Memorandum on Leprosy Control

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MEMORANDUM ON
LEPROSY CONTROL

by

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If existing knowledge about leprosy were conscientiously and persistently applied, the disease could be controlled in our generation and eradicated in the next.

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FOREWORD

PURPOSE OF THE MEMORANDUM

by

DR. W. R. AYKROYD

This memorandum outlines in simple and largely non-technical language the modern approach to leprosy control. Charitable agencies, missionary societies and even public health departments are often not properly aware of the progress achieved in control during recent decades, and advance is unnecessarily retarded by obsolete ideas and methods. Oxfam itself receives requests from many parts of the world for help in leprosy work and is under an obligation to ensure that the limited sums which it can devote to leprosy are spent to the best advantage.

The memorandum is intended, in the first place, for the guidance of Oxfam Field Directors, Committees and Headquarters staff when handling requests for assistance in this field. Further, it is intended to indicate, to those who put forward the requests, the lines which Oxfam is attempting to follow and the kinds of programme it will be most ready to support. Apart from these internal purposes, the Medical Panel believes that the memorandum will be of interest and value to workers in different countries concerned in one way or another with the problem of leprosy.

In 1968 Oxfam issued a booklet* on tuberculosis designed for similar purposes. The large circulation of this booklet suggests that a parallel one on leprosy will be greatly in demand. Oxfam is most grateful to Dr. Browne for having prepared this memorandum. His long and wide specialised

**Memorandum on Tuberculosis in Developing Countries* by Christine E. Cooper. Paediatrician, Department of Child Health, University of Newcastle-upon-Tyne. Consultant Paediatrician to the Government in Sierra Leone.

experience indicate his suitability for the task, while his position as Medical Secretary of LEPRA and Medical Consultant to The Leprosy Mission is witness to the fact that the publication of the memorandum is in effect a joint undertaking on the part of LEPRA, The Leprosy Mission and Oxfam.

The memorandum begins and ends with a declaration about the eradication of leprosy. This is the first moment in the long history of the disease that so inspiring a statement can be made.

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MEMORANDUM ON LEPROSY CONTROL

Medical attitudes towards leprosy control—like popular thinking on anything to do with leprosy—fluctuate widely between the extremes of easy optimism and despairing resignation. Exact information on any aspect of leprosy may not only be difficult to come by, but it may not be available or indeed obtainable. Enough is known, however, of the size of the leprosy problem and the efficacy of treatment and control measures, to provide the basis for a determined attack on a disease that has so far resisted the combined efforts of official bodies and voluntary agencies.

Size of the problem

For most countries, precise statistics of the number of leprosy sufferers are not known, but in the world as a whole a total of 15 million is probably an underestimate. There is always more leprosy in a country than early guesses indicate, sometimes much more. In the world the numbers are probably increasing. There are several reasons for this: despite the fact that a good drug has been available for over twenty years and that during this time some millions have been cured of leprosy, in very few countries have leprosy control schemes been successfully organized. In precisely those countries that have a big leprosy problem on their hands, medical facilities in general are inadequate (especially for people living away from the large towns), the population is increasing (that is, there are more people to catch leprosy), the span of life is lengthening (more people are being exposed to leprosy for longer), and clothed leprosy patients in the growing towns not only conceal the signs of leprosy more easily, but often they are not surrounded by good neighbours from their own tribal group. In addition, in some countries the leprosy campaign has shared with rural health services and preventive medicine in general the budgetary restrictions due to an over-emphasis on curative medicine in large central hospitals.

Estimating the prevalence of leprosy

For the diagnosis of past or present leprosy infection, no

skin test (like the Heaf or Mantoux test for tuberculosis) is known, nor is there a specific serological test (like those for syphilis). Sample surveys of typical populations indicate approximate prevalence rates. When treatment is provided, and later is seen to be effective, and when facilities for reconstructive surgery and social rehabilitation are made available, more people suffering from active leprosy and from the results of past leprosy come forward for treatment.

