smoking early.

The mass x-ray set up on a jungle landing pad.

Graduation day on a witch-doctor course.

An aborigine woman suckling a wild piglet.

A typical unmanned jungle helicopter landing pad.

in observing food taboos and restrictions, and in dancing by the community, when the medicine man works himself into a trance and seeks to drive the disease spirits from the sick body. All this requires little exertion on the part of the patient. As treatment can be carried out in the home, there is no need to leave home or be separated from relatives. Most illnesses being self-limiting, the patient usually recovers from the illness. The removal of the evil spirit from the patient's body is regarded as the cause of this cure. There is no rejection of modern medicine as such by the aborigines. The taking of medicine is a recognized way of driving evil spirits out of the body. Quinine is considered an excellent drug, as the bitter taste it gives to the blood keeps evil spirits away. Treatment with medicines in the home by the medical orderly is also not difficult and is usually readily accepted, especially if the native "witch doctor" is accommodating and allows the medicine to be given at the same time as his own treatment.

Witch Doctor Courses

From 1957 efforts were made to make use of the native medicine men by giving them simple medical instruction. One medicine man from each group was given a 10-day course in elementary medicine and hygiene. At the end of it he was presented with a badge and sent home with a box containing a few medicines which were distinguished by different colours—the red tin containing chloroquine for malaria, the blue, aspirin for headaches, and the yellow, vitamin tablets. The medicines were so chosen that were the native medicine man to mix up the tins no real harm should come to the patient.

The real purpose of the course was to enable our staff to become acquainted with these native medicine men and to enable the latter to see the aborigine medical centre where patients were treated, so that they could reassure their relatives at home. Back in their homes we expected them to increase the potency of their traditional treatment by giving medicines from their medicine box at the same time. They were also asked to report to our staff if any of their flock were still ill after their own medicines and evil spirit removing had been completed. Over a period of three years 250 aborigines attended these courses.

Hospital Treatment

But what if treatment cannot be given in the jungle home and the aborigine is required to be sent to hospital? Going to hospital creates a number of fears and problems for the aborigine, especially if he has never before left the jungle. The

fear of dying away from home is always great, and the fear of the outside world where people do not know his language and lead a completely different life is even greater. In the jungle everything is free, everyone friendly; outside everything has to be paid for, and the attitude of the uneducated Malaysians of other races to aborigines is not necessarily friendly. To be able to die quietly at home in his jungle house is what many aborigines preferred.

It is not surprising that at first few aborigines were flown out of the jungle posts for treatment, and that when the aborigine finally consented to be lifted out the illness was often so far advanced that he did not survive. Patients were taken to a Government hospital, and while acutely ill were not always fully aware of their strange surroundings. After two weeks the patient, if not discharged, frequently ran away. Loneliness at being the only aborigine in the ward, often without being able to communicate with the other patients, fear of the unknown, and the sight of other patients going for operation were the chief reasons that the aborigine wanted to abscond.

Two weeks in hospital was often sufficient to treat acute illnesses or reduce and immobilize fractures, but it was quite inadequate for the treatment of chronic diseases such as pulmonary tuberculosis. For aborigines requiring long-term hospitalization medical treatment centres were opened in 1957 at Gombak near Kuala Lumpur and at Kuala Lipis in Pahang. At these centres the sick

were allowed as far as possible to live a normal aborigine existence, cooking their meals. Ambulatory patients were allowed to follow their jungle pursuits of fishing, searching for jungle fruits, and making fish traps in the vicinity of the hospital.

Training of Medical Staff

The original 28 medical staff were recruited in 1955 before the arrival of a medical officer. All were non-aborigines, and most were ex-medical orderlies from the armed Forces or junior estate dressers. None had any medical qualification that was recognized in a Government hospital. Subsequently each received practical training in Government hospitals and gained considerable experience of jungle medicine, but without any extensive medical knowledge or background.

