

## ADMINISTRATIVE ASPECTS OF POLIOMYELITIS IN ISOLATION HOSPITALS\*

H. R. J. WANNENBURG, M.B., B.CH. (RAND), *Medical Superintendent, Wentworth Hospital, Durban*

My intention in this paper is not to present a dissertation on the clinical aspects of poliomyelitis or on the administration of infectious disease hospitals; it is rather to indicate how the pattern of such administration has altered in South Africa during the past decade by reason of the changing incidence of poliomyelitis, the development of new and often costly techniques for its diagnosis and treatment, and the social problems that have arisen out of the alarm and dread with which the public has come to regard the disease.

Poliomyelitis now attracts the major attention of medical administration in infectious-disease hospitals. A general shift in the coordination of the hospital services has become necessary in order to cope with this new 'number one' on the infectious disease parade. More exacting demands than formerly are made on personnel for the exercise of certain human qualities; and we find as usual that the solution of one problem creates new problems.

### *The Changing Aspect of Poliomyelitis*

The increase in poliomyelitis has been marked by wide-spread epidemics throughout the world during this last half century.

\* Based on a paper presented at the South African Medical Congress, Durban, September 1957.

Previously regarded as but one of the specific infectious fevers with unfortunate complications in a certain percentage of affected patients, it now looms as a disrupting visitation affecting the community at large and resulting in sociological as well as pathological complications.

As in war, it is during epidemics that intense investigations and efforts become possible. This half century has seen the isolation of the polio virus. Diagnostic methods have been improved, the epidemiology is better understood, and special equipment for treatment of complications has been designed. The merits of chemotherapy and antibiotics have been investigated and they have been found to be good weapons with which to fight the secondary infections which were formerly fatal. The control of certain forms of bulbar paralysis by tracheotomy is a very recent milestone.

These advances, though impressive, have only served to aid diagnosis and treatment. Epidemics still sweep the world and the disease has come to attack older age-groups. The community develops a feeling of helplessness, anxiety and depression with each succeeding outbreak of the disease. The experience and feelings of the individual patient and his relatives, multiplied by the number of such family units involved, eventually become the experience, hope and feelings of the nation.

With the saving of lives which in the past would have been lost, the problem of the rehabilitation of the patient and his reabsorption into society now exercises the minds of social services.

The brightest beacon that has yet shone for suffering humanity is the poliomyelitis vaccine now available for the immunization of communities. Much is expected from this vaccine and the expectation is proportional to the alarm and anxiety with which the community has come to regard poliomyelitis and its complications.

#### *The Changing Aspects of Administration*

The onset, diagnosis, course, treatment and prognosis of a disease sets the pattern for administration measures in dealing with it. Poliomyelitis being an infectious disease, one additional administrative requirement is compliance with the provisions of the Public Health Act as regards isolation and prevention of spread. The medical administrative measures previously employed have been changed as the result of:

(a) The recognition of the dangers to the patient in the pre-paralytic stage of the illness, which has its effects on the procedure of admission of the patient to the hospital.

(b) The newer concepts of treatment, which have to be implemented in the hospital.

(c) The growing dread of poliomyelitis in the community and its effect on public relations.

#### ADMISSION OF POLIOMYELITIS PATIENTS TO ISOLATION HOSPITALS

##### 1. *Public Health Aspect*

The Public Health Act declares poliomyelitis a notifiable disease and requires the isolation of the patient to prevent the spread of infection. The period for such isolation is at present laid down as 21 days from the onset of the illness. In most cases isolation is more effectively achieved in isolation hospitals; moreover, in view of the specialized nursing and treatment that are necessary, admission to isolation hospitals is now as much in the patient's own interests as in those of the public health. The onset of complications in poliomyelitis takes place in the early pre-paralytic phase of the illness and therefore the sooner the patient is admitted to hospital for skilled observation the better. The medical practitioner requesting admission does so, not on proven diagnosis, but when he suspects that the patient may be suffering from poliomyelitis. This procedure is speeded up in times of epidemic. The isolation hospital now serves an additional purpose, in that patients are admitted for diagnosis as well as for isolation. The patient is admitted first on suspicion, and then investigation and diagnosis proceed in the prepared environment of the hospital.

