21. REHABILITATION OF THE MENTALLY AND PHYSICALLY HANDICAPPED

Overwhelmed by acute and chronic health problems, the doctors who practised in Central Africa from the late-nineteenth to mid-twentieth century had to use all available medicines and surgical and obstetrical techniques to meet the needs of a large number of patients. It was hereby impossible to devote the necessary time and effort to bring relief to mentally and physically handicapped individuals. Physicians could at best relieve a few victims by treating epileptics who were numerous in certain areas, those suffering from spinal tuberculosis (Pott’s disease), and cases of leprosy. Leprosy patients were often assembled in rural farming communities and benefited from semiprofessional assistance which consisted in the distribution of drugs, dressing of wounds, prevention of disabilities, feeding or housing, and the chance to get a useful occupation. Medical services, in contrast, were powerless to deal with the problems posed by the blind, deaf, paraplegics, other physical disabilities and the insane.

Many initiatives carried out by charitable individuals made it possible to relieve much of the misery and solve some of the problems of these outcasts, for whom neither qualified personnel nor the necessary material assistance was available. Many doctors have been encouraging and supporting such initiatives.

The medical profession was not happy when specialized personnel arrived to contribute their technical skills to rehabilitation, a socially important branch of therapy. Physio-therapists were face-to-face, at their arrival, with a large number and variety of handicaps which exceed their capacities to bring relief, regardless of their motivation and strenuous work. They could have confined themselves to their technical duties but they reacted in the same way as those who set up and organized the medical services. The physio-therapists also tried to increase their length of reach by training and complementary courses for nurses and auxiliaries in the techniques of the profession.

Particular health professionals and auxiliaries were very useful to carry out daily tasks of rehabilitation in medical establishments. They were also essential for the training of mobile units that could spread their activity to outlying areas as requested by local conditions. Even better, they were aware of all the benefit deriving from the potential provided by the African family and community. They spared no pains to get both family and community to participate in their work and treatment methods. By setting up a series of initiatives adapted to local conditions they succeeded in having the handicapped looked after by relatives, who were trained in the best way possible to deal with the specific handicaps of their dependents.

Combining professional assistance and volunteer aides made it possible to reintegrate into society many persons who had lost all hope of participating in community life. These achievements have to be acknowledged and are for the physiotherapists a great source of pride.
HISTORICAL BACKGROUND

1. Before 1960: the first attempts by multiple initiatives
   1.1. Starting functional rehabilitation for the handicapped
   1.1.1. First actions in hospitals
   1.1.2. The first orthopaedic and rehabilitation centres
   1.1.3. The Rehabilitation Centre in Kinshasa
   1.2. Rehabilitation of people in their community
   1.2.1. The School for Rehabilitation of the Deaf in Bandundu (Zaire)
   1.2.2. Vocational services for leprosy patients in Zaire

2. The Sixties: development and growth
   2.1. The Centre for the Handicapped in Gatagara
   2.1.1. The beginning
   2.1.2. Expansion of the activities
   2.1.3. The “Radio Mera” workshop
   2.1.4. Peripheral extension and the setting up of a mobile team
   2.2. The Centre for the Physically Handicapped in Goma
   2.2.1. Functional rehabilitation
   2.2.2. Priority given to vocational training
   2.2.3. Vocational rehabilitation of disabled beggars
   2.2.4. The motor-tricycle manufacturing workshop
   2.2.5. Extension of the geographical area served
   2.3. Further African activities

3. The Seventies: expansion of the various activities
   3.1. Positive factors
   3.1.1. The evolution of staff training
   3.1.2. The Association of the Centres for the Handicapped in Central Africa
       (ACHAC)
   3.1.3. The Alma Ata health manifest and the pastorate of basic communities
   3.2. Extension and referral centres
   3.2.1. Setting up new centres
   3.2.2. Special services in centres and medical institutions

MAJOR CHALLENGES

1. Selected handicaps to soothe
   1.1. Orthopaedic disablement
   1.1.1. Poliomyelitis
   1.1.2. Paraplegia
   1.1.3. Bone tuberculosis
   1.1.4. Leprosy
   1.1.5. Amputations, flexed stump and foot prosthesis
   1.2. Non-orthopaedic handicaps
   1.2.1. Elephantiasis
   1.2.2. Sensory handicaps
   1.2.3. The neuro-psychiatric handicap
2. The priority approach. ................................................................. 830
   2.1. The personalized approach to the handicapped individual ......... 831
   2.1.2. Primary, secondary and tertiary prevention ......................... 831
   2.1.2. Social, educational and vocational reinsertion ................... 831
   2.1.3. An imperative all-purpose approach, the multi-disciplinary team .... 831
   2.2. The “community” approach .................................................. 831
   2.2.1. The mobile services ...................................................... 832
   2.2.2. Community rehabilitation started by the local population ....... 833
   2.3. Priority for the most severely handicapped ............................ 833
3. The various technicians – The substitution principle. ................. 833
   3.1. The Medical Staff, Physician and Surgeon ............................ 834
   3.2. The Physiotherapy Staff. ................................................... 834
   3.2.1. The Physiotherapist-Orthopaedist’s tasks .......................... 834
   1° The orthopaedic consultation .............................................. 834
   2° Orthopaedic appliances ..................................................... 835
   3° Orthopaedic or straightening plaster cast .............................. 835
   3.2.2. The Physiotherapist-Rehabilitator .................................. 836
   3.2.3. The Community Physiotherapist-Rehabilitator .................... 836
   3.3 Nurses trained in physiotherapy-rehabilitation and nursing of paraplegic and psychiatric patients ................................. 836
   3.4. Technical personnel ....................................................... 836
   3.4.1 The Orthopaedic Fitter-Tanner ......................................... 836
   3.4.2. The tricycle mechanic ................................................. 836
   3.5. The health auxiliary .......................................................... 836
   3.6. Teachers, Educators and Social Workers ............................... 836
   3.6.1. The Teacher for the handicapped .................................... 836
   3.6.2. The Educator and the Social Worker ................................ 837
   3.7. Levels of competence ........................................................ 837
4. Staff training ................................................................. 837
   4.1. The choice of candidates .................................................. 837
   4.2. The training and the trainers ............................................. 837
   4.3. Types of training. ............................................................ 838
   4.3.1. Community Physiotherapist-Rehabilitator ............................ 838
   4.3.2. Assistant in community physiotherapy and rehabilitation ....... 838
   4.3.3. The graduate Community Physiotherapist-Rehabilitator ........... 838
   4.4. Upgrading of personnel .................................................... 838
   4.5. Supervision and referral .................................................. 838
5. Management ............................................................... 839
   5.1. The minimum essential ordinary budget .................................. 839
   5.2. Local means, and staff with simple qualifications ..................... 839
   5.3. Self-financing and differentiated fees ................................... 839
   5.4. The participation of external donors ...................................... 839
6. Coordination ............................................................. 839
   6.1. Coordination in the rehabilitation centres. .............................. 840
   6.2. Coordination with other ministries ....................................... 840
   6.3. National associations ....................................................... 840
   6.3.1. The Association of Centres for the Handicapped in Central Africa .......... 840
   6.3.2. The Union of Zairean physiotherapists ................................. 840

BIBLIOGRAPHY. ............................................................... 840

815
HISTORICAL BACKGROUND

Rehabilitation has long existed in Africa, starting with isolated initiatives. It is interesting to note that the European concern for rehabilitation of the handicapped was closely followed in Zaire, Rwanda and Burundi by more and more diversified actions, developing in spite of the present crisis. These countries now have some forty years’ experience in technical and scientific rehabilitation.

1. Before 1960: the first attempts by multiple initiatives

In traditional medicine, various treatments were applied to avoid retraction of the lower limbs in poliomyelitis and to control epileptic attacks (see the chapter Medical Anthropology, pp. 48 to 61).

Measures, often empirical at first, were taken either by members of religious missions or by private individuals to alleviate various handicaps resulting from such conditions as poliomyelitis, leprosy, deafness or mental disease.

Rehabilitation was confined mainly to functional readaptation in hospitals and clinics, social reinsertion work, some school resumption for the deaf and vocational training for leprosy patients.

1.1. Starting functional rehabilitation for the handicapped

1.1.1. First actions in hospitals

In the forties, the Protestant Mission Hospital in Kimpese admitted the first casualties and then the paralytics. Kimpese was to become famous for its surgical operations practised in the following decades by an African male nurse named Matondo.

There was a dearth of orthopaedic material, so that an orthopaedic surgeon performed arthrodeses of the knee or the ankle to control sequels of poliomyelitis in Kivu, at Katana in 1954, then at Mibirizi and at Goma. Shortening of the other limb was sometimes controlled by osteotomy. The same surgeon also operated on leprosy patients to free their osteo-ligament sheaths. Surprisingly enough, unexpectedly advanced orthopaedic surgery could be performed with relatively modest means.

In Bukavu, physical rehabilitation developed and a special unit for it was built in the hospital.

In 1955 at Mbuji-mayi (Eastern Katanga), a health worker of the Société Minière de Bakwanga (MIBA), having been instructed some rehabilitation work, started treatments in physical medicine. In the MIBA hospital, the health worker opened a rehabilitation centre in which he worked until 1972. He wrote an essay on Rehabilitation of trauma casualties, prefaced by Prof. Merle d’Aubigné, under whom he had worked (Smal, 1961).

1.1.2. The first orthopaedic and rehabilitation centres

In 1954 in Vaku (Lower Zaire), a nun opened a Department of Orthopaedic Equipment with very simple materials.

The same year in Lubumbashi on the initiative of the Red Cross, a Centre was opened for the Orthopaedic Rehabilitation of the Cripple (COR) with workshops where virtually all types of appliances, including wheelchairs, could be manufactured. After 1961, two orthopaedic technicians were appointed there by the Katanga Medical Service. The surgical team of Lubumbashi University was to assume a good part of the consultation service and to perform many corrective procedures. Patients benefiting from this action were not only from various regions of Zaire but also from neighbouring Rhodesia (Zambia).

A survey on 100 patients showed the cause of disability to be 32% congenital lesions, 29% post-polio-myelitis lesions, 23% trauma and 16% miscellaneous. The procedures utilized consisted of 53% fitting with orthopaedic appliances, 24% plaster casts, and 23% physiotherapy (Compère and de Scoville, 1962).

In 1959 in Kinshasa, the Physiotherapy Department of the University Clinics (Professeur Ghesquiére) was opened; and between 1960 and 1962 three teachers from the Institute for Physical Training and Sports in Kinshasa City worked there. They later assumed very high responsibilities in the field of rehabilitation in Zaire. One of them, C. Benda, became the first Zaire citizen to graduate in physiotherapy and motor rehabilitation (Essay on the Study of leprosy sequel and rehabilitation possibilities, 1964). He was the first Zairean to be head of the Physiotherapy Department at the Higher Institute of Medical Techniques (Institut supérieur de techniques médicales, ISTM), associated with the Kinshasa University.

B. N’kakudulu graduated in physiotherapy in Europe (Essay on the efforts to control poliomyelitis in the Congo, 1967) then obtained a doctor’s degree with a dissertation on the concept of global rehabilitation of the handicapped in basic community services in Zaire and Rwanda (1981). He is at present the
director of the Rehabilitation Department of the University Clinics, and Professor at the Faculty of Medicine at Kinshasha. In connection with the rehabilitation Service a section for orthopaedic appliances was developed, which followed Professor Huckstep's experience. It made very simple splints and supports built of local material (concrete, iron rods, wood, local leather), with the help of World Rehabilitation International. This Section was later taken up by the Department of Orthopaedic Surgery. *Puaati*, a licensee in physiotherapy (essay on the Problems raised by the implementation of physiotherapy in Zaire), became director of the Department for Rehabilitation at the Bakwanga Hospital (eastern Kasai) where he succeeded Smal.