Importance of leprosy

Leprosy is important not because it kills (like malaria, or tuberculosis), or because it is highly contagious (like smallpox), or because it attacks whole populations (like schistosomiasis), or because it is responsible for epidemics (like cholera or measles) or for pandemics (like influenza).

Leprosy is important because it cripples. It vies with poliomyelitis as the world's greatest crippler. If crippling includes impairment of sensation, then about a quarter of those suffering from leprosy are crippled. Leprosy is thus the cause of grave economic loss in many developing countries: instead of producing, of contributing to the community, the crippled victim of leprosy makes demands on his healthy fellows for food, shelter and medical care. All this is quite apart from the human tragedies that result from a disease that has serious social consequences for the patient and his family.

Bases of control

In any given situation, there is one ideal combination of methods that will make for effective leprosy control (Browne, 1968). Many ambitious and costly schemes founder because they are partial or ill-balanced or fail to take cognizance of some important factor or factors. These factors must be taken into account in preparing any scheme for leprosy control.

* * * *

To make this Memorandum more helpful to non-medical readers, some terms in common use by workers in leprosy need explanation.

Indeterminate leprosy is the earliest manifestation. It is non-contagious, frequently self-healing, and may develop into one or other of the following types:

Tuberculoid leprosy is the commonest type in many countries. For all practical purposes, it may be regarded as non-contagious. It is often self-healing, but it may be accompanied by severe nerve damage.

Borderline (dimorphous) is an intermediate type, sometimes almost tuberculoid, sometimes almost lepromatous, or anything in between. It is contagious, often tends to become worse (i.e. more like lepromatous leprosy), shows no tendency to self-healing, has a varied and unpredictable course, and is frequently accompanied by early, widespread and progressive nerve damage.

Lepromatous leprosy begins insidiously and may smoulder for years as symptomless patches in the skin. It is contagious, through the skin and nasal discharges. It shows no tendency to self-healing, and nerve damage is late and widespread, usually symmetrical. Borderline and lepromatous leprosy are commoner among the lighter Mongolian and Caucasian races than in the dark skinned. These forms tend to be more severe in their systemic effects, and to be more frequently accompanied by damage to eyes and peripheral nerves. They are in the main responsible for the continuation of the leprosy endemic in any community.

The **lepromatous/tuberculoid ratio** is the expression of the ratio between the numbers of patients with lepromatous leprosy and those with tuberculoid leprosy. In some countries and in order to convey a more accurate impression of the seriousness of the leprosy situation, the term lepromatous will include all patients suffering from the contagious forms of leprosy, and the term tuberculoid will include all the others.

"Open" disease is an administrative term denoting that form of leprosy in which the patient sheds living organisms from the nose and skin: in other words, he is contagious. **"Closed"** indicates that, whatever the appearances, the patient cannot be the source of contagion to others because he is not shedding live organisms from his body. The vast majority of leprosy organisms near the surface of the body are rendered incapable of living (and hence, of multiplying) after a few months of treatment, though it may be years before the last remnants of dead bacilli disappear from the tissues.

The **bacterial (or bacillary) index (B.I.)** is an arithmetical indication of the concentration of leprosy bacilli (alive or dead) at the various sites (in skin and nose) examined. The higher the index, the greater the concentration.

The **morphological index (M.I.)** is the percentage of the total numbers of leprosy bacilli examined that may be regarded as having been living when removed from the body.

The **slit-smear technique** is the method of obtaining representative amounts of material from the deep layers of the skin or lining of the nose, and staining them so that the leprosy bacilli present may be examined (M.I.) and their concentration determined (B.I.).

Barrier nursing refers to the nursing of a patient suffering from an infectious disease in such a way that the risk of his passing on the disease to other patients in the same ward is effectively reduced. Precautions are taken that all articles that may be contaminated by infective matter (excreta, discharge from wounds, expired air, nurse's uniforms, etc.) are so treated that they will not convey the infection.

The word "leprosy" is frequently used in a loose way: it means different things to different people. It includes any or all of the following:

1. **A disease** transmissible with difficulty, caused by a specific micro-organism *(Mycobacterium leprae)* that is passed on by patients suffering from lepromatous or borderline leprosy ("open cases") to susceptible contacts.