##### 2. *Transporting the Patient*

Fatiguing the patient in the pre-paralytic stage of the illness may result in complications, and therefore the most rapid and least exhausting means must be provided for transporting the patient from the locality of diagnosis to the hospital by private car, ambulance or aircraft. The onus of deciding when the patient must move rests on the medical attendant and not on the receiving hospital, and it is desirable that the doctor, at the time of his request for admission, should give the hospital the benefit of his knowledge and views about the case.

##### 3. *Hospital Arrangements Pending Admission of Patient*

In poliomyelitis complications may supervene with extreme rapidity, and the hospital must look upon every such admission as a potential emergency, even if the doctor when requesting admission did not consider the case serious. The further the patient has to travel before admission, the greater is the fatigue and therefore the more likely are emergency complications.

Resuscitative equipment and staff to operate it should therefore be available for patients during transportation over distances to the hospital. Equipment has been designed for this purpose. Personnel at the hospital must be in a constant state of readiness to act immediately in emergency on arrival of the patient. Resuscitative equipment must be available at the point of arrival as well as in the rooms where it would normally be used in the hospital.

Workshop personnel responsible for the maintenance of equipment form part of this emergency arrangement. An overseer must be personally responsible for seeing that all mechanical and electrical equipment is frequently and regularly tested, and

not only when impending breakdown is noticed. Reserve equipment and emergency electrical power plants should also be regularly serviced and inspected, whether use has been made of them or not. The responsibility of the hospital fitter and electrician has increased tremendously under these changing administrative circumstances. On the conscientiousness and willingness with which their duties are carried out in normal hours of duty, or after hours at short notice, largely depends the life of every patient who is in a mechanical respirator; no other personnel can perform their duties. If equipment fails during use it has to be repaired in the shortest possible time and with the shortest possible interruption of effective working.

##### 4. *Admitting the Patient*

The actual admission procedure aims at the delivery of the patient into allotted accommodation with the least possible delay and with the greatest regard for his safety. Office procedures of admission are only dealt with after the first medical examination and investigation have been conducted in the ward. The admitting office will have had advance notice of the request for admission and skeleton admission papers are prepared at that moment.

Transport bringing the patient proceeds direct to the reception area, which should be situated as close as possible to the infectious diseases wards. A suitable ambulance bay with access for trolleys to inter-ward corridors should be provided, in which the vehicle can draw up under sheltered, secluded and well lighted condition to discharge its passenger. A medical officer should be immediately available to examine the patient inside the ambulance and to make a rapid assessment of his condition. He is then taken by trolley from the ambulance to the particular accommodation where the medical officer decides he should be isolated. It is there that a more detailed clinical examination is performed by the medical officer and material for laboratory examination taken. The speed with which the diagnosis is confirmed is of importance to the patient and to the local health authorities. Should the poliomyelitis patient show respiratory embarrassment, resuscitative equipment is at hand for use during his journey to the respiratory unit, where specialized equipment is used.

In this way the ambulance serves as a mobile out-patient department and reception centre, and is disinfected on return to its base. The hospital can thus dispense with reception cubicles, and the risks of cross-infection between waiting patients are reduced to the absolute minimum.

Experienced medical officers are required to receive the patient on admission. Sufficient experience of the diagnosis of other infectious diseases is necessary to prevent the admission of, say, a patient with measles into a poliomyelitis ward. For this reason medical interns and recently-qualified personnel have a very limited value in this kind of hospital.

#### ISOLATION, ACCOMMODATION AND TECHNIQUE

The objective of the isolation hospital is to isolate the patient from contact with other patients and members of the general public (including parents and relatives) and so prevent the spread of infection.

It is now generally accepted that the poliomyelitis virus is excreted in the stools and may also be conveyed by droplet infection, and that the disease is spread by direct contact with the patient. The infection is conveyed by the hands and clothes and by articles handled by the patient. As regards air-borne infection, isolating these patients in separate fully-enclosed cubicles, each with its own window and door, has proved effective in the control of cross-infection, even to the extent that other infectious diseases (except measles and chicken-pox) may be accommodated in the same ward provided they are in their individual cubicles.