1.1.3. The Rehabilitation Centre in Kinshasha

In 1958, at the time of the poliomyelitis epidemics, the Centre for Rehabilitation of the Physically Handicapped (CRHP) opened in Kinshasha on the initiative of the women of the city, and under the sponsorship of the Belgian League of Spastics (Ligue belge des paralysés cérébraux). It was to be directed by Mrs. De Craye and Mr. Z. Diembi who, having fallen from a palm tree at the age of 15, was taken care of at the University Clinic in Leuven, and then graduated in administration at Kinshasha University. He was given the post of Secretary at the Centre.

The presence of a severely paralysed person in such a high position of responsibility made a great psychological impact on all the patients. The Brothers of Charity from Ghent then took up the responsibility of running the Centre, which became a pilot centre for the west of the country. It obtained the help of orthopaedic surgeons, Dr. Hennebert from the University, Dr. Cardenal from the WHO, a Belgian cooperation doctor, and Dr. Nkongolo, a Zairean orthopaedic surgeon.

The surgical procedures were first performed at the neighbouring Mama Yemo hospital, then in the Centre itself, which was equipped with its own operating quarters, radiology service, and physiotherapy department.

Simple models of orthopaedic appliances were developed in the Centre, following the example of Kampala (Huckstep, 1975).

As early as 1965, in order to solve the problem of professional reclassification, the social service staff of the Centre went to all the businesses in the city, looking for work for the handicapped. A workshop was opened, first for boys in Bandalungwa and then for girls in the Centre itself. The girls did some general sewing and then started to make dolls.

1.2. Rehabilitation of people in their community

Although at the beginning the main effort centred on the functional rehabilitation of the handicapped, there were two centres concentrating on the handicapped person as a whole, his or her schooling, vocational rehabilitation and social reintegration.

1.2.1. The School for Rehabilitation of the Deaf in Bandundu (Zaire)

In Beno (Bundundu), a school for deaf persons was opened by sisters, and recognized by the State in 1957. It was the first school of its kind in French-speaking Africa. It received children from all regions of Zaire, and from some other African countries (Congo, Gabon, Angola, South Africa, Ivory Coast).

1.2.2. Vocational services for leprosy patients in Zaire

At Tshombe-St Marie, at the Dikungu Centre founded by Dr. Hemerycks (Eastern Kasai), a major objective was to “make everybody active and serviceable”. Thanks to a freely chosen vocational training (carpentry, logging, forging, mechanics, pottery) the inmates could find work other than household or field work, so they could even make a small profit. A social centre was at the disposal of women willing to learn sewing and knitting. For the children there was a kindergarten and a primary school. The Centre was equipped to help the crippled and disabled to move, by means of crutches, wheelchairs or orthopaedic sandals (Janssens, 1985; Hemerijckx, 1946).

In Kinshasha, at the Hôpital de la Rive, vocational activities were developed for the leprosy patients so as to give them encouragement, an occupation, and some profitable work.

2. The Sixties: development and growth

At the beginning of the Sixties, in the difficult period when various countries were becoming independent, several initiatives were taken to help with the social reinsertion of the handicapped, their schooling or their vocational training. At the same time they underwent functional rehabilitation. When Zaire became independent, a great deal of the rehabilitation work was taken over by missionaries.

2.1. The Centre for the Handicapped in Gatagara

At Gatagara in Rwanda at the end of 1960, a Centre for the Handicapped was opened: “The Home of Our Lady of the Poor”. It was the first institution combining motor rehabilitation, schooling and vocational
training. It initially took in young people suffering the after-effects of poliomyelitis or with congenital club foot.

2.1.1. The beginning

The initiative was taken at the end of 1960 by a priest, J. Fraipont, who found it striking that a handicapped beggar who had dragged himself on the ground still remained a beggar when put back on his feet.

Father Fraipont therefore wanted to do everything possible to have the handicapped as a whole person to stand on his own feet. As a teacher, he concentrated on the young, aware of the fact that after adolescence the chances of a successful schooling or a vocational training were thinner and rehabilitation was harder.

2.1.2. Expansion of the activities

The Centre opened its workshop for orthopaedic appliances to the amputated and other motor handicapped.

It considered itself responsible for those it admitted and extended its help until their complete social reinsertion.

In 1967, the Centre also opened a section for young deaf-mutes, which later moved to Butare, as well as a school for the blind.

Functional rehabilitation, under the responsibility of a general practitioner, also received the help of visiting orthopaedic surgeons coming regularly from Brussels (Saussez and Poilvache, 1984), as well as surgeons from Kabgaye and Butare, in cooperation with Ghent University, FOMETRO (Fonds Médical Tropical, Tropical Medical Fund) and AGCD (General Administration for Cooperation and Development).

The truth is that the balance between the education department and the medical one was difficult to establish, especially as international agencies carried heavy financial clout and gave priority to medical rehabilitation.

2.1.3 The “Radio Mera” workshop

As early as 1966, the Gatagara Centre opened the Radio Mera workshop, under the responsibility of an engineer. It produced the first radios made in Rwanda; they were sold at a low price all over the country. Some sort of production line was even achieved. Two years later, the workshop moved to Gikondo (Kigali) and a sewing workshop was added to it. These workshops were organized as cooperatives.

2.1.4. Peripheral extension and the setting-up of a mobile team

This same Gatagara Centre was to set up a dozen boarding houses, called local houses, to facilitate schooling of the young rehabilitated in the local primary schools, in a country with a very scattered habitat. These houses were distributed around the country, often under the responsibility of handicapped teachers, supervised by missionary personnel.

An all-purpose mobile team travelled throughout the country and visited the local houses periodically, examining the handicapped on the spot, repairing their appliances, and ensuring a social link with their community. The team consisted of a physiotherapist, a member of the social service and a specialist to fit orthopaedic appliances.

Around 1986 the direction of the Centre was taken over by the Brothers of Charity from Ghent. At present Rwandan Brothers do all the jobs. The voluntary society the Friends of Gatagara, with headquarters in Brussels, provides valuable help.

2.2. The Centre for the Physically Handicapped in Goma, “Shirika la Umoja”

In 1963, two particular events led the Bishop of Goma (Kivu) to pay attention to the handicapped: his young nephew was struck with poliomyelitis and became paraplegic, and a hotel keeper in Goma decided that the presence of handicapped beggars, often very young ones, was a blemish to the tourism-oriented city and offered 30,000 Congolese francs per month to any agency ready to take serious action about them.

Thus began, on September 15, 1964, in the middle of the rebellion, the Centre for Physically Handicapped; and a graduate in physical training and physiotherapy was appointed. The name of this centre is Shirika la umoja, which means: United we become stronger.

2.2.1 Functional rehabilitation

In September 1965, the Centre opened its Department of Functional Rehabilitation. It could benefit from medical advice and surgery provided by other hospitals.

At the beginning, the only procedures for the after-effects of poliomyelitis consisted in tenotomies of the ischiatic muscles and of the fascia lata tensor tendons, as well as lengthening of the Achilles tendon. In cases of tuberculosis of the knee, an arthrodesis was per-
formed. Immobilization plaster casts for polio were applied after the surgical procedure, to be renewed at the appropriate time by the nurse at the hospital.

The visits of an orthopaedic surgeon from the Liège University, and of a Professor in the University Clinics in Kinshasa, who came for orthopaedic surgery, helped to improve surgical procedures, and made it possible to discuss some difficult cases such as severe retraction of the hip in polio patients of above 18 years of age (Renotte, 1973). A refresher course could be organized for local surgeons, and CEMUBAC was persuaded to supplement the surgical material by providing external fixators.

Occasionally, the Centre also received valuable help from the medical and surgical team of the French "Cooperation" working at Ruhengeri hospital, in Rwanda, 70 km away (1964 to 1989), and from another team at Kyondo Hospital. Later, plaster casts for gradual extension were applied at the Centre itself. It was the beginning of a long-term research work on redressing casts. Great benefit was derived from the initiatives on cutout casts in Kimpese (Lower Zaire), in Kanyinya (Burundi) and in the Cardinal Léger Centre in Yaounde (Cameroon). Fruitful exchanges took place on the occasion of a symposium organized in November 1981 by the Gatagara Centre at Kigali, which made it possible to help most cases of retraction of the knee or the hip, for polio patients of below 17 years, with plaster casts and without surgical operation.

2.2.2. Priority given to vocational training

The Centre first opened a School of Arts and Crafts for handicapped adolescents, with a sewing section for boys. This section received the help from the Sewing Department of the vocational school at Kigali.

Very quickly, sections on bootmaking, carpentry, masonry and orthopaedic appliances were added to it, and later automotor tricycles (see 2.2.4.), as well as a Home Economics section for girls, a kindergarten for toddlers, and a primary school class which the young aged from 6 to 13 could attend during the period of their rehabilitation.

The best students became the most motivated teachers, sometimes even responsible for their section, and thus gradually shedding the inferiority complex they had acquired within the society.

2.2.3. Vocational rehabilitation of disabled beggars

Although the problem of young beggars had been solved by the apprenticeship system, the adult beggars were still worrying the staff. In 1971, taking advantage of a new building project in their neighbourhood, they decided to offer very simple tasks, such as carrying stones from the extraction site to the building site, a few hundred yards away, to be paid by the cubic metre displaced. Then the idea developed of offering a salary, albeit modest, about 95% of the legal minimum, for those who registered as workers in social rehabilitation. When the disabled person's work reached an acceptable level, with near normal efficiency, the salary was raised to the higher level, 95% of the minimum salary in the next category. Finally, if the work chosen not only helped the handicapped but also answered a need for the community, and reached virtually the level of a normal worker, the disabled person was integrated into the working team as a fully-fledged member having the same advantages. That system was known as the social team. Costs were covered on the one hand by the work done, and on the other by the interest of the amounts the bank did not need to allocate. The system helped to put to work most of the disabled beggars. Some of them, however, after hesitation and a little home accountancy, resumed their activity as beggars, but only after working hours.

2.2.4. The motor-tricycle manufacturing workshop

The Round Polio Centre at Kampala had developed a simple wheelchair (Huckstep, 1975). Starting in 1960, L. De Baere, a Belgian mechanic in Bujumbura, conceived a robust but somewhat cumbersome motor-tricycle, using bicycle wheels. It helped to transport goods. Later, in Bukavu, he developed smaller and lighter tricycles.

Following that model, as well as tricycles furnished by Belgium and France, other machines were built in Goma by garage mechanics, after long working hours. Those tricycles were presented to the Centre by the local clubs. They improved substantially on the earlier models as they had a greater carrying surface in front.

In view of the high demand, the Goma Centre had a technical engineer recruited by the Terre Nouvelle fraternities, and also obtained financial support from the local Lions' Club to build a workshop. The first new model of tricycle left the workshop in 1973.

It had two important properties: first it was a useful means of goods transport in town, able to carry up to five bags (250 kg) of cement, thanks to a chassis extending far under the seat, that could prevent the loss of balance which a helper could provoke by leaning backwards. The other feature was that it was made almost exclusively of common bicycle spare parts and water pipes. The only part that had to be imported was the torpedo brake on the axle.
Towards 1985, the workshop at the Goma Centre started to train students in mechanics on a regular basis. The head of the team is at present a deaf-mute, a very skillful and inventive self-made man, and the workshop answers the needs of the region.

2.2.5. Extension of the geographical area served

As had been the case for various other centres, the geographic area from which the patients were coming extended gradually from the Goma zone (± 100,000 inh.), to the southern part of North-Kivu (Masisi, Rutshuru, Walikale, 1,000,000 inh.), to the Bukavu region (1,000,000 inh.), to North Kivu, Lubero and Beni (1,000,000 inh.) and to the neighbouring Rwanda districts, to reach finally the sub-region of Maniema (Kasongo and Kindu) and also Upper Zaire with Kisangani town (1,200 km away by air), Bunia (600 km further north), and also Shaba (Kalemie).