The first three aborigines were taken for medical training in 1957 and another three by 1959. Since 1959 all new vacancies on the medical establishment have been filled by aborigines; there are now 143 aborigine medical staff. Without doubt the key to the success of the medical service for the aborigines has been the recruitment and training of aborigines in medical duties. Patients coming to hospital have a "relative" on the

Distribution of deep jungle medical posts.

staff who speaks their language, understands their wishes and fears, and can explain to them the origin of their disease and the purpose of the treatment given.

Communications

One of the chief problems in providing an efficient medical service is the isolation of the aborigines; the sick must be found and brought to hospital if necessary. Born in the height of the Malayan Emergency, with the jungle full of troops, the medical services from the start have had air support in flying out the sick and dropping supplies of medicine and food into the jungle. The medical officer has always had access by air to the jungle police posts, and since 1955 has paid monthly visits to each.

There were, however, only 13 police posts in the jungle from 1955 onwards, and unless a helicopter landing zone had been constructed where troops were operating it was possible to visit other deep jungle aborigines only by boat or on foot. From 1961, with the construction of new medical posts in the jungle, the number of posts visited regularly by air has steadily increased. With each new post a helicopter landing pad was constructed. There are now no fewer than 130 landing pads, compared with 13 in 1955. The air support in the early days was provided solely by the R.A.F. The Royal Australian Air Force later took over the remaining R.A.F. commitment, but now the Royal Malaysian Air Force has taken over the whole commitment.

These services have all been provided without charge to the Department of Aborigines. When the emergency on the Thai border became less demanding helicopters became more easily available for medical tasks. This extra "slack," often in the form of training hours for the pilots, was used to expand the medical service to the deep jungle aborigines by increasing the number of doctor visits, increasing the number of sick flown out of the jungle, and by flying the mass x-ray machine and team from one jungle pad to the next. In this work the pilots showed an enthusiasm and devotion far beyond the necessities of their service.

The 13 police posts in the jungle all had wireless communication as part of the national police wireless network. When new medical posts were constructed it was hoped that they could be provided with small wireless transmitters, so that they could call the nearest police post for help when necessary. However, Malayan police signal regulations did not allow any external "attachments" to be made to the network. In 1959 five portable wireless transmitter/receiver sets were borrowed from the police, together with one base set. This was the start of the medical communications network to the deep jungle medical posts. In 1960 seven more sets were borrowed from the police. Two years later the medical service received 20 mobile and 3 base sets of its own. This medical radio network has grown, and by 1967 there were 104 radio transmitter/receiver sets in use.

The Leap Forward

With the Malaysian Government's second five-year development plan (1961 to 1966) funds were allocated for the expansion of the medical services to the aborigines. The limiting factor was the total sum allocated. By building deep jungle medical posts as cheaply and simply as possible more posts could be constructed. Each post consisted of a building 30 feet by 15 feet with concrete floor, slotted steel angle frame, slit bamboo walls, and zinc roof. The cement, the slotted steel frame (cut into 5 foot lengths), and the zinc roofing were dropped to the site by parachute. The bamboo and the sand were collected at the site. The area round each post was cleared of trees and levelled. A helicopter landing pad was constructed of bamboo

adjacent to the post. Three aborigines were trained to put up the medical post building. When they had completed one post they walked through the jungle to the next site. In this way medical posts were built in all deep jungle valleys populated by aborigines. The total number of medical posts increased from 18 to 57.

Aborigines have since tended to move their houses closer to the medical post in their valley, so that medicines, welfare goods, and wireless communications with the outside world are nearer at hand. In addition, 59 small emergency evacuation aid posts with helicopter landing pads were constructed to serve isolated aborigine communities still far from the nearest medical post.