2. **A clinical condition** exhibiting the widest divergence in host-parasite relation—from a tissue reaction against scanty dead organisms, to a bulky mass full of bacilli that invades the skin and the mucosa of the upper respiratory tract.

3. **A destroyer of peripheral nerves**. Interruption of sensory and motor pathways leads to loss of feeling, ulcerations, contractures and painless deformities of hands, feet and face.

4. **A state of tissue sensitivity,** especially of certain structures in the eyes (the iris and ciliary body), and of the main nerve trunks of the limbs and face (hence, acute peripheral neuritis). This state is sometimes characterized by prolonged and severe illness.

5. **A condition, half disease and half myth, surrounded by numerous fears and superstitions,** and accompanied by psychological disturbance and social dislocation that result not only from the disease itself, but also from community pressures.

Aims and objectives of leprosy control

When we talk of "leprosy control", we are really referring to the prevention of the spread of a disease that is not very "catching". But there is more to it than this simple statement indicates.

A clear definition of the objectives of leprosy control in any given situation would at once reveal the inadequate planning and sentimental basis of much that goes for leprosy work. Granted, ideas may differ: one voluntary agency may set much store on such salvaging operations as custodial care for the hopelessly crippled or blind or outcast; another centre

may feel in duty bound to concentrate on reconstructive surgery; and another on bringing leprosy treatment rapidly within the reach of everyone needing it in a given area. In some circumstances, a school for children with leprosy may be a social necessity; elsewhere, it may be an expensive anachronism whose construction is to be deprecated.

Some activities of some voluntary organizations may be commendably philanthropic and altruistic, but have little bearing on the control of leprosy or on the prevention of the disease in the community. In general, voluntary agencies are able to show more initiative and flexibility than governments, but some may be tardy in adapting themselves to modern views on leprosy control.

The cost/benefit or cost/effectiveness of leprosy control schemes must be estimated, notwithstanding differences of objectives, methods and standards of care.

Possible methods of control

The control of leprosy as a slightly contagious disease could depend upon some or all of the following measures, enumerated in ascending order of practicability at the present time and in the present state of knowledge.

1. **Segregation of all leprosy patients,** or at least of all contagious leprosy patients, either forcibly or voluntarily. This measure is quite impossible of application in any developing country. It is too costly, leads to concealment of leprosy (especially early and contagious and treatable leprosy) and has never really worked where it has been tried.

2. **Raising the general standard of living and hygiene,** and the abolition of domestic overcrowding. Historically, this may explain the decline of leprosy in the north-west of Europe and point the way to control elsewhere. This is a long-term development. At present, in most countries where leprosy is a serious problem, it is impossible.

3. **Prophylactic dapsone administration** (in graduated doses

and entailing twice weekly oral dapsone for an unknown but lengthy period). This has been shown by Dharmendra *et al.* (1967) to provide an apparently similar degree of protection against leprosy as B.C.G. to children exposed to comparable challenge. (It is not known whether any additional protection is afforded if dapsone is given as well as B.C.G.). While theoretically commendable, this method of prophylaxis—which requires strict supervision of healthy individuals for several years while they are taking a potentially toxic drug—is generally impracticable, and may be undesirable.

4. **B.C.G. vaccination.** This may enhance the potential resistance to leprosy challenge of children living in more or less close contact with an open case of leprosy. In the circumstances of the Uganda trial (i.e. scattered population, low leprosy prevalence, low lepromatous/tuberculoid ratio), such protection is apparently afforded to about 80 per cent of children (Brown *et al.*, 1968). In Papua and New Guinea, the percentage is 50 (Russell *et al.*, 1968). In Burma (where the population is much denser, the leprosy prevalence higher, and the lepromatous/tuberculoid ratio greater), B.C.G. apparently affords no protection (Bechelli *et al.*, 1970).

