establish itself as a specialty in its own right. General practice ought no longer to accept doctors with less than appropriate clinical hospital training: it should no longer be prepared to be some sort of dump for people who had given up hope of achieving specialist status. As a consequence of the claim a compulsory training scheme was set up and is now in action—though each vacant training post attracts enormous numbers of applicants, over 100 being by no means an exception.

If regulations are now dispensed with it is feared that the desired end of improving standards of general practice will be jeopardized. If principles are thrown overboard it might prove

difficult to recover them. A mere defeatist attitude is, of course, not tenable, and those responsible for taking the decisions are engaged in thoughtful negotiations which I hope will lead to a reasonable solution.

In the meantime some of our young doctors emigrate, temporarily or maybe for good, but evidently too few to solve the problems of the surplus. And this is understandable. Seven or eight years ago students were welcomed at Danish universities, so they now expect that their skills may be applied in their own country, and not somewhere on the opposite side of Mother Earth.

Medicine in the Tropics

Reorganization of a Nutrition Unit in Papua New Guinea

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Summary

Adequate nutrition is a medical priority. It has been estimated that more than half the children in the Chimbu District of Papua New Guinea are malnourished. A practical scheme to combat poor nutrition there was based on emphasizing the value of breast-feeding and of locally grown foods. The daily menu given was the same, with three meals each day. The scheme's underlying principles can be adapted for any developing country or for migrant and other minority groups in a developed country.

Introduction

The Chimbu District in the Central Highlands of Papua New Guinea is a mountainous region of 2300 square miles (6000 km²) supporting a population of 163 000 people, of whom 27% at the 1971 census were children under the age of 6 years. Venkatchalan¹ reported an incidence of 1.7% kwashiorkor and 5.8% marasmus in the district. Though records of weight against age kept by the maternity and child health (M.C.H.) sisters have shown an improvement in recent years (at least among the 30% of children who attend the village clinics), the toddler (1 to 4 years of age) mortality rate for the district was 1.5% in 1972.² (A rate greater than 1% is regarded as an index of a significant nutritional problem. The rate in "developed" countries is 0.1%.)

However, various degrees of malnutrition obviously occur before the manifest signs of kwashiorkor and marasmus, and growth studies suggest that more than half the children between 1 and 2 years of age are malnourished. As malnutrition has been linked with growth retardation, increased infection, and possibly mental retardation,³ it would appear to be a medical priority.

Hospital Nutrition Unit

At the beginning of 1973 the nutrition unit in the district hospital at Kundiawa consisted of a ward, with an average of 15 patients and their various relations, and a small room off the main kitchen where meals were prepared. Children were referred to the ward by M.C.H. sisters from village clinics, or brought by missionaries and patrol officers or transferred from the general paediatric ward. Weekly weighing sessions showed that, while most of the children maintained their weight, few gained and some even lost ground.

The ward was run by six nurse-aides, few of whom could read. Observation showed that they spent considerable time in giving and charting carefully measured quantities of vitamin drops, cod-liver oil, and iron elixir. This took priority over food. Each child was given milk with meals, but in spite of repeated demonstration the dilution varied considerably. This was reflected in the irregular weight gains.

A sister supervised the unit, but it proved impossible to keep one for longer than two months before transfer. Moreover, several were men and showed complete apathy towards nutrition. Owing to the amount of work the doctors could give only minimal supervision. So it was essential to devise a programme with a simple monotonous routine which could be maintained by nurse-aides. The aim was to improve the nutritional state of the child while in the ward and to teach the mothers so that the improvement could be continued after discharge.

Communication was important. The sisters were from the coast and did not speak the local language, Kuman. When off duty they tended to remain aloof in the sisters' home. In contrast, the nurse-aides were from the local villages, so spoke Kuman, and were able to give us invaluable background information. Owing to their hospital work they were highly respected and were able to communicate our ideas to the villagers by putting ward methods into practice with their own families.

Nutrition in the General Population

The main meal is taken in the cool of the evening and generally consists of sweet potato (kau-kau), occasionally pumpkin, and green leafy vegetables. These are either boiled or baked in an earth-oven. Pig is reserved for infrequent festive occasions. In the morning a cold lump of kau-kau, left over from the evening

meal, may be eaten, and during the day snacks of banana, paw-paw, and pineapple. Vines⁴ estimated that 96.4% of the diet by weight was kau-kau. This contains an average of 1.3 g protein per 100 g wet weight.⁵ Fats form less than 5% of the calories consumed.³ There is a widespread moderate hypochromic anaemia of 9.5–10 g/dl among the children admitted; it is thought to be due to multifactorial nutritional deficiencies. Serum iron levels are reported to be normal.⁶ Surprisingly, though the diet is almost completely devoid of vitamins A and D, little clinical evidence of deficiency is reported.