The employment of full nursing asepsis and the provision of each cubicle with its own set of equipment for clinical examination and for nursing extends the safety measures against cross-infection. Every individual entering the cubicle must wear a gown before touching the patient or anything in the cubicle. On leaving the cubicle the gown is to be taken off and the hands thoroughly washed with a good antiseptic and soap and water, which is provided in each cubicle. In moving from cubicle to cubicle this procedure must be meticulously observed both on entering and leaving. Resident doctors, nursing staff, domestic and visiting staff and ancillary medical personnel are all equally required to

carry out this aseptic technique. The biggest problem is to impress upon new members of the staff and student nurses that this simple procedure holds the key to cross-infection and must be faithfully observed. Nursing staff and other personnel are absolutely forbidden to eat any foodstuffs whilst on duty in the poliomyelitis ward.

Poliomyelitis patients may be moved to an open ward reserved for this disease only, when the cubicle accommodation is short, and when the acute phase of the illness is over and the risks of dangerous complications, in the opinion of the visiting physician, have passed. Observation of these patients still continues in the open ward and isolation technique is still carried out. Enclosed cubicle space should be reserved for the observation of newly-admitted patients.

The cubicated ward is in the most constant use throughout the year and the staff of this ward is therefore the most experienced in the techniques and observational skills required. The ward is also available for the training of new personnel. Full isolation precautions must of course also be taken in the respiratory unit, where patients requiring respiratory assistance are accommodated. Nursing staff from wards other than poliomyelitis wards may be called upon in emergency to assist in the respiratory unit. Isolation technique and nursing asepsis makes this possible without creating cross-infection.

#### Visitors for the Patient

Parents and close relatives of poliomyelitis patients are understandably very anxious and, if permitted, would probably like to sit with the patient all day. Rules for visiting in any hospital are made for the benefit of the patient as well as for the nursing and medical staff, but visiting of infectious-disease patients is not permissible in the normal way because visitors become direct contacts of the disease and may spread the infection. Rules forbidding visiting must, however, be flexible to meet certain special situations. It is wise to allow visiting when a patient is in the iron lung, even during the period of isolation. Full aseptic nursing technique must, however, be carried out by the visitor. Such permission is best confined to the parents or close relatives of the patient. Other classes of visitors should not be permitted to visit except from the safe distance of an intervening ward verandah. It is best for these verandahs to be enclosed so as to prevent visitors from surreptitiously stealing up to a window for a quick touch or some other expression of affection or greeting. In general, it is found that the visiting public cooperate after some initial tactful explanation. Occasionally there is no cooperation, but an explanation that the local health authorities may take action under the Public Health Act against the visitor is usually sufficient to ensure compliance. Other special visitors permitted include ministers of religion and business associates requiring urgent signature of papers by the patient. Fortunately these visiting restrictions are only applicable during the first 3 weeks of the illness.

A final safeguard requires that any member of the nursing staff living outside the hospital must either change into her own clothes before leaving the hospital, or must be issued with a clean uniform at the end of her duty shift, in which she then goes home and in which she reports for duty the next day.

#### SPECIAL EQUIPMENT USED IN TREATMENT

The mainstay in artificial or assisted respiration equipment is still the cabinet respirator, commonly known as the iron lung. The lungs in use today are the result of successive improvements designed for more accurate control of the patient's breathing and for better access to the patient for nursing or medical procedures. More recently, intermittent positive-negative pressure apparatus has been introduced which, along with newer laboratory techniques, enables the patient's respiratory requirements and blood chemistry to be controlled within very precise limits.

Administratively this problem is reflected in the decision that has to be taken on what type and quantity of equipment is to be available for use, and for a reserve. Poliomyelitis is an unpredictable disease and it cannot be estimated with any reasonable measure of accuracy how many patients in any given time will develop respiratory insufficiency and require the assistance of resuscitative equipment. What may be regarded as a satisfactory amount of equipment in reserve in the morning may, as a result of a few new emergencies admitted on one day, be hopelessly inadequate in the afternoon. It is a dreadful feeling to have all

your iron lungs occupied while you are expecting a bad-risk patient to be admitted. It is extremely difficult to obtain equipment under conditions of emergency. It may have to be borrowed from other institutions for the time being. An added difficulty in administrative forecasting is the increased staff required to operate the equipment.

Whilst the quantity of equipment needed cannot be accurately estimated, the selection of equipment lies within administrative control, and may offset the relative shortage of equipment to a certain extent.