With a large number of new jungle medical posts available it was necessary to have the establishment for staff to man them. The real strength of the medical service to the aborigines lies in the greatly increased size of medical staff, evenly scattered over the whole of the populated deep jungle area. Most encouraging has been the effect of the new jungle medical posts on the nomadic Bateq Negrito tribes in north-east Kelantan. Supplied with a sufficient quantity of donated Bulgar wheat, they have settled down for the first time close to a medical post, where they have made their first cultivations of hill rice and tapioca.

Even before the start of the recent expansion the 12-bed medical centres at Gombak and Kuala Lipis were insufficient. Although at first only chronic long-term patients were admitted, soon most sick aborigines were demanding to go to one of these centres for hospitalization, alternatively refusing hospital treatment. With aborigine labour accommodation at Gombak was increased by the construction of wooden ward blocks, 60 feet by 16 feet, with concrete floors. The 12-bed medical centre became a 450-bed hospital.

By 1963 there was a daily average of 100 patients at Gombak and there were 50 deep jungle medical posts to be visited, but there was only one medical officer. However, professional medical help had by then become available from voluntary organizations abroad. On 3 January 1963 the first Peace Corps nurse started work at Gombak, and on 1 June 1963 a Peace Corps doctor arrived. With additional professional help the number of patients at Gombak Hospital increased more rapidly, and a year later there was a daily average of 210 patients.

Although the Peace Corps doctor was not replaced when she left in February 1965, help had meanwhile come from elsewhere. In August 1964 CARE-Medico, a North American organization, set up a team of one doctor and two nurses at Gombak, and has since maintained it at this strength. The British V.S.O. sent two volunteers in August 1965, and this was increased to four a year later, including for the first time a dental officer. The New Zealand V.S.A. started help by sending a nurse in September 1967, followed by a volunteer doctor in January 1968.

This inflow of new skills, ideas, and enthusiasm has resulted in the development of ancillary medical services at Gombak, leading to the creation of a hospital with full equipment and facilities except for surgery.

Present Development

Gombak Hospital

There is a base hospital at Gombak, 11½ miles from Kuala Lumpur, situated by a river and surrounded by primary jungle. Accommodation exists for 450 patients in 13 wards. One ward of permanent structure is used as an acute care ward; the remaining 12 are of temporary wooden structure erected by aborigine labour. Four of these are used for tuberculosis and chest diseases, three as general medical, two as antenatal wards, and one as a postnatal ward. An abandoned powerhouse has

been converted into pathology laboratories, x-ray department, dental clinic, labour ward, and class-rooms. There are no facilities for surgery. All the trained staff are at present expatriates, and all the local staff working in the hospital are aborigines who have been trained at the hospital.

Jungle Medical Posts

There are 59 deep jungle medical posts and 11 deep jungle midwife clinics, each manned by an aborigine medical assistant or midwife. Every medical post has a dispensary and accommodation for two inpatients. There is also a wireless transmitter/receiver set and a helicopter landing pad. The whole of the inhabited jungle area of West Malaysia is now covered by these medical posts, usually one post in each river valley.

The medical assistant at the post visits on foot all the aborigines in an area, which may cover up to 30 square miles. This often necessitates his being away from the post for periods of 7 to 10 days. He is visited monthly by the medical officer and receives rations and medicines each month by air drop. In addition, 300 lb. of Bulgar wheat and other welfare foods, donated by the U.S. Government, are dropped each month to all the landing posts. If an aborigine requires hospitalization the medical assistant calls up Gombak Hospital on his wireless giving details. The patient is later picked up by helicopter and flown out of the jungle, usually straight to Gombak Hospital.

Besides the medical posts there are 62 emergency medical evacuation aid posts. These are essentially emergency helicopter landing pads in areas in the jungle where there are small aborigine groups living over three hours' walk from an existing post. There is a small building with an emergency supply of drugs at each. A local aborigine who has been given a 10-day first aid course at Gombak is paid 35s. per month to give first aid treatment, report any sick, and keep the helicopter landing pad clean and serviceable.