The Departments of Public Health and Agriculture, Stock, and Fisheries have encouraged the planting of high protein legumes, locally known as "strong" beans (e.g., wing beans, *Psophocampus tetragonolobus*, containing 8.4% protein by weight) and of pumpkin and peanuts. Unfortunately much of the value of the peanuts is lost as they tend to be eaten raw. Cheap tins of mackerel are available in the stores and have become for the more urbanized a regular part of the diet. The Departments are also encouraging chicken rearing.

Solution Attempted

MEDICATIONS

A haemoglobin estimation was made on admission and "total dose" intramuscular iron (weight in kg $\times$ 2/3 ml) given in the first few days. A repeat haemoglobin estimation after one week would always show increase, whereas previous results after a month of oral iron had seldom shown improvement. Occasionally a blood transfusion was given. The criteria for this were (1) a haemoglobin below 7 g/dl, (2) a haemoglobin between 7 and 9 g/dl in a child who was miserable and refusing to eat, (3) kwashiorkor as distinct from marasmus. This greatly increased the child's liveliness and appetite, and the expense of the transfusion was easily counterbalanced by quicker progress in the initial stages.

Blood samples were routinely examined for malarial parasites on admission, and treatment was given if necessary. The vitamin drops and cod-liver oil were discontinued. We believed that sufficient would be provided in the food and that it was important to emphasize to mothers that it was the food and not pills that was making the children better.

If round worms ("snakes") were reported, piperazine was given. Ideally stool specimens should have been collected from each child and examined for hookworm, but logistically this proved impossible. However, a small survey which we completed showed that no child under 5 had sufficient hookworm to warrant treatment. So specimens were examined only in the few patients admitted who were above this age or who showed an unusual degree of anaemia. Though pamphlets distributed by the Public Health Department recommended the routine use of antibiotics on admission, this was seldom found necessary. The majority of patients required only intramuscular iron injections for the first few days. This left the nursing staff free to concentrate on feeding and teaching.

FOOD PROGRAMME

Apart from slight variations in the availability of foods the menu to be followed was the same each day. As a report linked infant malnutrition with infrequent feeding,⁷ the M.C.H. had encouraged mothers to provide three meals a day instead of the one large evening meal. We adopted this policy, giving meals at 9 a.m., 2 p.m., and 6 p.m. Frequent snacks were given between meals, but owing to lack of staff no food was given between 6 p.m. and 7 a.m.

The programme was colourfully painted on two large boards in the kitchen. The board on the left was kept as simple as

possible and served as a reminder to the nurse-aides. On the right detailed information of quantities and cooking instructions were given for the sisters.

With the exception of high-protein biscuits, which were readily available to the hospital and popular with the children, all the food was obtained locally. The staff would buy the necessary vegetables from the market, which was held twice a week in Kundiawa. The nurses are respected, and the other women would carefully note their purchases. In particular they bought large quantities of green leafy vegetables (kumu), pumpkin, and "strong" beans. More of these vegetables were grown to meet our demands. We believed that this was such an effective method of teaching that we tactfully refused an offer from a plantation to supply vegetables at a reduced price. Attempts to grow high-protein vegetables on hospital ground, and so demonstrate the techniques required, were thwarted by pilfering.

Regrettably, the local people have observed that many of the bouncy, healthy expatriate babies are fed by bottle and have adopted this method. The nurses of Papua New Guinea are among the country's elite, and their actions are similarly observed by their countrywomen. Many of these nurses have children soon after qualifying and owing to the shortage of trained staff are encouraged to return to work. The babies are thus often bottle-fed while their mothers are on duty. But the average village woman does not understand the importance of quantities and dilutions. Bottles are seldom adequately washed, let alone sterilized; and once a bottle has been filled, it will be allowed to roll around the bottom of a large string bag, together with scraps of paper, rags, vegetables, and the baby. These babies get recurrent gastroenteritis and fail to thrive, so bottle-feeding is anathema to all paediatricians in this country.

With this in mind we stopped the preparation of milk except for orphans under 6 months old. Such babies would usually stay only 7–10 days before the relatives decided who would adopt them. We encouraged the new mother to stay for a few days and observe the catering. They all managed to breast-feed their adopted child even if they had previously had none. But the quality is probably inferior, as follow-up studies in M.C.H. clinics showed that these children did not gain weight as readily as others. But the children admitted to the unit were underweight, generally below the third percentile on W.H.O. charts, and they needed extra protein and fat, so oil and skimmed-milk powder were added to the food. On leaving the ward mothers were given a tin of skimmed-milk powder and could obtain more from M.C.H. clinics.