Many of the handicapped accepted obtained a grant from their community to cover transport and other expenses.

This shows how qualified personnel in a developing country have sometimes to serve areas larger than some of the biggest European countries. This means also that much informal field training takes place, and that some auxiliaries have to assume very heavy responsibilities as they often work in great isolation. They therefore need the support of very regular and close supervision by a professional.

2.3. Further African activities

Apart from previous centres which helped develop new ones in their region, other centres also had a very intense activity, though it remained localized.
- in 1965, a Centre for the handicapped was opened at Bujumbura (Burundi) providing massages to control poliomyelitis retraction as well as schooling.
- in 1968 at Kinshasa, with the support of the University Clinics, the Vocational Centre for the Handicapped (CPH) opened. The same year, the Minister for Social Affairs inaugurated the National Centre for the Handicapped and Disabled (CENAPH), supported by ILO.
- in 1969 in Rwanda, at the hospital of Gahini of the Church Missionary Society, a special department was started by Miss E. Harding. With time, this service grew considerably; together with a physiotherapy department in the hospital, Miss Harding opened a home for handicapped children below nine years old who were admitted for rehabilitation for an average period of 21 days. Then she started a Rehabilitation Centre for Adults. The physiotherapy treatment was free of charge, and some food was given during the stay; but medical care (consultations, drugs, surgery) and orthopaedic appliances were charged to the parents.

An original feature was the importance of informing parents or guardians about the exercises to be performed by the disabled child so that it could continue at home.

Later a staff training course was organized and held twice or three times a year.

The same year in Burundi, an amputee missionary, anxious to see other amputees benefit from a prosthesis, opened a centre at Kiganda which manufactured orthopaedic appliances.

3. The Seventies: expansion of the various activities

3.1. Positive factors

Three positive factors that led to numerous other initiatives were the new possibility of training specialized personnel; the setting up of the Association of Centres for the Handicapped in Central Africa (ACHAC) and the wealth of contacts it procured; and the establishment of mobile service teams.

3.1.1. The evolution of staff training

Some centres had often organized staff training for their own use, to meet their personal needs. They gradually admitted to their courses personnel intended to be employed elsewhere, so that the disabled in need of treatment would not be subjected to difficulties and expenses in terms both of travel and of boarding.

The centres started to distribute among one another their fields of action: western Zaire, eastern Zaire, Rwanda and Burundi.

a) Centres of training for the motor handicapped

In Zaire

- In the western part of the country, the training of Assistant Physiotherapists and of Fitters of orthopaedic appliances started in 1967 in the Kinshasa Centre.

As an emergency measure a two-year training course was set up, at the level of Assistant Physiotherapists (A3 or first high school level) for young people having already completed a two-year orientation course. To-day, several of those assistants are still working with great competence, although they cause some problems for the graduates who feel the assistants are taking their places.
In the eighties, when new centres were needed, the Centre organized a six-month training course, for candidates of a higher level, the last year of secondary school.

- For eastern Zaire, Rwanda and Burundi, courses were organized at the Goma Centre as early as 1971 for the centre's staff and for pupils coming from neighbouring regions. The school for auxiliaries in rehabilitation was the starting point of the *Shirika La Unoja* (United we become stronger) project, which since 1989 has secured the training of assistants in physiotherapy and rehabilitation at A2 level, and is recognized by the State of Zaire.

- For Zaire as a whole, training in physiotherapy at higher or university level could until 1973 be obtained only abroad. The setting up of the Physiotherapy Section A1 at the Higher Institute for Medical Techniques (*Institut supérieur des Techniques Médicales*, ISTM), within the University of Kinshasa, was an important factor for the development of rehabilitation in Zaire and Rwanda. It trained more than 400 graduates who are now heading the rehabilitation services in many public hospitals or in private companies and clinics in all parts of the country.

- At Kinshasa primary school teachers were especially trained to take care of the motor handicapped, at the Bondeko Village Centres (see below 3.2.1.). After a two-year course, they were considered of equal status to graduates if they were teaching handicapped children (ACHAC, 1990).

In Rwanda

A training course in simple physiotherapy and rehabilitation was offered to the staff of all the medical institutions of the country, first in Gahini, and then in Gatagara for blind masseurs. Nurses learned, for example, how to mobilize a ruptured limb, how to use sticks and crutches properly, how to prevent deformities and how to apply simple treatments, before the mobile team arrived (ACHAC, 1990; Pinchart, 1991).

b) The Centres for the Deaf-Mute and Blind

- In western Zaire, the Ndiana Ndinga school in Beno (Bandundu) started in 1963 to train teachers for the deaf, with the help of a Belgian speech therapist. Later the training took place in Kinshasa.

- For Rwanda and Kivu, the Centre for young deaf-mutes in Butare organized first of all short courses of one month for secondary school teachers, then one-year courses for students who had completed their secondary education.

- In Kinshasa, the Mama Mobutu Centre for the blind was opened. Disabled girls from Gatagara went there to learn Braille, some notions of teaching methodology and the psychology of the blind child. This course was followed by practical training periods (ACHAC, 1990).

c) Centres for the mentally ill or handicapped

In Zaire

- With the help of the Neuro-Psycho-Pathological Centre of the University Clinics in Kinshasa (CNPP), staff for the western part of the country were trained to take care of mental cases.

- Also in Kinshasa, teachers were trained to deal with the mentally handicapped.

In Rwanda

- At Ndera near Kigali a training course was organized for medical and paramedical staff serving in the country's institutions for the mentally handicapped. For several years supervision was carried out first monthly and then quarterly by a visiting mobile team. The centres in Goma and Bukavu also benefited from those courses.

3.1.2. The Association of the Centres for the Handicapped in Central Africa (ACHAC)

In 1974, in answer to an offer made by the Goma centre on the occasion of its tenth anniversary, seven centres for the handicapped of Zaire, Rwanda and Burundi took part in a three-day symposium on their problems (ACHAC, 1975).

This symposium gathered 35 participants with various skills: a physician, some physiotherapists, an occupational therapist, a surgical fitter, nurses, teachers, social workers, administrators and animators.

The major problems of the centres were debated: functional rehabilitation and orthopaedic appliances, schools and vocational training for the young handicapped, the future and the marriage prospects for the handicapped girl, social integration of the handicapped, social work in cooperation with the parents, the part played by out-patient services and visiting teams and finally the training or animation of personnel and problems of financing.

The proposal to create an association was adopted unanimously and thus the Association for the Handicapped of Central Africa (ACHAC) was founded. Its first objective was to promote a dialogue between the centres and other associations. Meetings were held every other year in the capital of the neighbour countries. A permanent secretariat ensured the link between all centres.

In 1992, in Zaire, Rwanda and Burundi, ACHAC counted 75 member centres, for physical rehabilitation, for deaf-mutes, for the blind and the mentally ill, for patients with elephantiasis and for mentally handicapped. This association was a powerful coordinator of rehabilitation for the whole region.
With its visits and mail, and with its liaison bulletin *A man like you*, the Association of Centres was able to promote exchanges, and to develop nursing techniques, multidisciplinary approaches to rehabilitation and staff training. As a result, a book was published in Zaire, focusing on wide support to be provided for the handicapped (Courtejoie, 1985).

The action of ACHAC was supported by Caritas Germany, ILO, the African Institute for Rehabilitation (IAR), PNUD, UNICEF, OXFAM/ZAIRE etc. (ACHAC, 1975; 1989; 1992).

3.1.3. The Alma Ata health manifest and the pastorate of basic communities

During the Seventies, reorientation of health services and primary health projects was taking shape. As the health and welfare manifesto of the Zaïrean people was published, the Mpanesa symposium took place in Kinshenza in October 1975 (see the chapter Development of Health Services p. 154). A little later in Alma Ata (WHO, 1978), primary health care projects were universally adopted.

Also at that time the Catholic Church founded the Pastorate of Basic Communities, requesting the Christian communities of districts and villages (500 people altogether) to become responsible for themselves and to take charge of their own handicapped. This prompted actions at the periphery, which were to play an important part in the promotion of Community Rehabilitation (Ngabu, 1976; see Community approach, p. 831)

3.2. Extension and referral centres

Around a few centres, an action developed which aimed at reaching the handicapped nearer home. This was done in liaison with associated centres, which thus became referral centres.

This new deal expressed itself in three different ways:
- setting up community out-patient services;
- starting rehabilitation in the community in which the handicapped lived with supervision by mobile teams (see p. 832);
- Setting up new centres for the handicapped, new services in the existing centres and in medical institutions, and mobile teams in order to bring the rehabilitation services nearer to the handicapped in their own environment.

3.2.1. Setting up new centres

As had been the case since 1956 at the Orthopaedic and Rehabilitation Centre for the Cripple (COR) at Lubumbashi for south-eastern Zaïre, at the Centre for Physically Handicapped (CRHP) in Kinshasa for western Zaïre and at the Goma Centre for the Handicapped *Shirika la Umoja* for eastern Zaïre, the handicapped admitted for treatment during the last ten years had come from further and farther afield.

In order to reduce travelling costs and to multiply the possibilities of action, several sub-centres were set up locally in the regions around the centres so as to open new functional rehabilitation services.

Specific support helped to start work in the centres: from Goma a graduate physiotherapist or a fitter of orthopaedic appliances was flown to another town where, after contacting the local authorities, he would install a new project.

In 1971 in Kinshasa, the Catholic hierarchy established ten *Bondeko villages* (villages whose inhabitants lived "as brothers") in order to decentralize services to the handicapped, who were located at ten different places in the town, one per religious subdivision.

Similarly many centres opened and developed in all parts of Zaïre and Burundi (ACHAC, 1975).

In Zaïre
- In Lower Zaïre: the Centres for the handicapped at Boma and Matadi
- in Kinshasa: the Bondeko villages (about ten, one per deanery); and the Salvation Army Centre for the Handicapped;
- in the Equator Province: the Centre of Banga-Bola and the Telema Centre;
- in Western Kasai: at Kananga, the Centre of the Brothers of Charity of Ghent
- in Eastern Kasai: the Centre for the Handicapped at Tshilenge;
- in Kivu: - a centre in Kindu and one in Kamituga, the Centre for Handicapped Children, whose staff were to visit all over the Warega region;
  - a centre in Kalima, in Bukavu (set up on the occasion of the International Year of the Handicapped) and in Butembo (this centre extended its activity to Beni and Mangina);
- in Shaba: Centres for the handicapped, with workshops for appliances, at Lubumbashi, Likasi, Kolwezi, Kapolowe, and Moba (Orthopaedic Centre Talitha Koum);
- in Upper Zaïre: Centre of Aru, going over the area (supported by the High Commission for Refugees); the Centre for Paraplegics run by a Dutch priest, the Amkeni Centre in Bunia, and in Pawa a centre supported by Handicap International.

At the same time, emphasis was placed on many other handicaps: centres for deaf-mutes were opened
in different regions, and a Centre for the Blind was started by the Brothers of Charity in Kinshasa.

In Burundi

A missionary started to visit the country systematically in order for sisters to be seconded to the service of the handicapped. This led to the development of the centres of Kiganda, Makamba, Kanyinya, Muyinga and Rukundo, while the State, with the cooperation of Switzerland, was to open the Centre for appliance-fitting in Gitega and a National Centre for Vocational Rehabilitation at Bujumbura.

In Rwanda

The Centre for the Handicapped at Gatagara described above was to extend its activity to the whole country. A new centre opened in 1988 in Bugesera on the initiative of an Italian priest, and in Kabyeye the Association for the Development of the Blind in Rwanda (ADAR) aimed at achieving complete independence for the individual, with due participation in community life by economic productivity and social integration.