Some have wireless transmitter/receiver sets. A white "H" on the landing pad is used to inform aircraft flying overhead that help is needed. Each of these aid posts comes under the jurisdiction of a medical post and is visited regularly by the medical assistant from that post. To the medical officer on his monthly trip round by helicopter, these aid posts are request stops on his "bus route." He flies overhead and normally only lands if there is a white "H" out on the pad. If an aborigine while hunting falls from a tree and breaks his back and cannot be carried to a landing pad the medical orderly makes a new landing pad near the site of the accident and directs the helicopter by pilot radio.

Staff

The present Government medical staff consists of one medical officer, one staff nurse, and 161 medical assistants. Of the medical assistants 16 are Malay and two Chinese; three of these are doing administrative duties at Gombak Hospital and the remainder are based in district Aborigine Department offices and give medical treatment to aborigines in the jungle fringe areas in the district. The remaining 143 medical assistants are aborigines who, with the minimal educational requirement of an ability to read and write, have received their medical training at Gombak Hospital. Originally selected to include aborigines from all groups and all areas, they receive six months' initial training without pay. Those who pass an examination at the end of their initial training are taken on to the establishment as vacancies occur. Thereafter the majority of the aborigine medical assistants spend periods of three months in charge of a deep jungle medical post, alternating with a three-month period working in Gombak Hospital. While at Gombak they receive further medical training. About 20% of the aborigine staff are girls, who are given additional special training in midwifery.

Over the years it has been found possible to train many of the aborigine staff to positions of skill and responsibility in their own medical service. When in charge of a medical post they are responsible for treating the sick in their area—malaria, scrub typhus, yaws, pneumonia—for deciding who needs to be evacuated to hospital, for operating the wireless set, ensuring that the helicopter landing pad is secure, and for building new landing pads in emergencies. At Gombak Hospital they are now doing staff-nurse duties in charge of wards. Most of the work in the pathology laboratory—haematology, blood bank, bacteriology, parasitology, and some biochemistry—is done by aborigine staff. One has written a paper in a medical journal.² The mass miniature chest x-ray unit that is flown round the jungle is manned entirely by aborigine medical staff.

At first a great risk was taken in attempting to train aborigines, as never before had they been trained for or held positions of responsibility. The success of the present medical service to the aborigines is related to the ability of these people to acquire these skills and responsibilities. But they have additional assets of their own. Being born and bred of the jungle people they are treating, they are trusted, and they alone are able to bring modern medicine through the thick jungle undergrowth of taboos and spirits to the minds and bodies of their sick brethren. The medical staff came from an isolated jungle culture; in their training they have learnt of the advances in medicine in the past 200 years. In treating their people they interpret this knowledge in relation to their own jungle beliefs and in doing so help to educate them. Being at home in the jungle, the medical staff are able to walk miles through the jungle unescorted and without losing their way. With a heavy pack of medicines and rations on their back they cross rivers, balancing on small branches of overhanging trees, shoot rapids on small bamboo rafts, and follow paths through small gaps in the undergrowth that only they can recognize as tracks.

For trained staff the medical service is almost entirely dependent upon volunteers, the majority of whom are from the United Kingdom and the Commonwealth. The British V.S.O. leads with five volunteers—a dentist, two midwives, a laboratory technician, and an occupational therapist. There is a doctor and a midwife from the New Zealand V.S.A. From CARE-Medico there is a Canadian doctor and two nurses, and from the American Peace Corps a radio engineer and a nurse. Additional professional help is received from doctors working in a U.S. army medical research unit and in a unit from the Hooper Foundation (University of California) at the Institute for Medical Research in Kuala Lumpur—a symbiosis in which the aborigine medical service provides the patients and the know-how for research into various aspects of medicine in a jungle setting in return for professional, and also some financial, help.