The mothers prepared the food under the nurses' supervision. They were shown how to cook and how to add peanuts to food after crushing them between leaves with stones. At the end of a meal when a child refused to have any more he would often absent-mindedly nibble at beans if they were placed in his hands.

TEACHING

As mentioned above, the mothers themselves prepared the food under supervision. The children ate their meals in the kitchen, where they could be observed. The mothers and older siblings were allowed to consume what the children did not finish, so developing, we hoped, a taste for it.

We made no attempt to teach about calories and proteins but emphasized the need to give frequent small meals with as great a variety of foods as possible.

Teaching boards were painted by local high-school boys and suspended in the ward. Two of these showed healthy, chubby babies together with drawings of nutritious foods. The third depicted a thoroughly miserable, marasmic child with "bad foods"—e.g., milk in babies' bottles, food covered by flies, and coca-cola, which is expensive and nutritionally unsuitable for these babies. These boards were used as a basis for teaching the mothers during the day. In the evenings we hoped they might observe them and remember a little.

Discussion

Throughout the programme emphasis was placed on the use of foods which were available locally, so that the menus could be continued at home. In the ward it was essential to obtain rapid observable results.

Scientific evaluation of the programme proved difficult in this setting. We used W.H.O. charts of height and weight for assessment, but they were of little assistance, as we seldom knew the child's date of birth, and dental assessments were found to be inaccurate. However, the children rapidly gained weight, an average of 300–400 g per week among the toddlers. Though the scale-reading meant little to the mothers, the increase in the child's size was readily apparent. Generally after four weeks in the unit the mid-arm circumference would start to increase and we discharged the child. Even if we did not, the mothers, feeling the pull of remaining children and the need to check on wayward husbands and tend their gardens, would leave of their own accord after one month. By this time a child would expect frequent meals and pester his mother for food. We hoped this would continue at home.

Conventional follow-up studies also proved impossible, but long-term results were seen in subtle ways, such as the increased production of beans in the markets. When a mother returns to the village, the other women gather round, examining the child and demanding details of treatment. For a few moments she is the focus of attention, and she delightedly tells them with expressive gesticulations. Women subsequently admitted would repeat the descriptions to us. This evidence of communication was most encouraging. So too was the occasion when a village councillor brought a malnourished child and asked if we could repeat the treatment we had given to another in the village.

Throughout the programme the importance of communicating with the whole community was stressed. Teachers, community health workers, and missionaries were encouraged to visit.

We hoped that the elements of nutrition and hygiene might be gleaned by involving other people such as the high-school boys who painted the boards.

This simple scheme proved remarkably successful in combating malnutrition. The diet used foods which were available in the district, so it is unlikely that it could be used in exactly the same form in a different locality. But the scheme is presented for the ideas which led to the development of the regimen, as these can be applied to any group suffering from malnutrition.

This programme was devised with the assistance of Sister Mary-Rose Wilson and with encouragement from Dr. John Rooney and Sister Barbara Mole.

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Conversations with Consultants

Miss Nightingale has Fled

FROM A SPECIAL CORRESPONDENT

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"I turned to ask sister a question during my regular ward round and she had gone—off duty, I was told." Thus was this physician, his formative professional years spent among nurses of the Nightingale mould, abruptly reminded that an era had ended. Continuity of patient care, as epitomized by the ubiquitous sister, had, in his eyes, been fractured beyond repair.

Nursing standards as such are still reasonable, he thought, vastly better, for example, than the nursing he had experienced when working in North America during the mid-sixties. But Miss Nightingale had fled and the long admired dedication had vanished with her. His four colleagues round the table agreed. Though the pleasant provincial town in which they worked had barely been touched by the union militancy endemic in city hospitals, medical as well as nursing traditions had changed. There was general consent among the group to the verdict that while the younger doctors were good, competent professionals on duty, when they were off, they were off.

The radiologist, appointed recently from a London teaching

hospital, wondered whether the extra duty scheme had influenced junior attitudes. As a senior registrar he had noticed friction among the training staff in different specialties and some of those in the "have not" specialties had become a little disgruntled. But he did not criticize the juniors' take home pay—indeed no one present thought their pay too high taking account of the hours worked and outside comparisons. "I would almost certainly have no S.H.O.," added the E.N.T. surgeon, "were it not for the extra duty scheme. My present S.H.O. has received about £100 from this source every six weeks." The local hospitals had pioneered married accommodation for training staff and on the whole there seemed no great difficulty in recruiting doctors, many of them home grown, and there was praise for the quality of the women.

Sandwich Generation

The physician was outspoken in stating that consultants were badly underpaid in comparison with the training grades. In his