#### Selection of Equipment

Selection calls for close consultation and collaboration between the physician in charge and the hospital administrator. The clinician knows what type of equipment he wants, but the quantity must be estimated by the administrator. The clinician is guided by what function the equipment is to perform in the treatment of his patients, the administrator by what the cost of the equipment is, how many patients may need it, how many staff would have to be provided extra to operate the equipment, and the facility with which such equipment can be maintained and repaired.

The selection of an iron lung is guided in the main by the speed and efficiency by which nursing procedures can be carried out, especially that of putting the patient in the lung and starting its operation. Nursing a patient in the iron lung requires a special technique and it may be necessary to continue it for months or years. Nursing procedures must be carried out without disturbing the patient's respiration. The more ill the patient, the more dangerous it is to stop the iron lung temporarily and the more complicated and frequent are the nurse's tasks. The facility with which nursing procedures can be effectively carried out with a minimum disturbance to the patient should therefore be one of the most important considerations in selecting a respirator. Further considerations are the number of nurses that will be required to carry out routine procedures with any particular make of respirator and the readiness with which nurses can be trained to do so. This information is necessary in order to determine how many 'lungs' a fixed number of staff can operate in an emergency; for the nursing complement stays fixed while the number of patients increases. The fewer nurses required to man one lung, the more lungs can be put into use.

The availability of spares and replacements and the speed of routine servicing, as well as the ability of the hospital workshop to deal urgently with mechanical emergencies, are further points to bear in mind in selecting an iron lung.

#### MEDICAL AND NURSING PERSONNEL

The staff normally required to manage the isolation and treatment of poliomyelitis is as follows:

##### (a) Full-time Visiting Physician

This physician should be in charge of the infectious diseases unit or hospital. He should be primarily responsible for the treatment and investigation of the patients and he should co-ordinate all medical opinion and skills available. Nowhere else is the same opportunity available for studying the acute phase of poliomyelitis as in the infectious disease hospital, and it is clear that the full-time physician-in-charge is in the best position to supervise the case and treatment of the polio cases. This implies that the visiting physician should be of senior status and in good standing with his colleagues and that he should have a wide experience in the management of poliomyelitis.

##### (b) Specialists

In the course of treatment the physician may require specialist cooperation in connection with a particular complication and he should call in specialists as required. Specialists now employed in the treatment of poliomyelitis include anaesthetist, ear, nose and throat surgeon, orthopaedic surgeon, physician, physical medicine specialist, and such other specialities as would be indicated in particular complications.

##### (c) Resident Medical Officers

The resident medical officers, who serve under the visiting physician, constitute a most important unit in the treatment of poliomyelitis. They are in most continuous contact with the patients and on them falls the greater burden of observation and treatment. Careful observation and evaluation of symptoms of

impending paralysis of breathing or swallowing is most important and frequent visits to the patient and a close liaison with the nursing staff is essential. The resident medical officer must be immediately available when called to see a patient, and on his availability the patient's life often depends. He also acts in the absence of the visiting physician, and must be able to make decisions of an urgent nature on the spot, and institute life-saving measures. He must be able to operate effectively any of the modern equipment, and in emergency he must undertake procedures that normally are the specialist's responsibility; e.g. tracheotomy, laryngoscopy, bronchoscopy and procedures in the anaesthetist's field. He must know enough of the mechanics of the equipment to rectify remediable faults in emergency. In the absence of the visiting physician he must make use of opportunities to instruct the nursing staff in the observation of the patient and the supervision of equipment in use, since it will be the nursing staff who will take over his functions in his absence. Finally, the resident medical officer is to be regarded as the administrator's deputy in the admission of patients, consultations with doctors and, the discussion of the progress of patients with anxious relatives when they call at the hospital or are accommodated there during a critical phase of the patient's illness. Consider the strain on this officer, especially during an epidemic. His heavy responsibilities demand both professional and personal qualifications. He must possess experience in the diagnosis and treatment of infectious diseases (of which poliomyelitis is but one). This can only be obtained in an infectious-disease hospital, and the number of medical practitioners confining themselves to this field of practice is small. The personal qualities required are those which are found in a general practitioner who commands the respect, affection and trust of his patients. In an infectious diseases hospital, and especially in the treatment of poliomyelitis, they are developed by daily contact with the patient and his relatives under the stress of continuous anxiety, fear and emergency. Such qualities cannot be created artificially but, if they are present, they can be developed by usage and encouragement.