However, in view of the encouraging results from Uganda, it is recommended that full co-operation be accorded—from the standpoint of leprosy control—to schemes of B.C.G. vaccination for tuberculosis. If B.C.G. can prevent the development of lepromatous leprosy, this will confer great benefits, and if it prevents tuberculoid leprosy (and hence deformity) this, too, is no mean achievement. If a statistician and a doctor versed in leprosy can be seconded to any such vaccination campaign, valid conclusions regarding leprosy may be forthcoming. Where such campaigns are initiated by voluntary agencies in conjunction with governments or WHO, the fullest collaboration between them is desirable.

5. **Reduction of the reservoir of infection.** This is at present the most certain measure that can be generally adopted. The individual patients are rendered non-contagious, deformity is prevented, and the cycle of transmission broken. There is no known vector or intermediate host of *Myco. leprae*. As far as we know, *Myco. leprae* is found only in man. Therefore, an attack on the organism in the only known source of infection, i.e. the patient suffering from active leprosy, would appear at present to hold out the greatest chances of ultimate success in controlling the disease.

   The cost of this measure depends on the prevalence of leprosy, the population density, the facility of communications, the lepromatous/tuberculoid ratio among those with leprosy, the presence and nature of existing medical facilities (dispensaries, medical assistants, etc.).

Case-finding

The numbers of people (a) presenting themselves at a clinic on their own initiative for diagnosis and treatment, suspecting that they have leprosy; (b) begging in the streets and suffering from various deformities attributable to leprosy; and (c) seeking admission for asylum care—bear no necessary relation to the size and importance of the leprosy endemic in the locality.

The real prevalence of leprosy may be ascertained by:

(a) **regular and frequent (annual) whole-population surveys** conducted primarily for leprosy, or for other endemic diseases (such as tuberculosis, trypanosomiasis, trachoma, yaws, etc.). Where the prevalence of leprosy is high, the population well marshalled and co-operative, and the medical services adequate, this method has much to commend it. But such surveys are expensive, rarely practicable, and seldom desirable when undertaken for leprosy alone. Where the prevalence of leprosy exceeds 1 per cent in a rural or urban community,

everybody must be considered to be a potential contact, although the majority of persons actually found to be suffering from leprosy may deny all knowledge of prolonged and intimate contact with anybody known to be suffering from leprosy.

(b) **Surveys of people at special risk,** such as household and family contacts of known sufferers from leprosy. Where possible, frequent (i.e. quarterly or six-monthly) examination of such contacts is a sure method of discovering early cases of leprosy.

(c) **Selected groups of persons** may be examined for leprosy either because of statutory requirements (recruits to the armed forces or police, contracted workmen and their families), or because they are conveniently available (school-children, prisoners).

(d) Special attention should be given to **patients attending skin clinics** or orthopaedic departments, and to those with chronic ulceration.

(e) In some countries, a very high proportion of **beggars** in markets or on highways is suffering from active leprosy, or (more usually) from the results of past leprosy.

TREATMENT OF LEPROSY

The following principles are generally applicable:

1. No treatment for leprosy is to be given unless a positive diagnosis has been made.

2. When the diagnosis of active leprosy has been made, treatment should be begun at once (except where contra-indicated on such grounds as acute reaction or neuritis).

3. Some forms of leprosy are self-limiting and self-healing, but it is difficult for most workers to recognize them. In any case, treatment will expedite healing of early (indeterminate) leprosy, and thus contribute to the

impact of the anti-leprosy campaign on the population; it may also prevent the development of lepromatous leprosy.

4. A simple scheme of treatment suitable for application by trained auxiliary workers to patients with any kind of leprosy in rural or urban mass control schemes, should be drawn up and promulgated. Only one drug, dapsone, should be used in this scheme. Dapsone is cheap, has few side effects, is active in all forms of leprosy, rarely induces drug-resistance, and can be given by trained auxiliaries with the minimum of medical supervision.

5. All patients with active leprosy, except those in certain well-defined categories, may be safely treated in domiciliary fashion with dapsone.

6. Since the length of treatment to be advised, the contagiousness of the patient, the prognosis, and the criteria for discharge depend on the type of leprosy, and its duration and severity, the classification should be determined and the fullest possible records kept.