For each of the three countries and per disability, in 1991 the number of centres (probably a low estimate) was the following:

<table>
<thead>
<tr>
<th>Service Type</th>
<th>Zaire</th>
<th>Rwanda</th>
<th>Burundi</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Centres for physical rehabilitation</td>
<td>29</td>
<td>3</td>
<td>10</td>
<td>42</td>
</tr>
<tr>
<td>Schools for the deaf-mute</td>
<td>20</td>
<td>1</td>
<td>2</td>
<td>23</td>
</tr>
<tr>
<td>Institutes and services for the blind</td>
<td>4</td>
<td>2</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>Hospitals for the mentally ill</td>
<td>5</td>
<td>1</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>Sub-total</td>
<td>58</td>
<td>7</td>
<td>14</td>
<td>79</td>
</tr>
</tbody>
</table>

3.2.2. Special services in centres and medical institutions

ACHAC offered new possibilities for training, and these triggered numerous exchanges. New supplemen-
tary services opened in existing centres, so that, where functional rehabilitation had been a priority, a concern developed for vocational training and work for the disabled.

In Zaire, the Kinshasa Centre for Rehabilitation of the Physically Handicapped opened several workshops (sewing, tricycles); and in the religious sisters' school of Beno (Bandunda), a vocational school for students with impaired hearing and the deaf was to open in 1972.

In Goma, the Shirika la Umoja Centre, which first dealt with the motor disabled, took care of epileptics, opened a class for the deaf and a department for elephantiasis patients, and admitted mental patients and the mentally deficient. Later a department was opened for cerebral palsy sufferers.

As a French occupational physiotherapist specialized in the treatment of spastic cases was available, the team and the auxiliaries in charge of motor rehabilitation could be taught specific examinations and treatments for spastics. This specialist devoted one month to a refresher course for former students. She came back a second time, in 1987, and again visited the Centre in Kinshasa. Thus a specialized department was opened to which a graduate in physiotherapy was appointed. With the help of auxiliaries the French physiotherapist took care of 169 new cerebral palsy patients between 1984 and 1991 (Tardieu, 1984; Gagnard and Le Métayer, 1979; Goma Centre, reports 1984-1991).

Thanks to the physiotherapists trained in Kinshasa and the auxiliaries trained in Goma, many hospitals – Kigali, Ruhengeri, Kabye (Rwanda), Goma, Katana, Bukavu, and Uvira in Kivu (Zaire) – could open a department of motor rehabilitation.

In Rwanda, the Gatagara Centre, which had started its activities for children with poliomyelitis or congenital club foot, admitted deaf, dumb and blind patients.

MAJOR CHALLENGES

Some major problems raised by the care of the disabled and the variety of their handicaps are described with the specific approaches they require and the adequate qualifications, and training of the staff needed to carry out the programme.

1. Selected handicaps to soothe

Some basic figures concerning Africa help to estimate the number of people with one or another handi-
cap. According to UNICEF, 10% of the handicapped in Africa could profit by rehabilitation, and WHO noted that half of these, that is 5%, had a motor handicap.

It was noticed that several recordings from Zaire indicated about 1% of all the handicaps to be severe (Martin, Ambulatory Services, to be published).

1.1. Orthopaedic disablement

In the beginning, many centres for the motor handicapped dealt essentially with up to 80 % of the
patients having the after-effects of poliomyelitis; in fact, when some action in motor rehabilitation begins for these patients, all the long-term cases turn up, and gradually various other disabilities are seen.

This was noticed in Goma where, from 1965 to 1969, more than 75% of the patients were polio cases; from 1970 to 1974, out of 1,718 patients, 948 (55%) still had polio, but from 1987 to 1991, for the five years put together, there were only 4.2% polio cases or 183 out of 4,294 new cases (Goma Centre, reports 1968 to 1991).

The centres which had made themselves a name with their results in treating polio cases, eventually admitted other types of disabled persons.

1.1.1. Poliomyelitis

a) Restoring the gait

Poliomyelitis affects mostly the lower limbs: if a patient is paralysed on one side and is untreated he will limp, or walk with one or two crutches; bilateral paralytics will walk on their hands and knees, or hands only if arms and shoulders are strong enough; but if shoulder muscles have lost their strength, they will slide on their buttocks. Most of the rehabilitation work aims at restoring or improving the gait.

Being able to walk again has such an important psychological effect for polio cases that communities and families always accept the strain of rehabilitation.

When the upper limbs are affected, rehabilitation achieves only modest functional results, even at the cost of major efforts; in the case of dorso-lumbar lesions, simple corsets, when they can be manufactured, are a useful complement to physiotherapy.

b) Non-surgical straightening of deformities

Most of the time patients come late for treatment and have developed limb deformities by retraction of the stronger muscles. Even though all the muscle groups are affected, it has been noticed that paralysis concerns mostly the tibialis anterior, the quadriceps and the glutaeus maximus, causing the triceps surae, the ischiatric muscles and the tensor fasciae latae to predominate, leading to a pes equinus and a flexum of the knees and hips. When the retraction is older, there may be also very severe joint distortions, due to a delayed development of the femoral aponeurosis (tractus iliotibialis), the capsule and ligaments.

At the level of the ankle, the equinus is often compounded by a varus; at the level of the foot, an adduction of the foot and a pes cavus are frequent; while at the level of the knee, the combined retraction of the tensor fasciae latae and of the ischiatric muscles on the one hand, and the delayed development of the posterior capsule, cause not only a flexum but an internal rotation of the leg, a valgum, a posterior and lateral displacement of the tibia in relation to the femur and a coaptation of the joint, which make it particularly difficult to straighten the leg (Jaumotte, essay, 1968). At the level of the hip, the tensor fasciae latae usually causes a flexum-ductum of the hip. The skeleton of the paralysed lower limb is usually shorter by as much as 15 cm.

In order to prevent or control these deformities of the lower limbs, treatment resorts to different procedures, depending on the severity of the paralysis or deformity:

- cotton wool dressing at the onset, to maintain maximal circulation (Kabule-Katenge, 1985)
- placing the limbs in extension through holes in a board is a traditional method and is efficient if applied from the beginning, before retraction starts;
- massage, which yields satisfactory results if practised regularly, but involves a high cost in personnel;
- strengthening muscular force in order to obtain a functional benefit. In this connection it must be remembered that walking with an appliance causes natural tonification;
- mechanotherapy, which gives interesting results in cases of severe deformities, provided that the patient tolerates a relative immobilization (which is difficult to achieve) and that posture is closely checked, in close collaboration with the patient (Huckstep, 1975);
- appliances allowing the knee to be extended, with an endless screw for simple flexum (Martin, Kalima report, to be published);
- the orthopaedic plaster cast, when applied to the knee, should not harm the vascular-nervous bundle. Control by plaster cast should therefore proceed gradually by gaining about 10 degrees a week; it should be supervised by a member of staff not only specialized in joint correcting casts but also being aware that an immobilizing cast is different from a correcting one, and conscious of the specific danger of gangrene (see straightening plaster cast, on p. 835).

Several of these techniques can be applied simultaneously or successively. Treatment should be supplemented by an orthopaedic appliance and walking exercises with or without crutches, or with sticks with supporting handles (Canadian walking stick).

c) Orthopaedic surgery

When rehabilitation can benefit from surgical procedures, the rehabilitation centres can ask for a surgeon.
The most common problems are:
- tenotomy of the triceps surae tendon in width, thickness or by lengthening thanks to a Z incision of the lateral and medial ischiatic tendons;
- tenotomy of the tensor fasciae latae and of the tractus iliotibialis at the level of the knee or the thigh;
- tenotomy or desinsertion of the tensor fasciae latae at the level of the anterior and superior iliac spine and, if necessary, desinsertion of the tractus along the iliac crest in cases of a severely retracted hip.

Some surgeons also operate on the superior insertion of the anterior rectus.

The surgical procedures are usually followed by the application of orthopaedic plaster casts for gradual extension, which are to enhance the benefit of the operation and to take into account all the deformities.

The number of polio patients helped by various treatments in Goma was 2,670 from 1968 to 1991 (Goma Centres, reports; ACHAC, 1974; and see the essays: Nakakudulu, 1967; Jaumotte, 1968; Huckstep, 1975; Delcroix, 1978; Mukabarayiriza, 1980; Seynave, 1982; Kakule-Katenge, 1985).

1.1.2. Paraplegia

In 1972 the hospital in Katana referred the first paraplegic patient to the Goma Centre, for fitting with an appliance and training to walk. Then a second one came from Kirotshe and was admitted with the proviso that he could be accompanied by an auxiliary nurse to avoid bed sores by daily care. A rehabilitation of the spastic bladder, through large fluid intake and emptying the bladder regularly, enables the paraplegic to avoid the disorders caused by incontinence, even if severe spasms of the lower limbs sometimes cause involuntary micturition. This was the origin of a department which was to grow and to admit paraplegics and tetraplegics from the hospitals all around.

Dr Król, a Polish orthopaedic surgeon, sent by WHO on an assignment to study rehabilitation, gave some elementary principles for the care of recently affected paraplegics. The traumatology and rehabilitation centre at the Brugman hospital in Brussels served as reference and support through various contacts, and above all by sending an occupational therapist to the Centre.

Regular training of the staff and of auxiliaries for rehabilitation was started; and it took advantage of the experience acquired, the contacts established, and an excellent set of treatises (Medico-surgical Encyclopaedia: locomotor system, physiotherapy, neurology; Minaire, 1979; Hosquet, 1986).

From 1973 to 1991 more than 150 paraplegics were treated and rehabilitated at the Centre, in a special pavilion and with special staff to ensure proper care: a physiotherapist, an auxiliary in rehabilitation, and a male nurse (Martin, Goma reports 1973-91, to be published).

At first sight, it might appear rather difficult to treat paraplegics in Central Africa, because of their trophic and urinary disorders, especially if one considers that no personnel were trained to cope with these handicaps:
- the trophic disorders very rapidly cause sores and ulcers if adequate care is not taken to prevent their occurrence;
- incontinence often requires the insertion of a permanent catheter, a frequent source of urinary infection;
- the bedridden condition of the paraplegic causes total invalidity, and the environment makes it virtually impossible for him to resume work. This may lead to both a depressive condition and social rejection.

In order to have some chance of success, action for the paraplegic must solve these major problems:

a) Bedsores

Preventive measures and care generally resolve the problems the bedsores can cause.

- for prevention, the main principle is never to leave the bedridden patient in the same position for longer than three hours, day or night. A strenuous routine must therefore be followed of turning the patient over night and day, and this from the very beginning. For most patients it is a matter of survival.

It is advisable to train the staff to turn the patient over in one single movement so that his spine is not distorted. During the first weeks following the trauma, once the spinal shock has faded and if the spinal chord has not been sectioned, there is hope of some nerve recuperation.

Then the patient must learn to turn over himself, and the family must be taught how they can help him; and this from the beginning of his admission.

The paraplegic will have to stand up from his wheelchair every hour, be it only for a few seconds, to modify gluteal support. He should push up on his extended arms to detach his buttocks from the seat. On the other hand, he must be careful to lie down for a quarter of an hour every other hour.

In order to help him to recover an acceptable osteo-articular function, the patient should regularly be raised to stand up.

For the bedridden patient, a hard surface should be provided, to be put under a foam mattress 12 to 20 cm thick. The bedding must be absolutely dry and clean, and the heels should be raised by cushions placed at the level of the lower third of the legs; the knees must also be kept apart with another cushion.
PREVENTION

The seated patient can use a foam or a water-filled cushion.

One must not forget to teach the paraplegic:

- to use a mirror to check if red patches, localized oedema, phlyctenae or epidermal losses develop;
- to massage systematically the sensitive regions, if the body remains long in the same position.

