will be difficult to identify and to manage satisfactorily.

Shands *et al*⁵ got it just right when they advised not telling patients more than they ask. By avoiding the conviction that everyone (or no one) should be told or that anyone has the power to perceive whom to tell, it should be possible to approach the theoretical ideal, when patients accept or even approve of what is said and where a minimum need the safety-net of "denial" because the truth is too much to bear. Some patients really do prefer uncertainty, and no one would care to be guilty of aggravating their suffering.

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Outside Europe

Problems of haematology training in developing countries

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The senior haematologists in the main teaching hospitals in Bangkok have been trained either in the United States or in the United Kingdom and are up-to-date in modern haematology. Haematology is taught to medical students, interns, and residents in much the same way as in Western countries, and includes morphology, biochemistry, immunology, and principles of nuclear medicine.

After so much time and effort we have realised, to our great disappointment, that this teaching has failed to have any impact on health services outside the university. Doctors generally are not able to provide appropriate haematological services. After a few decades of modern haematology teaching, there is no evidence that the high incidence of anaemia among the vast rural population has decreased. It is important to analyse the causes of this failure and to recommend remedies.

The scene

Thailand has 46 million people, of whom 85% are farmers and poor. Administratively the country is divided into 72 provinces, 674 districts, 5500 tambons (groups of villages) and 50 000 villages. There are few doctors, and their distribution is the reverse of the density of the population. Of the 8800 doctors in the country, 1500 are in the United States, about 5000 are in Bangkok, 1800 in the provincial towns, and fewer than 500 in the district hospitals. About 20 million people in over 300 districts have no doctor, while most district hospitals have only one, who has to look after 50 000-100 000 people or more.

Laboratory services in general are poor. There are few medical technologists in the provincial hospitals and none in the district hospitals.

Water and food-borne diseases and parasitic diseases are rampant. Haematological diseases include most of those seen in Western

countries. Those important to public health are anaemia, thalassaemia, and glucose-6-phosphate dehydrogenase deficiency. On average, 40% of the farmers are anaemic, and in very poor villages the prevalence is over 90%. In each generation over 500 000 individuals are born with thalassaemic diseases (not traits). In the male population in the north-eastern part of the country up to 15% suffer from G6PD deficiency.

Causes of failure

Some of the reasons for the failure of haematology teaching to have an impact on the health services of the country are as follows.

LABORATORY SCIENCE ONLY

Haematology in Western countries is practised largely as a laboratory science based on the principles of morphology, biochemistry, immunology, and nuclear medicine. Morphological haematology is so fundamental to trained haematologists that they have failed to realise that this is an extremely difficult skill for doctors in general, who are not capable of proper blood smear interpretation, despite some training in this while at medical school.

Actually, many haematological problems in developing countries can be handled without laboratory tests. A patient with hookworm anaemia in New York would probably be "investigated" thoroughly, including red cell size measurement, serum iron study, serum ferritin determination, etc. But in Thailand the many millions of such cases must be handled differently, perhaps without even looking at the red cell morphology. A boy with intermittent bleeding since birth associated with joint swelling and family history can be diagnosed as having haemophilia; in a crisis fresh frozen plasma or cryoprecipitate may be given at district hospitals, although haemophilia has not been proved by factor VIII assay, which is not available there.

Acute haemoglobinuria after acute infection or drugs, or both, in a man will probably be due to G6PD deficiency and may be handled accordingly. There are many millions of such cases in Thailand. If all diagnoses had to be proved in a laboratory the country would go bankrupt.

"Investigative" haematology is too costly for developing countries. It has scared off most doctors, who do not want to tackle haematologi-

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cal problems when they practise in localities without laboratory facilities. They are already overwhelmed with primary medical care and acute problems because of the shortage of doctors and other health personnel.

DISEASE-ORIENTATED RATHER THAN PROBLEM-ORIENTATED

Like most teaching in medicine, haematology teaching has been disease-orientated rather than problem-orientated. The multiplicity of diseases affecting all the blood cell types, each with various cellular and subcellular pathologies, tends to make haematology too complex to "memorise." This has discouraged doctors from handling haematological problems.

DOCTOR AS ONLY CURATOR OF HEALTH

Too much emphasis has been placed on the doctor as the only curator of health. On the one hand, many common problems can be and should be handled by paramedical or auxiliary personnel, but not enough attention has been paid to them. On the other hand, some of the haematological problems are too difficult for doctors in general to handle. For example, treatment of leukaemia requires laboratory follow-ups, expensive antileukaemic drugs, and antibiotics. The district and provincial hospitals are not able to treat leukaemia as this would require a special haematology unit with well-trained haematologists at regional medical centres. Yet so much time and effort is spent in teaching about leukaemia to medical students, interns, and residents who will become general doctors, while there is no specialised training of haematologists who could work in regional medical centres. In developing countries with a scarcity of doctors it is not yet time to train specialist haematologists.