7. In the case of tuberculoid and indeterminate leprosy, treatment should be given for at least two years, or for at least one year after all signs of clinical activity have ceased. For all other kinds of leprosy (lepromatous and borderline), treatment should be continued for at least four years, or for at least two years after all clinical and bacteriological signs of activity have ceased; cooperative patients in whom this kind of leprosy is considered to be quiescent, are advised to take *half the therapeutic dose* for the rest of their lives.

8. After discharge, patients should be examined as follows: every three months for a year; then every six months for two years, and annually thereafter. Slit-smear examinations are more important than clinical examina-

tion when patients have had lepromatous or borderline leprosy. Follow-up may be limited to patients in the group most likely to relapse, i.e. those who have suffered from borderline leprosy, and who took treatment for an insufficient length of time.

9. If resources are limited, it is far better to concentrate on treating patients who are contagious than to attempt to treat everybody. Dapsone being very slowly excreted, impeccable regularity of treatment is not essential. If 75 per cent of contagious patients can be treated, and if these patients can make 75 per cent of attendances for treatment, then the threshold of infection will be so reduced that the back of the endemic is broken.

10. If the control is effective, the number of those developing leprosy will show a progressive reduction after 3-5 years.

Note

1. Patients no longer suffering from active leprosy, i.e. those with residual deformities and ulcerations, do not need treatment for *leprosy;* in fact, not only does dapsone do them no good, but walking long distances to get their tablets may further damage their insensitive feet; this may bring the anti-leprosy campaign into disrepute.

2. Microscopic examination of slit-smear preparations (from ear-lobes and the edge of an active lesion) is advisable for all patients suspected of having lepromatous or borderline leprosy. Such examination should be done (a) on diagnosis, and (b) annually thereafter. An auxiliary can make the smears, fix them on the spot, and either stain them (by Ziehl-Neelsen's method) at once, or send them to the laboratory for staining and reading. The Bacterial and Morphological Indexes should be determined.

3. **Lepromin testing** is not necessary for diagnosis, but helps in confirming the classification made on clinical grounds.

4. In field work, examination of skin specimens removed by biopsy is not often feasible or indeed essential.

5. **Drug resistance.** Fortunately, drug resistance is not the problem in leprosy that it is in tuberculosis. Proved resistance to dapsone and to thiambutosine has been reported, but is not common. There is no reason to advocate more expensive multi-drug regimes in leprosy with a view to forestalling the appearance of resistant strains of *Myco. leprae*, or in the hope of hastening cure. When resistance does develop to dapsone or to thiambutosine (and possibly crossed resistance to the sulphonamides), clofazimine is the drug of choice.

For purposes of leprosy control, as distinct from treating everybody with leprosy, the following observations are relevant:

1. Patients suffering from active leprosy are divisible into two administrative groups:
   (a) **"Open":** patients in this group shed viable leprosy bacilli from the upper respiratory mucosa, from ulcerations of affected skin (as distinct from neuropathic ulcers of the extremities), and (not so commonly) from intact skin, hair follicles, sweat glands and milk ducts. They suffer, usually, from lepromatous or borderline leprosy; sometimes from tuberculoid leprosy undergoing exacerbation.

   After four to eight months of standard treatment, such patients no longer harbour viable (i.e. morphologically normal) bacilli, although four to eight years of treatment may be needed before all bacillary remnants are cleared.

   (b) **"Closed":** patients suffering from indeterminate or

tuberculoid leprosy may be regarded as non-contagious. There is a loophole here, since these patients may on occasion apparently act as sources of infection.

2. Clinical criteria suffice in general for initial differentiation into "open" and "closed", but bacteriological examination (by the slit-smear technique) is necessary for confirmation and for determining the non-viability of bacilli.

3. Nursing mothers suffering from lepromatous leprosy rapidly cease, with treatment, to shed viable bacilli, and suckling infants imbibe prophylactic amounts of dapsone in the milk. Therefore, separation of nurslings from their mothers is neither necessary nor desirable. The social and psychological consequences of maternal deprivation and high child mortality, are to be avoided at almost any cost. For these and other reasons, the creation of "Preventoria" (units for healthy children of mothers with leprosy) is not recommended. Close contact must, however, be reduced to a minimum as long as the mother is contagious.