- for the care of bedsores: as soon as they appear, one must avoid any pressure on the affected site by positioning foam cushions on both sides, and having holes cut in the mattress so that the bedsores rest on air. The patient should, by assuming consecutively one of the three positions possible, avoid putting pressure on the sores. Thus for a left anterior trochanter bed sore, the patient shall avoid lying on the left side and shall instead lie either on the right side, on his back or on his abdomen. A massage with ice around the bedsores favours vasodilatation and therefore tissue nutrition; a trophic massage to make the bedsores bleed will also help tissue regeneration. This massaging should be done each time the wound is cleansed, if possible with sterile gloves or prior disinfection of the fingers.

In case of infection, cleanse with Dakin’s solution and dress. As soon as the wound is clean the bedsore develops regeneration tissue.

b) Urinary disorders

Great care shall be taken in cases of urinary incontinence on the one hand and of retention on the other, as the latter can cause a reflux towards the kidney, with infection and renal failure which may end in coma and death.

Incontinence may develop immediately after the trauma, because the spinal cord is in a state of shock and the bladder has no tonicity, usually for 4 to 8 weeks. If the damage to the spinal cord is low, with destruction of Budge’s nucleus in S2, S3 or S4, for a bone lesion at the level of L1 – L2, it will be imperative to introduce a permanent (balloon) catheter in sterile conditions, to avoid wetting the sheets and still to be able to turn the patient over. For lower lesions, the bladder is emptied by abdominal pressure; this type of lesion causes severe urinary complications and infections because the bladder can seldom be emptied properly and is usually left with a substantial urine residue.

Retention: four weeks after a trauma, the so-called automatic bladder recuperates by spinal reflexes. There is then a risk of retention, which should be treated by catheterization or regular evacuation. When the catheter is removed the patient shall be told about the parasympathetic symptoms of bladder overflow, such as chills, sweating, headache, and feeling heat over the lower abdomen; and reflex evacuation can be triggered by tapping on the pubic or sacral region when the bladder is sufficiently dilated.

For a good urinary function, one must drink enough fluids (three litres).

Rehabilitation of patients in emptying their bladder requires the establishment of hourly reflexes by drinking at given times and emptying the bladder two hours later.

As soon as the problems of bedsores and urinary disorders are taken care of, one must of course undertake the early recuperation of all possible muscles.

To reach the sitting position one can proceed in the following way:

- keep the patient lying down to stabilize the spine;
- between the third and sixth month make the patient gradually sit up, using an adjustable backrest and a Jewett corset to prevent kyphoscoliosis.

A simple Jewett corset can be easily made with local material; it helps to support the trunk in the antero-posterior and lateral positions.

c) Social reinsertion and resumption of work

The concern for social reinsertion should appear from the first consultation as it will guide the different actions to be taken.

Thus a recent paraplegic with bedsores should be prepared for his future activity at the very early bedridden period. This may involve for a student, the placing of a small lectern in front of him, so that he can read and write in a prone position while avoiding a dangerous posture for his bedsores. One must never wait until the end of the treatment before preparing social reinsertion. By that time, the patient’s view of himself as handicapped will have been aggravated by his long period of inactivity; whereas resumption of work in bed puts him immediately into another category. Even lying down, he can be moved on a rolling bed to attend classes during treatment.

This social reinsertion does not mean making decisions in place of the patient about his future occupation. Due account must be taken of the patient’s future way of living and of local conditions, as well as of his handicap to determine how he can adapt: for example adaptation of the way of moving, adjustment of the habitat so that a tricycle can enter. A hut will have to be built for the patient near the market or the school so that a former tradesman may resume his work or a student return to his education.

From the very beginning, when passing from the lying to the sitting position, the patient should be
motivated to work. Every effort should be made to find out what he can do, considering his age, his past and his mental aptitudes. Studying is to be encouraged; and secretarial work, even in a recumbent posture, is possible. Taking part in simple but remunerated handicrafts is an interesting line to consider for him as for all the disabled.

To resume work, using a tricycle or a wheelchair to move around, as described in the chapter on history at 2.2.3., is very important, provided the recommendations expressed for the sitting paraplegic are duly followed.

1.1.3. Bone tuberculosis

Patients with bone tuberculosis must receive antituberculosis treatment, but at the same time, the joint involved must be correctly handled for orthopaedical preservation.

a) Vertebral tuberculosis

As soon as a patient with Pott's disease is admitted, the spine must be examined by palpation, pressure, and percussion, in order to localize accurately the damage and assess its severity. The erythrocyte sedimentation rate, often very high in active cases, emphasizes the link between the severity of the course and the orthopaedic treatment. In case of doubt and where possible, a radiological examination, especially in the lateral position, is most valuable.

In all confirmed active cases, it is advisable first to have the patient lying on a hard plane during the whole treatment, as rest and improvement of vertebral posture come into play. If strict rest in a supine or prone position (the latter less comfortable) cannot be guaranteed day and night, the lying position must be maintained with a plaster corset applied with maximal correction of the kyphosis, and in maximal extension of the thoraco-lumbar spine.

This corset helps to avoid or reduce the collapse of the vertebrae thanks to a dorsal and paravertebral support at the level of the most damaged vertebrae, with a pubic or sternal counter-support. In this way, reduction of the kyphosis during the tuberculosis treatment is achieved, or at least its further deterioration is avoided; in incipient paraplegia, the paralytic signs and symptoms are thus often dispelled.

The corset is made by staff trained to apply correction plaster casts. If no orthopaedic table is available, such a plaster corset can be applied to the patient while held manually aloft, an exhausting procedure; or suspended by a Seyres' collar, a contraption easy to make. But it is usually more comfortable for the patient and the staff to place the patient prone between two tables, so he is already in a position which corrects the kyphosis. The staff will then stretch the spinal column by pulling on the cervical column, with a counter-traction at the level of the pelvis and thighs.

This type of corset, having as its main purpose the straightening of the spine, demands special attention for respiration and digestion, a double problem, all the more so as the thoracic and abdominal respiratory capacity of the patient is already reduced by pain and kyphosis.

It is necessary to ensure the patient's comfort by placing a protective pad on the navel, using a large amount of cotton wool or some other material, which is removed when the cast has dried. Although functionally ideal, such a corset is hardly elegant and is somewhat cumbersome. A large window can be cut at the level of the stomach, although the section of the anterior splint makes the cast weaker.

Dorsal support at the level of the angulation of the spine is applied by two small posterior paravertebral splints, protected by a thickly padded cushion to avoid damage to the posterior spinal processes. The sterno-pubic support can be moulded on a long anterior sterno-pubic splint. The splints should be made of six layers of plaster bandage. Sternal support should rest only on the sternum and allow maximal expansion of the ribs forwards and laterally, thanks to a suitable amount of padding on both sides of the sternum and all around the thorax. The pubic support should not compress the abdomen.

For a maximal extension of the vertebrae, two lateral splints shall support the upper third of the thorax, avoiding the armpits, and join a broad pubic splint resting on the iliac crests. The number of points of support and counter-support help to estimate the number of assistants necessary to make the corset. In the case of Pott's disease, there are eight points of support and counter-support, which requires at least six people, taking into account the two persons who have to exert traction and counter-traction.

The corset should be worn for two to three months. As soon as the plaster is dry, the excess padding should be removed, to avoid compression of the abdomen and thorax. Cuttings could be made at the level of the armpits and hips, with removal of excess padding at the level of the pubis to allow flexion, mictertutation, and sitting posture. (Martin, personal technique, to be published).

b) Tuberculous coxarthrosis

In this case, while a plaster cast is necessary or advisable to avoid hip ankylosis in an unsuitable position, the patient should be put in a functional position,
with a pelvi-crural cast at 150° in extension. This intermediate position enables him to walk because of a compensatory lordosis and to sit on a specially adapted chair, with part of the cast cut.

1.1.4. Leprosy

a) The leprous hand

- In light cases, active and passive mobilisation is added to the medical treatment.

  If pain is too severe, it may be necessary to apply a foam splint in a functional position. If pain is unbearable, a traction splint should be stuck against the fingers to prevent clawing.

  When stiffness is set, it is difficult to treat; one can try to reset extension of the wrist and flexion of the metacarlo-phalangeal joints.

- The moderate and severe cases require surgery. In this connection one should remember that anaesthesia of a lepros patient always entails the risk of a leprosy reaction. Moreover, before any surgical functional correction is undertaken by tendon transplantation or involving bones and joints, it is essential to apply the following programme:

  - physiotherapy and movements;
  - surgical release of the osteo-ligamentary canals in case of reactive damage, if necessary after a course of medical treatment;
  - surgical treatment of excessive cutaneous adhesions or retractions.

- In case of failure, it is important to stabilize the wrist, as this permits a certain use of the thumb-finger forceps (Coutelier L., 1970; see also the chapter Leprosy, p. 1419).

b) The leprous foot

  Trauma should be prevented by educating the patient and by wearing simple shoes or sandals. The sandals, made of microcellular rubber or resin, shall be suitably moulded and worn regularly. Moulded sandals help avoid traumatizing pressure on ulcerated zones. Plaster cast boots are occasionally indicated (Coutelier L., 1970; WHO, 1959).

1.1.5. Amputations

Models of prosthesis are either classic, adhesive or contact prostheses, including articulated models, which can be manufactured from local materials by local craftsmen.

a) the simple classic prostheses may be made by a shoemaker-fitter without any previous moulding, with a wooden leg and without articulation.

  Thus a leg prosthesis can be made with a light wooden board as a sole, under which a piece of tyre is fixed; it shall be articulated at the level of the heel with an iron rod of 6 to 8 cm width, long enough to be fixed to the knee or the thigh; at different heights, loops of iron wire in which leather straps are passed will enable to fix the prosthesis to the remaining limb.

  Now however, the same level in orthopaedic correction is demanded as is achieved in Western Europe.

b) The second type of prosthesis requires a technician, and an accurate moulding of the supporting points – ischiatic or sub-condylopateal – by using first a negative plaster cast, followed by a positive model in concrete (if plaster powder is scarce).

c) The Jaccard brothers, in Yaounde, have devised an adhesive prosthesis, quite practical for regions of difficult access as it can be adjusted gradually in three stages without great transport costs. They have come to Zaire to teach local technicians their ingenious method.

d) Although contact models favour the return of venous circulation in the stump and are very convenient for some patients, they cannot be used everywhere because they require a surgical osteomyplasty and great care in fitting. The surgeon must carve the bone stump round, cover it up with a muscle padding and stitch the whole on the side, away from the site of pressure (he has to cut out the skin so as to form a large flap which can be lifted high enough).

Some models of prosthesis made from local materials give an excellent functional result. Here are two examples:

1) the flexed stump prosthesis

  The supporting pressure is applied on healthy skin at the anterior side of the stump and the prosthesis is maintained by a strap at the calf, so that this model does not require moulding. It can be made with iron rods, round or flat, and a wooden leg or foot.

  With such a prosthesis the amputee can do heavy work, particularly in the fields.

2) The foot prosthesis

  In town, it is psychologically important to be able to place a wooden shoed foot at the end of the prosthesis. Craftsmen are often very skilful and can make a wooden foot locally, provided a model is available.

  The foot is made up of three pieces: a heel, which receives the stick, a medio-tarsal part which must be oblique with a difference in level of 1.7 cm, and a forefoot which is adapted to the shoe. The three pieces are connected with four small rubber cylinders, about
4 cm long and 7 mm across, cut out from old tires. These rubber cylinders are placed in holes drilled in the wooden pieces: two between the heel and the mediotalar part, and two between the latter and the forefoot. The three pieces are also linked together by a sole made of tyre and an upper leather strap, which is nailed to the three pieces.

The possibility of wearing a shoe is a great social boost to the amputee, and the drama of amputation is better tolerated when he or she can wear clothes and shoes to conceal the handicap, even if a light limp persists.