Wireless Network

All the medical posts, many of the unmanned emergency medical evacuation aid posts, the ambulances, the helicopters, and the medical officers on tour in the jungle are in wireless contact with Gombak Hospital. The wireless station at Gombak is on the air during daylight hours on three different wavelengths. At 8 o'clock each morning a general news broadcast for all medical posts is transmitted, followed by messages for individual posts. The medical posts then call up in alphabetical order, and thereafter switch off their sets. The staff at the medical posts call at other times only when they have important news, such as aircraft movements and requests for evacuation of sick. The ambulance drivers call up at regular intervals during the day for messages of sick to be picked up. The helicopter pilots call up if they need help or have a message to pass. There is a radio set at the helicopter squadron headquarters in Kuala Lumpur listening out on the same wavelength.

The basic wireless sets used are 58 Canadian Marconi CH25 sets with 100-watt U.S.B. output and in the field operated by means of a pedal generator. These sets were donated by the Canadian Government. In addition, there are in use 30 British Redifon 164 sets with a 5-watt A.M. output and 20 BCC156 sets with 1½-watt A.M. output. There are three TRA906 sets with 5-watt U.S.B. output, which are carried by the medical officers on tour. A Peace Corps radio engineer maintains the sets.

Evacuation of Sick

Of the 134 deep jungle posts, clinics, and emergency evacuation points 75 can be reached only by air, 35 can be reached by boat as well as by air, and 22 can be reached by a vehicle with a four-wheel drive. Requests for evacuation of sick by air are made to the R.M.A.F. with an urgency classification. In emergencies the nearest helicopter flies straight to the post and lifts the patient to hospital. No aborigine in the 50,000 square miles of West Malaysia is more than two hours by helicopter from hospital, and an aborigine with a broken back should be in hospital within three hours of the accident. Eight hundred patients a year are flown out of the jungle to hospital. At 10 medical posts on navigable rivers the medical assistant has a small boat which he uses as a travelling dispensary and also to carry the sick to the nearest road.

Three-quarters of the patients admitted to Gombak are picked up by ambulance at the jungle edge. In an attempt to keep the ambulances on the road a vehicle maintenance centre has been opened at Gombak, where the aborigine drivers can be taught to maintain and repair their vehicles. Routine travelling dispensaries visiting the aborigines living in jungle fringe areas were started in three districts but have since been discontinued, as all six ambulances are fully utilized in collecting sick aborigines. With the arrival of six new ambulances in May 1968, a gift from the Canadian Government, all jungle fringe aborigines will be visited regularly by travelling dispensaries consisting of aborigine medical assistants and midwives.

Flying Doctor Visits

The medical officers visit all the medical posts and clinics each month. When he is lifted by helicopter from Gombak Hospital on a Monday morning the doctor leaves the houses, roads, and people of the sophisticated world and in a few minutes is flying over thick jungle valleys broken only by occasional scars of aborigine cultivation. Water sparkles in the sunshine as it falls down from the mountain-side into the fast-flowing river in the valley.

As the helicopter lands on a bamboo pad at a medical post, the aborigines in their loin cloths, blowpipe in hand, are squatting under the tall tree beside the post. They have come down from their houses all round the hillside to await the monthly visit from the outside world. Once their sick have been treated, they start asking questions about the state of the world outside. From their transistor radio they have learnt of turmoil in countries whose names and ideologies mean nothing to them. Their one fear is that if there is trouble near at hand outside the jungle this will lead to hardship again for them in the jungle. A simple answer is not easy, yet their knowledge of the world outside is too limited for them to understand any more. For six days the doctor is lost to the outside world as he flies from one medical post to another, calling in addition at the unmanned pads when requested, holding surgeries, paying staff, delivering and receiving letters, changing the wireless set if necessary, and collecting the parachutes from the ration drops. Sometimes he leaves the helicopter to visit a patient some distance away. Periodically he flies to the jungle edge to drop off a load of patients requiring hospitalization. At night

he stays in one of the posts. By the end of the week, weather permitting, he has visited all the posts north of Kuala Lumpur. The posts to the south are visited by another doctor on an excursion lasting two to three days.