It is thus ironic that laboratory-orientated haematology teaching has been devoted almost exclusively to the category of doctors who will not use that training to advantage. What are required are both fewer and more advanced levels of teaching that would have more impact on haematological services.

Attempts at remedy

Several attempts have been made to tackle these problems and we give examples of three of them.

COMMUNITY VOLUNTEER TRAINING

To promote primary health care village health volunteers are being trained. In Thailand Buddhist monks represent an important community resource. Over 200 000 are scattered in more than 26 000 temples throughout the country, and we have been training the monks in primary health care. A simple approach to hookworm iron deficiency anaemia has been taught to the volunteers. While advanced teaching about anaemia in the medical schools over the past 20 years has not resulted in any improvement of anaemia among the rural population, benefit has come from the simple "non-morphological haematology" taught to community volunteers. One monk has written: "Doctor, since I have been trained with you I have noticed that many farmers are pale and weak. I gave ferrous sulphate tablets to them and they became stronger. Now a lot of them are coming to me for help. Could you send me more tablets of ferrous sulphate." Books and handbooks have also been published, and a magazine called *Folk Doctor* is widely distributed with one of us (PW) as editor and publisher.

TRAINING OF COMMUNITY LABORATORY ASSISTANTS

At the district hospital level laboratory services are almost non-existent. Qualified medical technologists are not available. The more advanced and prolonged their study in the universities the less they are willing to work in the rural districts. District doctors have to do simple laboratory tests themselves when necessary—for instance, blood grouping and cross-matching for blood transfusions to patients in shock from acute blood loss. But they are overwhelmed with too many other chores, which results in medical services of poor quality.

We have conducted experimental training of community laboratory assistants. The trainees, boys and girls or midwives or health workers

selected by the district doctors, are trained for three months in simple diagnostic techniques such as examinations of urine, stool, sputum, and blood. Specific competence in each procedure is tested for before "graduation." For example, in haematology all must be able to undertake ABO blood grouping and cross-matching, measure haemoglobin concentration and packed cell volume, and white cell count, and interpret blood smears for iron deficiency anaemia, thalassaemia, and thrombocytopenia.

There is no problem persuading them to stay in the districts. They have not lived in Bangkok during their training period long enough to alienate them from their rural home.

PROBLEM-ORIENTATED TEACHING APPROACHES

Numerous haematological diseases lead to a few problems—for instance anaemia, bleeding, enlarged lymph nodes, abdominal masses, dark-coloured urine, and oedema of feet and ankles. Management of these problems depends on the knowledge and skills of the individuals concerned with the complexities of the problems and available facilities. With problem-orientated approaches, however, doctors often feel helpless.

We have taught problem-orientated approaches in haematology for some years and have written a handbook on this basis. Haematology has thus become less formidable to the doctors, and they have been encouraged to do something for the patients in various settings.

Recommendations

In any society an appropriate system of health care should consist of four related levels—primary health care, primary medical care, secondary medical care, and tertiary medical care. In each country haematology training should be designed to fit into this system. For developing countries with similar problems to those of Thailand we recommend the following.

(1) For primary health care the local people and volunteers should be educated as much as possible to handle common haematological problems without any laboratory tests.

(2) Nurse practitioners and paramedical and auxiliary health personnel should be trained to handle common haematological problems without laboratory support but with a few simple tests only.

(3) If medical technologists or laboratory technicians are not available in district hospitals short-term haematology training based on competency should be organised for local boys and girls with middle or general education. The community laboratory assistants should then be replaced by these more experienced laboratory personnel or advance to this level themselves if they are capable enough.

(4) As doctors in developing countries tend to be less competent in laboratory haematology, medical technologists should be better trained in haematology. It is not enough for them to report "numbers," they should also understand haematological diseases and problems of the country so that they can help doctors to make better decisions. A postgraduate haematology course, perhaps for two to three months, should be organised for medical technologists.

(5) For teaching-training of the medical students, interns, residents, or practising physicians, laboratory haematology and detailed treatment of difficult problems, such as leukaemia, should be played down and not emphasised. Concepts, haematological problem-orientated approaches, and the handling of haematological problems of public health importance should be emphasised.

(6) Specialists in haematology should be well trained and work in regional medical centres. Haematology centres in the country should be reasonably well equipped. They should take care of patients with difficult haematological problems, do research to understand country problems, set up a network of haematology quality control, and organise and support appropriate haematology training as outlined in this review.

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