1.2. Non-orthopaedic handicaps

1.2.1. Elephantiasis

In Central Africa, elephantiasis is not uncommon. The frequency of non-filarial elephantiasis has been mentioned by several authors (Lowenthal, 1934; de Meira, Somnes and Nogueira, 1947; Clark, 1948; Jordan, Grant and Laurie, 1956; Oomen in Ethiopia, 1969, in Cameroon Hardy and Pooley, 1981). Later Price develops the hypothesis of an aetiology peculiar to volcanic regions (Price, 1974; 1976; 1978; 1980; 1981; 1983; 1984; 1986).

Having carried out epidemiological surveys in Ethiopia, then in Rwanda and Burundi, Price noticed a prevalence which, in certain regions, could reach up to 2% of the population.

Animal experimentation suggested that the action of silicium on lymphatic nodes and vessels might be the real cause of non-filarial elephantiasis. The silicium absorbed by the plantar arch was thought to provoke an obstructive lymphatic involvement (Fyfe and Price, 1986; see the chapter Dermatology, page 869).

Eventually, whatever the cause, oedema of the leg always develops into elephantiasis hard oedema, with a fibrous pad on the dorsum of the foot and a verrucose aspect of the skin down between the toes. In the latter case the term mossy foot is used.

In the Kivu highlands, elephantiasis is widespread in the volcanic zone between lakes Kivu and Rutanzingue (previously lake Edward).

During a village-to-village examination in September to October 1977, it was found that 59 out of 927 patients (6%) had elephantiasis. This attracted attention to the seriousness of the problem in the volcanic region of Goma, and the studies made by Price became known.

On the other hand, a missionary from Nyundo leprosarium was then taking follow-up care of leprosy patients in western Rwanda. This area is, like Goma, located near the Nyiragongo volcano; and he treated the many cases of elephantiasis by regular dippings in salt water for half an hour, then brushing the skin vigorously with a hard brush or pumice stone. Thus all the cracks disappeared and the skin became pink. Moreover, the patients, to avoid their feet touching the ground, were given with good results, sandals of the Samaritan type, made of used tires (de Terwagne, personal communication).

On the basis of those observations, the training of auxiliaries in rehabilitation included a course on elephantiasis and its treatment. The students learned to apply the treatment; and more than 300 patients were followed between 1977 and 1991 in the out-patient service of the centres of Goma and Ruhengeri.

Questioning the patients brought to light other factors:

- when nodules appeared, a biopsy was made, which often confirmed a Kaposi sarcoma;
- following a wound in the lower third of the leg, the rapid development of lymphoedema above the wound excluded the volcanic nature of the ground as the cause of the disease and pointed to an infection;
- concomitant leprosy was detected once.

Treatment consisted of soaking and brushing the foot and leg for an hour and a half, then compressing them during 8 to 15 minutes with bicycle inner tubes. Then an evacuating massage was applied for 3 to 10 minutes, the foot being raised, and passive and active mobilization with muscle tonification of the anterior tibialis, sural triceps, flexor and extensor or the toes first without and then with resistance. Such a treatment seems to have yielded lasting results.

A locally manufactured shoe or boot is not yet easily accepted by most patients, some of whom eventually wear normal shoes or slippers. In any case one should ensure that the shoe is properly aerated.

In case of a wound, permanganate or Dakin's solution was added to the water in which the foot was soaked.

When chigger fleas (Sarcopsylla penetrans) get into the cracks, they have to be removed.

The course of the disease may be influenced by two factors:

1) The reduced volume of the oedema in the morning in some patients suggested that moulded boots should be put on before getting out of bed, which lessened the pain and made walking possible, which also reduced oedema; the use of compressive dressings applied to the patient while his legs were raised gave also good results.

829
2) an anti-infectious treatment reduced the frequency of fever bouts and the swelling of the lymph nodes in the groin.

Most of the people treated were satisfied with the results. Inflammatory attacks and pain, in particular at the level of the lymph nodes, disappeared. If treatment was regular, the swelling decreased after 8 to 10 days, and the patient could walk again (Report of ACHAC’s Eighth General Assembly, 1990).

1.2.2. Sensory handicaps

a) Sight deficiencies
   - The young blind can be sent to school; but no special class can be set up for less than five children.
   - The first out-patient service in a given region usually includes a census of the blind, so that their number and age can be known in order to estimate the possibility of opening a class.
   - To teach in Braille, special staff must be trained for three months. Braille typewriters are necessary, as well as textbooks written in that alphabet.
   - The older blind have to be trained in a trade or craft such as basketry, massage, etc.
   - Apart from the blind, people with deficient vision must also be helped.

A few basic data should help the visiting optician or ophthalmologist: the time of onset of the disorder, a rough description of the external condition of the eye and conjunctiva, reading capacity and vision at a distance of five metres are recorded on a card. Some social data should be mentioned too. It is easy to obtain a box of lenses, a focometer and some spectacles, so as to handle simple problems straight away.

A few ocular problems have been included in the courses on non-orthopaedic handicaps followed by the auxiliaries in rehabilitation in the Shirika Ia umoja Centre at Goma.

b) Deaf-mute

It is interesting to note that, with a little pedagogical common sense, the deaf can attend the village primary school. They should sit at the first row and the teacher should be asked never to speak with his back turned, while he should articulate carefully and use gestures, drawings on the blackboard and other visual teaching aids. The village experience was quite positive.

A rudimentary examination is possible with a drum and a bell in order to have a rough idea of the auditory capacity; with an audiometer it should be possible to see whether a hearing aid is suitable (see the chapter ENT p. 888).

In a financially modest environment, the purchase of a hearing aid is justified only if it provides a substantial gain.

A one-month refresher course in speech for teachers at a school for the deaf helped the deaf children to understand much better, bringing great joy to the parents.

1.2.3. The neuro-psychiatric handicap

One may rightly consider an epileptic or a mentally deficient person as neurologically handicapped, in a similar way as the motor handicapped. What they have in common is that they cannot find a solution to their problems in their environment; and they have identical school and occupational difficulties, to be solved by the same social services or special schools.

a) The best example is to show how an epileptic, a case sent to hospital, was helped. The doctor said the patient could not be admitted to hospital due to the high cost and great length of the treatment; but the clinic could control the patient’s condition with phenobarbital. A male nurse could follow the patients, and on the other hand one of the leaders of the community managed a stock of drugs, purchased at wholesale price (Harding and Chruziel, 1975).

At the Goma Centre, more than 1,000 epileptics could thus be helped over 20 years.

b) For the mentally disabled, actions are best coordinated with the extension activities of social workers and should receive the support of the community; the all-purpose team, when they visit, are able to solve the major problems if any.

The essential point is to make the village aware of their possible role in helping the mentally ill and handicapped.

c) The retarded and behavioural cases who cannot follow a normal schooling tempo will benefit from special classes for no more than 10 pupils, and an adapted syllabus. A training course for teachers specializing in teaching the mentally handicapped was started in Kinshasa.

2. The priority approach

The priority in rehabilitation is first of all to approach each individual person. Emphasis should also be placed on the importance of rehabilitation within and by the community in which the disabled lives. This is a real community approach. Priority
should be given to the most severely handicapped person, while one should use modest means to help continue the rehabilitation work.

2.1. The personalized approach to the handicapped individual

In rural districts, even a light physical handicap is often a heavy burden, due to its socio-professional consequences classifying the disabled person as useless. In the cities, the handicapped are often equated with the poor and the beggars. In Swahili country, the term *maskini* is applied both to the poor and to the handicapped. The handicapped are therefore more or less seen as beggars. It is true however that in large cities begging is often one of the best sources of income.

It is therefore essential, in approaching the handicapped, to focus thought and action on the person as a whole and his or her possibilities for rehabilitation, rather than just to insist on the handicap, especially when it is already stabilized. More consideration should be given to the social than to the physical handicap.

For practical purposes, one should observe carefully and determine the primary need of the individual, taking into account his environment. One has to find a solution to the problem as a whole.

For a child in secondary school, with severe *genu valgum* requiring a two month’s immobilization cast, such a treatment should be programmed for the longer holiday period. If the child is in pain, a light correcting orthopaedic appliance should be applied immediately to control the joint pain, pending the treatment by the plaster cast. In contrast, if there are signs of infection, the first priority shall be to refer him for prompt hospital treatment.

2.1.2. Primary, secondary and tertiary prevention

If primary and secondary prevention are medical, tertiary prevention is social and should try to prevent or restrict the social consequences of the handicap.

When the handicap is stabilized or when no intervention can quickly reduce a settled, difficult handicap, or one with a poor prognosis, priority must be given to tertiary prevention, deferring the other measures.

The social impact of the handicap for the disabled will therefore have to be analyzed and action taken accordingly. The specific situation will thus be integrated into a whole set of therapeutic measures.

At the start, treatment of the tertiary prevention will also try to prepare the professional future of the patient by having him learn a suitable trade. For a student, for example, it will be important to facilitate his further schooling or vocational training even while he is in bed at an institution, which must be prepared to answer this aspect.

2.1.2. Social, educational and vocational reinsertion

It is essential to add social, educational, vocational and religious aspects to the medical treatment of the handicapped.

- Social action should tackle social disorder affecting the individual because of his handicap: the epileptic appeared as the most likely to emerge from his condition of social rejection, although an old belief subsists that the patient is contagious during an attack. Therefore children sometimes throw stones at him.

- Educational action should try to favour the admission of the disabled child into the common school, finding for example a lodging in the neighbourhood to give easier access to school for the paralytic.

- As regards vocational training, one should recall the possibilities for the blind to learn basketwork, for the handicapped of the lower limb to work at a hand-operated sewing machine, even in the village, and also for the disabled of both upper limbs to paint holding a brush in the mouth. Adaptation of the working post must not be forgotten during vocational training.

In a religiously minded community it will be easier to welcome the handicapped, as the deficiencies will be better accepted, so as to render rehabilitation quicker and more complete.

2.1.3. An imperative all-purpose approach: the multidisciplinary team

A multi-disciplinary approach is required to solve the various problems of the handicapped.

At the outset, the institution or the local community may not have all the services necessary. They should be added, starting with the services most likely to help the handicapped to be reinserted in the community thanks to a multi-disciplinary team, whose members will have to work together.

2.2. The community approach

A community may be understood in two different ways:

- geographically, meaning that the intervention is to take place within the community itself and will help all the handicapped of the area: this occurs when services are mobile;
- actively, meaning that the community should play a part in the rehabilitation of the handicapped person or even assume the major responsibility for the action to be undertaken. This is what is really meant by community rehabilitation (see p. 833)

2.2.1. The mobile services

They start from a centre which visits the community where the handicapped person lives and consist of mobile teams.

They endeavour to save the disabled person the trouble of having to travel, and visit him or her at home or near home.

They can concentrate on a particular handicap, as is often the case for screening and treatment services for leprosy; or they can be all-purpose, and consider all the problems of the handicapped in a given geographical region, including motor, sensorial and neuro-psychiatric handicaps. At the beginning, the mobile services assume the follow-up of former patients.

The service may consist of only one person, a physiotherapist, or a team, with a physiotherapist, a social worker, and an orthopaedics technician with all the equipment for repairing orthopaedic appliances.

In the early days, the Gatagara mobile team would make several visits per year to some peripheral points called the homes of young handicapped schoolchildren. The team would come to repair appliances and to try solving social problems.

At present, the mobile team fulfils several functions. The physiotherapist listens to and examines new as well as long-term patients, makes measurements and supplies orthopaedic appliances; he also selects the children who are to be referred into the centre itself. The orthopaedic technician repairs or adjusts the defective appliances and the social worker tries to ensure an optimal integration of the handicapped in his environment.

During the visits, the team members also help the local auxiliary initiated into the elementary techniques of physiotherapy and give him further training (see p. 834).

The mobile team may be permanent, travelling all over a territory throughout the year; or it may be occasional, depending on demand.