#### (d) Nursing Staff

The nurses of course play an indispensable part in the treatment of the patient. The nursing staff shares with the medical officer the responsibilities of continuous observation of the patient, and it is on the conscientious attention to all the minutiae of nursing observation that the medical officer depends to a large extent for the assessment of the patient's condition. In contrast to the medical officer's intermittent attention to the patients in any one ward the nursing staff are tied to their posts for the full spell of their hours on duty. The number of nurses required is in direct proportion to the number of patients admitted. Circumstances of course arise in which a number of nurses and the resident medical officer are engaged continuously in the treatment and observation of one patient only. The limiting factors in a poliomyelitis epidemic are therefore the numbers of nursing staff in the first place and of resident medical officers in the second.

The patient in the iron lung is completely dependent upon nursing technique for his day-to-day existence. This imposes a great strain on the nursing staff and is a most important point in arranging for reliefs, off-duties and days-off for the nursing staff and the providing of adequate relaxation. That the strain is mental as well as physical must be borne in mind in dealing with matters of staff discipline.

The patient is dependent on the staff for every ministrations, from the drinking of water through a straw, feeding by spoon and scratching his nose, to wiping the sweat from his brow. Only the patient's head lies outside the respirator and if a fly settles on his face he cannot wave it away. In addition he is dependent for every natural bodily function on the assistance of the nursing staff. He is also washed, dried and rubbed and has his linen changed in the lung as often as necessary. The difficulty is that all these nursing procedures must be done without such interruption of the patient's respiration as would cause his condition to deteriorate. Under certain circumstances patients cannot afford stoppage of respiration for more than a minute, and it follows that any nursing procedure that requires stoppage of the lung must be executed within the safety of that one minute. It is for this reason that the choice of type of iron lung is so important; it must enable the nursing staff to perform their duties with as little interruption as possible to the respiratory function of the apparatus. Team work becomes an absolute necessity. Every

nurse must know exactly what she is to do and the timing becomes most important. These procedures, and unremitting attention to detail on the part of the nurses, often go on for days and weeks, less often for months, and occasionally for years.

The availability of members of nursing staff becomes an important administrative problem during times of increased incidence of poliomyelitis, and more so if there is an increase in the percentage of patients developing dangerous complications. Isolation hospitals that exist as self-contained units will find that during times of epidemic their nursing staff is inadequate in number, and appeals will have to be made for assistance. Similarly, a single medical officer, normally sufficient to attend to the common infectious diseases admitted, will be worked off his feet and will collapse from physical and mental exhaustion. Reliefs will be required for both these categories of staff. An advantage of making isolation hospitals units of a larger hospital is that staff can be transferred from other hospital departments to the isolation section, and work done in the departments so depleted may temporarily be suspended.

If such rearrangement of staff is not sufficient then assistance will have to be sought outside hospital through voluntary organizations for assistant nurses, and through the Medical Association for medical assistance. All safeguards must be taken to prevent conveyance of infection, and this will naturally add to the responsibilities of the regular staff.

#### PUBLIC AND STAFF-PATIENT RELATIONS

The work of the hospital is done under the stress of continuous anxiety, fear and emergency. Under these circumstances the patient, especially the patient in an iron lung, dependent on the nursing staff for every ministrations to his wants, and on the medical officer for hope and encouragement, forms very close bonds with them. Sharing the bleak days and the moments of despair with the patient and his relatives, the staff require qualities that amount to dedication. In very few illnesses does one get so close to the patient and to the parents and relatives in their great anxiety as one does in poliomyelitis. The staff eventually share every thought of the patient and can anticipate his every wish.

Since poliomyelitis is such an unpredictable disease, keeping up the morale of the patient and the relatives is a very responsible task. The prognosis is based on statistical evidence when it comes to discuss the future. It is known that  $x\%$  of patients survive the illness without complication, and  $y\%$  develop temporary complications and  $z\%$  permanent or fatal complications. Such knowledge is retrospective. In the individual case under treatment no such forecast can confidently or ethically be given. Within the limits of clinical acumen a prognosis can be given, but even today with all the advances that have been made this prognosis always carries a reservation that the disease is unpredictable during the acute phase. A patient who appears to be in no danger the one moment may be fighting for his life in a quarter of an hour.