The dental officer also makes periodic visits to the jungle medical posts, extracting teeth, and uses a foot-pedal dental drill in treating dental caries.

Disease Patterns

Clinically the aborigines fall into two groups. One group consists of the deep jungle aborigines living in small units over a large area and at a relatively high altitude—up to 3,500 feet. They normally remain in their hereditary areas and have little contact with other races. They practise shifting cultivation, and are economically self-sufficient. They have small families of one to four children. Their water supply is comparatively pure. Among these aborigines only 3% have an "anaemia threshold" (over 7,000 eggs/g. faeces) hookworm infection. *Ascaris* is only found as a very light infection in 2% of this group.³ Amoebiasis is absent. Non-toxic goitre and chronic parotitis is common.

In the second group are those aborigines living in jungle fringe areas, often behind a Malay village. Although some still depend on the jungle for their livelihood, many tap rubber or find other manual employment outside the jungle. They often have large families. The water supply in many of these communities is contaminated. Five per cent. have an anaemic threshold hookworm infection, and 40% have moderate or heavy *Ascaris* infections (over 8,000 eggs/g. faeces). There is a 6% incidence of large race *Entamoeba histolytica*.³ Amoebic dysentery in the aborigines is often associated with severe anaemia. In 122 histologically proved cases of *E. histolytica* admitted to Gombak Hospital 47% on admission had haematocrit readings of under 31%. Of total hospital admissions only 22% had initial haematocrit readings below 31%.

In the jungle the aborigines grow and cure their own tobacco. From early childhood they smoke heavily. About 90% of all adult aborigines have had chest x-ray examination. Only four cases of carcinoma of the lung have been found, and all these in jungle fringe aborigines with access to commercial tobacco. Neoplasms elsewhere in the body are not uncommon.

Malaria

Malaria was endemic in all aborigine groups. Blood surveys before 1964 showed an average gross single smear parasite rate of between 25 and 65%. Since June 1964 an attempt has been made to give suppressive antimalarial therapy to all the aborigines. Chloroquine 300 mg. plus pyrimethamine 30 mg. (Daraclor) is distributed monthly by the medical staff. At the best, most of the aborigines take this drug most months. This has resulted in an overall fall in the malaria parasite rate for single blood smears to 10%. It is proposed to continue this mass suppressive chemotherapy in every aborigine group until each group has become enveloped in the national malaria eradication programme.

Tuberculosis

A mass miniature x-ray machine, received in 1962, has been taken to all aborigine groups—by helicopter to those living in deep jungle areas and by lorry to those living in jungle fringe areas. Subject to the availability of helicopters, aborigines in most areas are given a chest x-ray examination every two years. A total of 45,000 chest x-ray examinations has been made, and it is estimated that 90% of the adult aborigine population of 20,000 has received at least one such examination. Of those found to have abnormal x-ray pictures 80% have eventually been investigated further, either on admission to Gombak Hospital or by subsequent mass x-ray examination. The

majority of the remaining 20% died before further investigation was possible. In 1962 the prevalence of tuberculosis in Kelantan State, all deep jungle aborigines, was 7%, with 2% sputum positive. In Selangor State, all fringe aborigines, the prevalence was 2%, with 0.8% sputum positive. By 1966 the prevalence in each area had been halved.

Mass immunization with B.C.G. has been given to aborigine children. Where Mantoux tests have been given three months after the B.C.G. inoculation the conversion rate has been only 30%. Since 1961 all aborigines with tuberculosis, if willing, have been given initial treatment in hospital—for six to eight weeks in the case of sputum-negative patients and from four to ten months with sputum-positive patients. Thereafter out-patient chemotherapy is continued until the disease is considered radiologically stable on serial x-ray films. In the event of a patient missing a visit of the mass x-ray team, chemotherapy is continued indefinitely pending a new x-ray examination. Of the 732 aborigines diagnosed as suffering from tuberculosis since 1960 415 are still receiving treatment, 203 are radiologically inactive and off treatment, and 114 have died. Contact has not been lost with any of them.