The occasional mobile service is commonly requested by the communities themselves and is in fact part of community rehabilitation (see p. 833). The communities have been motivated to cope themselves with their handicapped; they express their wishes as to the time, duration, programme and number of staff they need from the mobile service. Moreover they organize their reception, board and accommodation. Sometimes they cover part of their travelling expenses, and arrange for a local institution to cover the cost of orthopaedic appliances for the poorest when the family cannot pay for the material.

The mobile team’s visit is preceded by a basic census of the disabled; and two scenarios may appear: - either the community engages an auxiliary in community rehabilitation (ACR), who examines the handicapped and starts a simple treatment, referring only those cases he cannot handle himself. The team’s visit is then an opportunity for his further training and for exchanges of information and views.

- alternatively if there is no permanent auxiliary in rehabilitation on the spot it is useful to have an additional auxiliary in the team, in order to save time for the physiotherapist. This auxiliary shall see the patients prior to the orthopaedic consultation, complete the details of their handicap on the basic rehabilitation card, and refer patients needing appliances to the team’s orthopaedic technician.

The auxiliary shall refer to the physiotherapist any complex problems such as paraplegia and aching hips.

When examining paraplegics who are often long-term patients, the graduate physiotherapist should locate the spinal level involved and give a prognosis as regards bladder rehabilitation. He should also explore the trophicity of the skin and the risk of pressure sores; prepare the social reinsertion of the patient; or consider the possibility of getting a bedridden patient into a sitting position or even ultimately see whether a tricycle or a hand- or motor-operated wheelchair can be used, taking into account the geographic environment.

For an aching hip with shortened limb, the physiotherapist shall try to detect a dislocation by comparing the position of the great trochanter relative to the anterior and superior iliac spines; he shall consider how to take weight off the hip by means of an appliance with ischial support.

At the time of the team’s visit, the community health auxiliaries should be present with the handicapped whose problems they can explain. Thus the team staff will be well informed.

When a handicapped person is referred to a better equipped centre, the auxiliary in rehabilitation shall accompany the patient together with a family member. This gives an opportunity for training the auxiliary.

The visits of the mobile services should be long or short depending on the needs of the community. The team may stay for one or several days, sometimes a
fortnight, and the local auxiliary can be further trained. The team may remain in the same place or may travel from village to village. The geographic area covered by the mobile service of the Goma Centre from 1977 onwards was about 29,000 km², that is about the size of Rwanda or Belgium. Access to some places is so difficult that they can be reached only after two days' travel on bad roads. That is why some areas are visited only once a year.

The mobile team's work may be considerable: in 1990, the Gahini team, for example, examined 1,409 patients, of whom 575 were hospitalized, 272 were outpatients, and 562 were disabled children (Pinchart, 1991).

The programmes are coordinated with those of the medical training courses; and the chief doctors of the areas are kept informed and up-to-date. The mobile services may be combined with those of other teams such as for leprosy control, to reduce travelling costs.

Mobile services are always in charge of consultation, orientation, supervision, motivation and training of the local staff. They sometimes pave the way for permanent services.

2.2.2. Community rehabilitation started by the local population

As the grass-roots communities became aware of their responsibility to take care of their handicapped members, their achievements led to a new dynamic in rehabilitation (see p. 822). As in the case of Primary Health Care (PHC), this dynamic stemmed from the confidence and maturity shown by the population in dealing with their own problems, in particular those of rehabilitation and reinsertion of the handicapped into the community.

Rehabilitation by the community is a priority, especially where adequate personnel is not available and where the social and financial conditions of the patient do not allow a satisfactory recovery.

Once motivated to take their handicapped in charge, the communities have to think about solutions for different handicaps. In Christian communities, the bishop actively requested this action, which made the communities discover the handicap phenomenon: in one place a leader had estimated the number of handicapped in need of help to be about thirty, but in fact 750 turned up. This led the communities to request a visit from a mobile team.

Some basic communities chose to send two young people to be trained at a School for Auxiliaries in Rehabilitation. They were chosen by the community leaders who contributed one zaire (local currency) per person and per month. When training was completed, the auxiliaries visited the 200 villages in a region 1,600 km² large, examined more than 1,250 people and wrote complete records which were analysed by their referral centre. They could even start treatment in physiotherapy and orthopaedic casting in cooperation with the health centre and make simple appliances, pending the annual visit of mobile services.

On the basis of these experiences, real community rehabilitation was developed in which the mobile services helped the assistants to find local technical, social and educational solutions for each handicap.

This system differs from individual rehabilitation in that the community in which the patient lives takes part in the rehabilitation and can carry it out for a larger number of people. The community can also ensure the daily supply of drugs for epileptics; and decide about schooling, social and professional issues in consultation with the teacher or the social service. It will refer only patients with a particular problem.

Such a system is workable if the qualified staff understand that, when care of a disabled person is entrusted to the community rather than being undertaken by the medical team, management of the treatment should be organized differently so as to be carried out by auxiliaries and community members. This multiplies the possibilities for action by the graduate staff, but requires proper training of the auxiliaries and regular supervision.

2.3. Priority for the most severely handicapped

Despite of the financial pressure to take better care of the rich, it is essential that the most severely handicapped receive all the time, care and attention that they need.

The most severe handicap is often the most time-consuming. The personnel shall therefore devote to a complex handicap whatever time is necessary and make use of auxiliaries. These helpers clear the ground by a preconsultation, so that enough time can be reserved for more severe cases.

The whole team may have to be mobilized to turn over correctly a tetraplegic under cervical traction keeping the cervical spine immobilized in relation to the dorso-lumbar column.

3. The various technicians – the substitution principle

In countries where the medical, social and educational problems of the handicapped are easily solved, one has only to orient each of them in the right direction. In Africa, however, one continually encounters a
dearth of personnel and means. Principles about competence or incompetence, graduate or non-graduate personnel are often inappropriate to local circumstances. One has to use the personnel available, in order to meet the local requirements.

One often hears: “Our hospital cannot handle polio cases because we have no orthopaedic appliances.” This is true in the case of elaborate orthopaedic appliances, but with a little ingenuity a simple apparatus can easily be contrived, using local materials and unqualified personnel.

Or again: “We haven’t got the time to handle chronic patients, we are already overwhelmed by emergencies.” This again may be true, but everything becomes possible when elementary interventions have been handled by an aid so that the doctor has only to answer specific points, and when properly supervised auxiliary personnel can assume the post-operative care.

In this way the doctor has been involved in the case, but in terms of time his involvement has been reduced by the work of the paramedical and technical staff.

3.1. The medical staff, physician and surgeon

Rehabilitation is to be either integrated into hospital activities, using the available medical and nursing staff, or else handled in centres for the handicapped.

A physician has certainly to specify the diagnosis and prescribe a medical or possibly surgical treatment, but the rehabilitation procedures can be handled by the physiotherapist and the orthopaedist in a separate centre.

To take an efficient part in rehabilitation, the physician should see his work integrated into a larger whole which includes physiotherapy, appliance-fitting and social reinsertion. Thus the doctor’s attitude will be different in the case of osteomyelitis and arthritis which are painful conditions requiring an immediate medical solution, and stabilized handicaps such as long-term poliomyelitis, stabilized Pott’s disease and posture retraction whose treatment should fit into full rehabilitation, including a programme of schooling or vocational training and social reinsertion.

The surgeon should not intervene except in cases where a satisfactory result can be obtained only by surgical techniques, as for gangrene or for releasing embedded nerves in leprous patients.

The surgical techniques should be simple, easy to practise without special material, particular anaesthesia or transfusion, and with little risk of infection.

For anaesthesia, ketalar was of considerable help, especially in children.

A surgical operation must always achieve great progress in local reinsertion or else be excluded, to avoid the patient’s condition being worsened in a social environment which cannot deal with his problems.

When the diagnosis is uncertain, extensive surgery should be undertaken only after careful consideration.

3.2. The physiotherapy staff

Although doctors who are often overwhelmed by emergencies have only limited time to spare, orthopaedics remains an uncommon speciality, at least in rural regions or simply in the country’s interior. Apart from the medical and surgical aspects, competent paramedical staff can meet the patient’s main needs and handle most factors of his rehabilitation.

To deal with the needs of the handicapped, the qualifications of the physiotherapist were extended in three stages:

- first, for conditions where no physician or surgeon is available to assume the orthopaedic treatment of a motor handicap, the physiotherapist trained along European lines is invited to supplement his knowledge to include handling an orthopaedic consultation, manufacturing, redressing plaster casts, and prescribing and fitting orthopaedic appliances. In addition, he should be given some notions of X-ray interpretation so as to be able to deal with the most common local problems. Staff given this training can then do the work of a physiotherapist-orthopaedist.

- secondly the physiotherapist must provide a global rehabilitation for the disabled person, as well as solve any scholastic, occupational and social problems, so becoming a full physiotherapist-rehabilitator.

- thirdly, because of the importance placed on the part played by the community, the work of the physiotherapist must be integrated within the community’s way of life. As nearly half of the requirements of the handicapped are not orthopaedic, the physiotherapist assumes the role of adviser and even becomes the sole person directly responsible for the handicapped and their problems. He thus becomes a community physiotherapist-rehabilitator.

This combination of competences becomes especially necessary where no particular social or medical service can deal with the needs of the handicapped.

3.2.1. The physiotherapist-orthopaedist’s tasks

1) The orthopaedic consultation

While keeping strictly to the ethic of referring all medical or doubtful cases, the physiotherapist should be able to make an accurate assessment of muscle
capacity, joint condition and bone deformations (using goniometry, measurement of the shortening of a lower limb in relation to the other, examining hip or shoulder dislocations and vertebral posture). In the case of osteo-articular aches he should examine the structures involved by pressure and percussion of the spine, palpation of tendon, ligament and capsular insertions, mobility with or without muscle contraction and assessment of bone fragility; and should give a functional assessment of gait or other movements. In non-evolutive chronic conditions, he must be able to recognize hemiplegia, poliomyelitis, traumatic paraplegia, etc.

2) Orthopaedic appliances

Where there are few surgical possibilities, or even after surgery, an appliance devised by the physiotherapist-orthopaedist can be a very useful complement.

3) The orthopaedic or straightening plaster cast

In the course of his training, the physiotherapist is taught to apply orthopaedic plaster casts, especially to gradually straighten a distorted limb by successive casts. This procedure offers great possibilities for children and can also help correct the retractions in poliomyelitis (Jaumotte, 1968; ACHAC, 1974; Kakule-Katenge, 1985).

In many cases, this procedure can replace surgery. At Goma Centre, 193 patients were treated by plaster casts, while surgery had to be resorted to in only seven cases (Centre Shirika La Umoja report, 1989).

a) Casts for joint correction differ from the usual immobilization plaster casts known by the nursing staff; and must be applied by specially trained staff, aware of the danger of gangrene.

Orthopaedic casts require a very accurate knowledge of distortions and of joint mechanics, with the components of the forces coming into play and the points of application with their directions. Specific splints are needed, as well as a sufficient number of aids for each type of procedure, while the anatomic and physiologic conditions must be taken carefully into account. This involves placing cotton wool padding in fragile locations.

For an extension plaster cast of the knee, where correction pressures may reach as much as 40 kg, it will be advisable to apply combined traction of the joint to prevent intra-articular distress, especially for the adolescent. So as not to hurt the patella sliding up into the cast when maximum extension is exerted, it is advisable to free it completely and leave the patellar tendon enough leeway. Thus the point of pressure is displaced to the lower third part of the femur.

For orthopaedic casts aiming at gradual extension it is advisable, in order to follow the progression better, to measure the angular deformations in degrees and the joint displacements in centimetres. This helps assess the efficacy of the treatment and, where the progression proves insufficient, to alter the procedure or to consult the surgeon.