IN-PATIENT FACILITIES IN DOMICILIARY TREATMENT SCHEMES

The proportion of beds per 1,000 patients deemed necessary varies with the lepromatous/tuberculoid ratio, area of scheme, communications, money available, etc. In Africa, at any one time, 5-10 beds per 1,000 patients should be adequate: in India and the East, 10-20 beds per 1,000 patients may not be enough, for leprosy is more serious in the East.

Local initiative and enthusiasm may demand more beds and more facilities than are strictly necessary for control of leprosy.

Most patients needing temporary accommodation as in-

patients have conditions falling within the following categories:

neuropathic ulceration of the extremities;
drug reactions;
acute reaction in lepromatous leprosy;
erythema nodosum leprosum;
acute neuritis;
acute foot-drop, or acute facial palsy;
acute iridocyclitis;
corneal ulceration following lagophthalmos;
preparation for reconstructive surgery;
those needing physiotherapy or education in the use of anaesthetic extremities.

Occasionally, on social grounds, or in the case of children, for schooling; the hopelessly crippled or blind; the homeless and friendless; those learning a trade or skill; patients learning to use prostheses.

The link between the domiciliary mass treatment scheme and the central hospital should provide for the rapid diagnosis of urgent complications and the rapid transfer of the patient from periphery to centre.

ORGANIZATION OF LEPROSY CONTROL MEASURES

There is no need to reduplicate expensively existing medical services to provide the facilities necessary for leprosy patients. Skin clinics in hospitals, dermatology departments in teaching units, general out-patient clinics, static and mobile dispensary units, general practitioners, should all be brought into the leprosy campaign. Local susceptibilities regarding leprosy should be recognized and respected, but not slavishly pandered to. For diverse reasons, the ideal of complete integration of leprosy control measures into the public health services cannot be achieved everywhere immediately, but it must be kept in view as an objective to be attained as soon as possible. The following measures should be adopted:

1. Leprosy to be taught to medical students, postgraduate doctors, nurses, physiotherapists, and medical auxiliaries—as part of their course of lectures and clinical demonstrations.

2. Existing diagnostic and treatment facilities to be utilized for leprosy patients wherever possible. Leprosy patients may be safely treated in general wards, provided that, if they are still contagious, the principles of "barrier nursing" be observed.

3. Leprosy should be treated at rural and urban static or mobile all-purpose treatment centres wherever possible.

4. As a temporary or transient measure, or sometimes (where local circumstances warrant) on a more permanent basis, mobile treatment runs may be organized on a regular itinerary: a mobile team follows a predetermined route (weather and roads permitting), halting at set points to provide treatment, to examine new and old patients, to offer advice and give instruction. Treatment for other chronic diseases (such as tuberculosis, trachoma, trypanosomiasis) can with advantage be combined with leprosy treatment. As much depends on the keenness and integrity of the medical auxiliaries, as on the reliability and road-worthiness of the transport. Bicycles may be used to supplement motor vehicles.

5. Where conditions permit only rare visits by a supervising doctor, supplies of dapsone may be entrusted to an auxiliary, or even a dependable village headman, to distribute to patients on demand. Where all medical treatment is free, and the people know it, this apparently unsatisfactory method is less open to abuse than would be thought likely. Visiting leprosy patients in their homes and giving them three months' supply of dapsone may be less expensive than trying to trace defaulters.

6. In all legislation, notification, and administrative measures, leprosy should be treated as a public health

problem amenable to principles of general application. The sooner that leprosy is no longer regarded as "unique" or special, the better for all concerned.

7. The training of medical auxiliaries in the recognition and treatment of leprosy, in the organization and execution of control schemes, in simple physiotherapy and the making of protective footwear—is of paramount importance.