Leprosy

Leprosy is found only in the aborigines living in the jungle fringe areas, especially where there is some intermarriage with the Chinese community. New cases are discovered at an annual rate of 0.6 per 1,000, with two cases of tuberculoid leprosy to one of lepromatous. Five per cent. of the cases are of early indeterminate lesions. There are twice as many cases diagnosed in males as in females. There are few social stigmas attached to leprosy among the aborigines, and in the majority of cases the patient presents himself for treatment with the correct diagnosis.

Maternity and Child Welfare

Indigenous antenatal care among the aborigines is non-existent. Almost all children are breast-fed for two to four years. Statistics have been collected from the aborigine women who have been delivered at Gombak Hospital. These people represent the more sophisticated and health conscious among

aborigine womanhood. Of the 2,600 children previously born to these 700 women the infant mortality was 136 per 1,000, and the total death rate by the age of 5 was 221 per 1,000.

The maternity unit was started at Gombak Hospital in 1963, when aborigine girls were taken on to the staff and trained as midwives. At first it was difficult to persuade aborigine women to ignore the pleas of their parents and leave behind rituals connected with childbirth to come to hospital. The first to come were aborigine women from the jungle fringe areas, but now gradually women from deeper and deeper in the jungle are consenting to come to Gombak for parturition. For the past two years 25% of aborigine births have taken place at Gombak Hospital. The neonatal mortality with hospital births at 50 per 1,000 is disappointing. With 30% of births premature and 5% under 4 lb., prematurity is the greatest source of neonatal mortality.

There is no population explosion among the aborigines, but some of the fringe aborigines have large families, and for socio-medical reasons benefit from birth control. In 1964 and 1965 "Ovulen" tablets were given to 99 aborigine women with little success. Now in 1968 only 11 of these women are still taking the tablets, and 37 had stopped taking them because they had become pregnant again. The intrauterine device (Lippes Loop) is ideal, easy to insert, and easy to remove when required; 125 aborigine women have been fitted in the period 1965 to 1967. Only two have since requested the loop to be removed. No known pregnancies and no symptoms have been reported.

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REFERENCES

- ¹ Polunin, I. (1953). *Med. J. Malaya*, 8, 55.
- ² Onyah s/o Itam (1967). *Med. J. Malaya*, 21, 384.
- ³ Dunn, F. L., personal communication.

MEDICINE AND THE COMPUTER

I—Managing a County Health Service

[FROM A SPECIAL CORRESPONDENT]

Computers were introduced into medicine only relatively recently in Britain—some eight years ago. Despite this, however, their use has grown rapidly, and in the clinical field they are at present used in at least four main ways: storage and analysis of records; statistical surveys; together with automation in the laboratory; and diagnosis. Many units are now working on one or several of these applications, and to try to get some idea of the present position I visited several centres up and down the country.

One application which has captured the attention of both public and doctors has been computer control of immunization schedules. Although most parents want children immunized, and doctors are keen on doing this, the actual proportion of children who are fully protected remains disappointingly low. One major cause of this is of course administrative. As Dr.

T. McL. Galloway, the medical officer of health for West Sussex, once wrote, "However ingenious a manual-clerical system may be, the monthly chore of searching thousands of records to identify those due for a service, what this service is, where and when it is to be given, making appointments, and coping with non-attenders is a recurring labour which even if done well in health departments and clinics is immensely time-consuming and beyond all but the very few family doctors who are not only unusually well organized but prevention-minded." The problem is made worse by the parents' difficulties in keeping track of whether their children have been vaccinated and immunized or not.

In West Sussex most of the administrative problems have now been overcome by the use of a computer. In the four years since this was installed in 1962 the vaccination and