The patient and the relatives expect a clear 'yes' or 'no' demand to be told the facts. In their anxiety to obtain information they approach every member of the staff and press for more convincing information. They read widely about poliomyelitis and gain ideas about the treatment and precautions. The reserve with which it is alone possible to give a prognosis may, in these circumstances, be interpreted as the withholding of information or as due to a lack of knowledge of the disease. The guarded prognosis is thus accepted with mixed feelings. Medical and nursing staff who are so approached therefore have a heavy responsibility to the patient and the relatives. It is unwise to let this responsibility rest on anybody but the visiting physician, the resident medical officer and the trained staff of a ward. Only through these channels should the clinician's daily view be communicated. The resident medical officer on occasion has to revise that view in the light of events and thus the responsibility may weigh heavily on him as well.

The visiting physician and the resident medical officer should be available during certain hours in the morning after a round to see relatives of patients. At these interviews an authoritative opinion can be given on any given case. Such an interview is the one best calculated to give relatives the truest picture of the situation and is the time to express a prognosis.

Special difficulty often arises from the resentment of patients who are admitted to isolation and who feel that they had no choice in the matter. Such a patient, if he is not seriously ill, feels

the deprivation of liberties more than other patients. The fact that he may not receive visitors in the normal way and that he must have no contact with other patients makes him very dissatisfied with his stay in hospital. The relatives often share this resentment and especially is this so when methods of treatment do not appear to be as active as they expected. The mental condition following on the toxæmia of the illness is often responsible for this resentment and depression, and great tact and careful handling are required on the part of the medical officers and nursing staff. Poliomyelitis patients in isolation come from all walks of life, and they differ greatly in the way they accept the situation in which they find themselves.

#### *The Hospital Bulletin*

For the convenience of the enquiring public, hospitals provide bulletins on which every patient's condition is briefly reported in language that a layman can communicate to the enquirer. Bulletin information, that the patient is progressing satisfactorily, does not always give the public what they want; information given personally by the medical officer or sister is more readily accepted. This dissatisfaction with bulletin information is still more evident when the patients are suffering from poliomyelitis. Persons enquiring insist on being put through to the ward sister or the medical officer, or they wish to speak to the visiting physician personally. The medical officers are asked for by name and a personal call then goes through to him. Four and five calls a day are quite common concerning each patient. The situation is reached where the medical officer, with 30 or 40 polio patients under his control, would be called on to deal possibly with 150 telephone calls of two or three minutes duration each. Obviously he cannot take them all personally and a goodly proportion go through to the sister in charge. The rank and file of nurses are not permitted to give information, since it may vary from the physician's report and give rise to misconceptions.

Whilst supplying information to the public is an important function, it is more important that trained staff should not sit in the duty room to answer telephone calls about patients, especially if they are progressing favourably. For this reason a bulletin

is issued which is designed to reduce to a minimum the number of calls to the ward and medical officer. Cases that are progressing favourably are so stated, and patients giving cause for anxiety are reported on the bulletin under a heading which enables the caller to be put through to the ward so that the patient's condition can be discussed. It is necessary to limit calls of this nature to the immediate relatives. Friends must accept the bulletin information; should they wish for further details they must get them from the patient's family. The public anxiety is only too clearly understood, but it is not in the interests of the patient to be left whilst a report concerning him is being given over the telephone.

In times of public alarm the press also act as a gatherer of information for public guidance. It is felt that information emanating from the hospital is best channelled through the local health department. Hospital information concerning patients is of a personal and confidential nature and is therefore only available to such quarters as are naturally or officially entitled to the information.

#### REHABILITATION

As this phase of treatment falls outside the isolation period, it will suffice to mention that some unfortunate patients recover very slowly, or not at all, from respiratory paralysis. Such a patient then utilizes an iron lung or other apparatus for years. It becomes almost his personal possession, and additional equipment has to be acquired by the hospital.

Rehabilitation requires patience and encouragement and it is felt that the confidence established and the cooperation obtained during the anxious days of the acute illness should be available in the period of rehabilitation. It is my view that rehabilitation should therefore proceed in the hospital of which the isolation unit forms a part. This also serves to increase the opportunity to train nursing staff and medical personnel, and thus increase the potential of the hospital to deal more effectively with staff problems arising during periods of emergency.

I wish to express my thanks to the Director of Provincial Medical and Health Services, Natal, for permission to present this paper to Congress.