Segregation villages have occasionally served a useful purpose, where good farming land was available, where the scheme was recognized as a temporary expedient, and where patients were free to leave when desirable. Such villages may, however, help to perpetuate the myth of the "uniqueness" of leprosy, its hereditary taint and incurability. They become the permanent dwelling-places of the cured, the ostracized, the ne'er-do-wells, and their children may be tied to the land. For similar reasons, villages that tend to arise in the vicinity of leprosaria are to be discouraged.

Occupational therapy, or more properly vocational therapy, has its place in leprosy, provided that the skills taught are practical, saleable, locally viable, do not require permanent help in the form of raw material or sales organization, and afford the ex-patient the chance of becoming self-supporting and an economically independent citizen. Expensive imported apparatus is anathema. For the majority of leprosy patients, vocational therapy will teach skills that will make him (or her) a better farmer than before, able to fend for himself (or herself), and able to compete successfully with healthy fellow-villagers. Teaching women to protect their hands when cooking and their feet when walking, is a rewarding occupation. The making of moulded handles for kitchen utensils, farming implements and tools, non-conducting handles for crockery and cutlery—may not only provide work, but should also prevent deformity by protecting insensitive hands.

THE ROLE OF RECONSTRUCTIVE SURGERY IN LEPROSY CONTROL

The over-emphasis on reconstructive surgery that may of late years have been detectable in some centres is giving place to a more sober appreciation of its proper place in leprosy control. In good hands, and for the right patients, surgery can restore a hopeless cripple to a dignified independence. Simple surgery for plantar ulceration, foot-drop, flail feet and lagophthalmos, and simple physiotherapy (mediated in general by auxiliaries trained by qualified staff) will do more good for some people than highly sophisticated operative procedures performed by general surgeons who cannot gain the necessary skill that comes only with constant practice. Successful surgery has excellent propaganda value in a leprosy campaign, but limited resources cannot be spent on operations and prolonged in-patient treatment and physiotherapy for the favoured few (especially when anatomical reconstruction is not accompanied by sensory restoration) if this means that no money is left for the prevention of deformity in the many suffering from active leprosy. Surgery for leprosy patients may with advantage be included in the work of a general orthopaedic department and not organized in a separate unit.

The provision of simple protective footwear, however, perhaps with moulded microcellular rubber, or plastazote insoles introduced into rigid soles, may prevent disability and neuropathic ulceration of the feet. Such expenditure is a very sound investment, provided that the shoes are cheap, hard-wearing, repairable, and not stigmatizing. Simple prostheses are required for legs, and various plastics are now being utilized. The more complicated and expensive artificial forearms and hands are beyond the needs and resources of most people in the developing countries.

THE ROLE OF EDUCATION

In view of the widespread superstitions and false notions about leprosy, education of the public is an essential part

of the attack on the disease. Educational material adapted to the country is aimed at different classes of society:

1. The patient;
2. The patient's relatives and friends;
3. Schoolchildren;
4. Students in teacher training colleges; medical students;
5. Special groups: women's and church groups; trade unions; youth clubs; travellers by public transport, etc.

All the resources of modern mass communication media should be utilized as opportunity affords:

1. Pamphlets, brochures, cartoons, posters;
2. Radio and television;
3. Film-strips; full-length films; loudspeakers;
4. Essay competitions; projects; model-making;
5. Lectures, talks;
6. Exhibitions—static and mobile;
7. Semi-popular booklets, such as *Insensitive Feet* and *Watch those eyes;* *
8. Disseminating the results of leprosy research through professional journals, so that the time-lag between the acquisition of new knowledge and its field application may be shortened;
9. Training courses and refresher courses for medical auxiliaries;
10. Scholarships, fellowships, bursaries for doctors and others engaged in leprosy campaigns.

THE ROLE OF RESEARCH

Highly technical research in the field of leprosy may seem far removed from the pressing day-to-day problems of

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applying the knowledge we already have, to the needs we face. Yet research must hold the key to better and less costly methods of control, to better and more efficacious drugs, to unequivocally effective preventive measures. Serious research in all aspects of leprosy—in laboratory, in operating theatre, in village control schemes—provides an opportunity for the advantageous investment of funds. Every recent advance in knowledge of leprosy has come about because somebody with an enquiring mind asked certain questions and tried to answer them.

The publication in scientific journals of the results of research is the best way of recording the progress made and sharing it with the world. Only thus can the new knowledge be brought to bear on leprosy in the individual and the mass. The financing of such publications is thus a most proper way to use funds subscribed for "leprosy", and everybody engaged in the leprosy service should be encouraged to read these journals, and to keep up-to-date. The best-known of these are:

International Journal of Leprosy
1200-18th Street, N.W., Washington, D.C. 20036.
16 Bridgefield Road, Sutton, Surrey.
Leprosy Review
57a Wimpole Street, London W1M 7DF.
Leprosy in India
Hind Kusht Nivaran Sangh, Red Cross Road, New Delhi-1.
Fontilles Revista de Leprología (Spanish)
Sanatorio de Fontilles, Prov. de Alicante, Spain.
Acta Leprologica (mainly French)
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VOLUNTARY AGENCIES, COSTS AND CO-OPERATION

The voluntary agencies, particularly Christian Missions, were first in the field of leprosy work (care for leprosy sufferers, introduction of new treatments, reconstructive surgery, and rehabilitation), and raise large sums of money for leprosy.

In some countries, they are still responsible for a considerable share in the anti-leprosy campaign, and in the world as a whole make a significant contribution to treatment and research. Having invested more in installations, some of them have tended in the past to be institution-orientated, and their compassion may not always be untinged by sentimentalism. They are now working together more closely with each other (mainly through ELEP, the European Federation of Anti-Leprosy Associations) and with governments. They bring to the care of leprosy sufferers Christian ideals, accumulated experience and local knowledge, as well as flexibility and initiative. Grants channelled through missions are usually spent to good purpose.

Governments have the final responsibility for the organization of leprosy control programmes, and voluntary bodies—as welcome and appreciated guests—should act in conformity with official plans and policies, implementing and supplementing them wherever possible.

The World Health Organization, in conjunction with UNICEF, will provide drugs, transport and expert advice at the request of governments.

Costs. Dapsone, in general use for leprosy treatment, is ridiculously cheap, costing about five new pence for a year's treatment. **Second-line drugs** (thiambutosine, sulphormethoxine, clofazimine) are more expensive, and the drugs used in the treatment of acute exacerbation (proprietary antimonials, chloraquine, corticosteroids, clofazimine) are costly.

Ambulatory treatment is the method of choice for the vast majority of patients; dapsone being cheap, the costs of getting the drug to the patient account for a large proportion of the cost per head per year—mainly transport and salaries of medical auxiliaries.

Hospital treatment costs from 30 to 50 times that of domiciliary treatment, and should be reserved only for those categories mentioned above (p.18).

The provision of facilities for reconstructive surgery to deal with the back-log of crippled patients suffering from deformities that should have been prevented, is a necessary luxury. Some developing countries cannot afford to devote even 10 per cent of the leprosy budget to this end, and rely on voluntary organizations to tackle this expensive individual therapy. With nursing care, physiotherapy (one-sixth to one-twentieth of a physiotherapist's time per patient), multiple operations, prostheses, post-operative training and follow-up, major reconstructive surgery is costly, but where it can be undertaken, its value and impact both direct and indirect are considerable.

It is, however, a misuse of resources to overtreat a few privileged patients and at the same time allow thousands to become crippled for want of treatment, and fail to break the cycle of transmission of leprosy from the patient with "open" disease to the susceptible contacts.

THE OUTLOOK FOR THE FUTURE

The task of tackling leprosy is more costly, more difficult and more protracted than we were led to expect twenty years or so ago. In some quarters, there is disillusionment, even despair. Serious forms of leprosy are not easily arrested, and the disease seems often to smoulder for years in the individual sufferer and in the community. If the present mood of sober realism leads to a reappraisal of the situation and a redeployment of men and means in a concerted co-operative attack on the disease—this will be all to the good.

If existing knowledge about leprosy were conscientiously and persistently applied, the disease could be controlled in our generation and eradicated in the next.

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