One should remember that deformities are all the more difficult to control as the child reaches adolescence. Therefore, some institutions do not treat children of more than 12 years. After that age, joint redressing becomes difficult because tendinous, ligamental and capsular tissues have for a long while not been involved in overall movement.

b) Some cut-out plaster casts are useful for the gradual redress of various articulations. There are several possibilities:

- at the knee: the posterior side can be cut out in case of genu flexum, while maintaining a plaster hinge on the anterior side with a lateral hinge on the opposite side. In case of genu valgum or varum, the lateral part is cut out;
- at the ankle, the cut shall have the shape of an orange segment and shall be used for the polio club foot or pes equinus as well as for congenital club foot. The cut-out shall be lateral to correct an inward curved foot or pes varus and at the level of the metatarsus for the foot in adduction;
- at the hip: because for polio cases, the tensor fasciae latae usually provokes a flexum abductum, the cast shall be cut at the groin but extend on the lateral side, at right angles to the femoral axis;
In case of severe retractions, the cut plaster cast helps achieve a suitable extension of the hip, where surgery alone is helpless (Renotte, 1973).
- for scoliosis or even lordosis, the cast, cut at the side of straightening, gives excellent results.

The advantages of the cut plaster cast are quite interesting for orthopaedic procedures because it makes it possible to concentrate on the pressure points and the correcting forces in various planes. But blood circulation should be carefully protected. The danger of compression is reduced if the pressure areas are protected by cotton wool padding. Particularly to avoid damage to the Achilles tendon when cast angulation is changed, the extremities of the cast should be rounded off.

Very accurate correction is achieved by a piece of wood marking the expected number of millimetres to be gained.
Such a cast is also less painful for the patient than surgery. From an economic point of view, the technique helps to reduce considerably the amount of plaster necessary for each treatment, an appreciable saving as plaster still has to be imported and is quite expensive. With half a plaster bandage, the initial cast can be reshaped and as many degrees can be gained as with a new plaster cast. Such a procedure can be renewed three times, if the cast is reshaped every week. A cruro-tibial cast, properly cut out, permits an average extension of 10° and saves time, as padding, splints and cast can remain for a longer period.

3.2.2. The physiotherapist-rehabilitator

The preponderance of motor handicaps, as well as the very long-term care and rehabilitative process they require, justified the creation of a qualification of physiotherapist-rehabilitator.

Such a person must have a thorough knowledge both of the most common handicaps and of plaster casting and orthopaedic appliances. He shall play a substantial part in the orthopaedic consultation.

Being trained in a personalized approach to the handicapped person, his duties go beyond mere rehabilitation to deal also with the patient's social problems. He shall also insure proper coordination with services other than those of health, especially the social and educational services (see p. 840).

3.2.3. The community physiotherapist-rehabilitator

In addition to the tasks mentioned above, this member of staff is responsible for the rehabilitation personnel in a given geographic area. He works either at the referral hospital or in a centre for the handicapped.

He works in close cooperation with the medical, social and educational services. He supervises the rehabilitation team working on the periphery, motivates the chosen community members and trains health auxiliaries in physiotherapy and rehabilitation.

3.3 Nurses trained in physiotherapy-rehabilitation and nursing of paraplegic and psychiatric patients

A supplementary training for the nursing staff in hospitals is often desirable when applying specific physiotherapy treatment, particularly for the care of paraplegic patients, care of bed and pressure sores, checking the urinary output, and turning the patient over every three hours.

In psychiatric nursing, it is important to supervise the timely administration of drugs to epileptics and mental cases.

3.4. Technical personnel

This personnel must use local material for orthopaedic appliances and tricycles.

3.4.1 The orthopaedic fitter-tanner

The orthopaedic fitter is often trained on the job or in a school for arts and crafts. The entrance qualification in the latter case is completion of primary school.

The fitter can manufacture simple contraptions from local material: such as a leg prosthesis made with a light wood sandal covered with a piece of rubber tyre, articulated with an iron rod properly shaped to the crural contact point and fixed by leather straps on the foot, the knee or the thigh. A paper pattern can be used in the preparation of such a prosthesis.

The fitter shall be able to make more complex appliances such as prostheses, corsets and boots. He must be trained to be able to analyze movements in space, to correct the major orthopaedic handicaps, and to check the appliances.

The fitter can learn simple tanning procedures and thus become independent of outside supplies, often difficult to obtain (Duyck, 1991).

3.4.2. The tricycle mechanic

With water tubes filled with sand and heated with charcoal, the mechanic can bend the components of the frame and solder them. He can use bicycle spares available locally such as chains, pedals, cogwheels, wheelrims and tires, whose resistance should be adapted to the local roads (see motor tricycles manufacturing workshop, p. 819).

3.5. The health auxiliary

The health animator should have very clear, if rudimentary, knowledge of the most common handicaps in his region, and know what he can do at his own level to help the handicapped, their parents and the basic community.

3.6. Teachers, educators, and social workers

3.6.1. The teacher for the handicapped

Teaching for the handicapped should be of very high quality, as it is essential to compensate for the handicap. The teacher should receive a special training in teaching methodology.
REHABILITATION OF THE HANDICAPPED

Where it is possible to send the disabled child to school together with normal children, an adaptation of the class is often necessary such as a sloping ramp for access, or the positioning of the benches so as to enable a recumbent patient to find a place, or to put a wheelchair behind a table. The deaf should be able to sit in front. The teaching staff and the other pupils should develop understanding for the handicapped, and, for instance, not treat an epileptic fit as dramatic.

3.6.2. The educator and the social worker

Like the teaching staff, they should know about the specific handicap of each pupil, and attend the coordination meetings with the health staff, taking into account the environment to which the handicapped child is to return. On the other hand the child should be asked to do all he normally can, and not to try things he cannot manage. Mothers of handicapped daughters often tend to demand nothing of them, considering them incapable. Girls should therefore, as much as possible, be enabled to keep house, to grind food and make dough, to transport water and carry wood on their heads. In the case of an involvement of the lower limbs, they should find a means of motion starting with movement of their shoulders.

Physical training and sports should play an important part in the life of handicapped, especially in the case of the polio myelitis patient. He could play football, even on two crutches. The paraplegic can learn to swim as well as any other person and even do mountain climbing, an achievement and a victory which wipes out any inferiority complex.

The young handicapped person often himself becomes an excellent educator or even an auxiliary physiotherapist-rehabilitator.

3.7. Levels of competence

At village level enough staff should be available, with simple qualifications for very specific tasks, taking the financial realities and the need for rapid solutions into account.

Various levels of qualification can be foreseen, according to the educational status of the population; and these standards can gradually be replaced by an intermediate diploma. They can be clarified by comparing them with the various levels attained by the nurses and auxiliaries, whose usefulness has never been questioned (see p. 188).

It is absolutely necessary to use staff with a simple training in order to achieve efficient rehabilitation at community level. This can be done with proper supervision by the responsible in charge.

As schools for health personnel is too strictly medical, it would be better for the rehabilitation services to rely for training on Centres for the handicapped rather than on hospitals, which are not prepared to handle certain aspects of social rehabilitation and reinsertion.

4. Staff training

The candidate to be trained must first be chosen properly.

4.1. The choice of candidates

The candidate should preferably be selected from among people very motivated to take care of the handicapped. Otherwise, once trained, he will often look for more profitable employment. This is less likely to occur if the institution itself chooses the applicants, and gives them the opportunity to take part in its activities before being selected for training.

An entrance examination and a voluntary period of practice will also ensure that the candidate is sufficiently motivated to help the handicapped. The candidate’s human qualities can then be assessed before his possible admission.

A student getting a scholarship should be asked to sign an undertaking that he will return and work for a time equivalent to the scholarship’s duration. Should he choose not to return, he must reimburse the sum awarded.

The potential stability of the personnel trainees is increased by good relations during training, moral and financial encouragement, and help in finding work once they have graduated.

4.2. The training and the trainers

At the start of organized teaching in physiotherapy and rehabilitation, there was often the need to train staff for the institution itself. The first tuition was thus for internal use. Later, depending on the circumstances, outsiders were admitted, and eventually a formal training institute was founded.

Training given in a centre for the handicapped has shown to have had a definite advantage, in that the candidate can see at the outset what problems he will have to face later. The teaching is more practical, and the relational experience is better than in a purely educational institution.

It is also in centres for the handicapped that the best teachers are likely to be found, as they can transmit their own daily experience.
4.3. Types of training

The training should be need-oriented. It extends from elementary training in Physiotherapy and rehabilitation for the health auxiliary, up to specific training which will vary in duration according to the scholastic standard of the trainee and the level of responsibility, as well as to geographic area covered by the service.

We will consider three categories of training.

4.3.1. Community physiotherapist-rehabilitator

This training covered different levels according to the development of activities and the professional standard that could be attained. It consists at present of a two-year course, with 20 hours of theory and 20 hours of on-the-job practice each week. It was started in 1975 in Goma, where the Technical Medical Institute Shrika La Umoja was founded. This institute trained 73 lower secondary level auxiliaries, mainly from candidates selected by the centres for the handicapped of eastern Zaire, Rwanda and Burundi.

4.3.2. Assistant in community physiotherapy and rehabilitation

This State-recognized training has been carried out since in the same institute, and consists of four years' studies. It is reserved for candidates who have completed four years of secondary school and obtained the relevant diploma (Diplôme du cycle inférieur de l'enseignement secondaire).

There are on the syllabus some general courses common to upper secondary school (humanities); profession-oriented courses (applied Physics, Psychopedagogy of the Handicapped, Sociology, etc.); paramedical courses (General Anatomy, Physiology and Pathology with particular emphasis on the locomotor system, First Aid, Emergency Care); some specific courses on Physiotherapy, Orthopaedic appliance fitting, Orthopaedic plaster casts, theory of Gymnastics; some knowledge of the Radiology of the locomotor system, special Pathology of the locomotor system and of the non-orthopaedic handicaps; as well as training in health and community rehabilitation.

Personal specializations can be added if requested; and finally there is a one-year practical period at the end of which a dissertation must be prepared and discussed in front of a jury.

4.3.3. The graduate community physiotherapist-rehabilitator

At present graduate physiotherapists are trained at the Institut supérieur des techniques médicales (ITM) in Kinshasa. The three years of study are very similar to the training of the European physiotherapists. However those in charge are well aware of the lack of adaptation to local needs. The course should in future give greater consideration to orthopaedic consultation, the orthopaedic redressing of plaster casts, orthopaedic appliance fitting, and the pathology and treatment of non-orthopaedic handicaps, as well as to community rehabilitation.

The training of qualified physiotherapist-rehabilitators should be provided in Central Africa at the University of Kinshasa (UKZ, 1989). For the last 30 years a few privileged individuals have been sent to Belgium to obtain such qualifications; however even these graduates need regular refresher courses, and must always remain ready to adapt to local conditions and to the problems of community rehabilitation.

4.4. Upgrading of personnel

This takes place mainly through contacts with competent people. It is a two-way process; occurring first when a patient is referred to a centre and advice is sought from the centre’s more specialized staff, and secondly when supervisors or specialists are visiting the field and can be asked for further advice and information.

4.5. Supervision and referral

The supervisor’s visit is an excellent opportunity to maintain a good level of training for motivated local auxiliaries. They can carry on with the usual standard treatments for a long time, but there is a risk of stagnation.

Already when an auxiliary accompanies a patient referred to a centre, both the patient and the auxiliary can profit by it. Indeed, as he discusses with a more competent person, the auxiliary can understand points which escaped him, arrive at a more accurate diagnosis, and provide more suitable treatment. In any case he has the chance to supplement his training.

The physician himself, when asked for advice, will find it useful to discuss with somebody who knows the patient well, and who can often answer questions better, or at least more quickly, than the patient himself. The physician will also be able to give his opinion faster and more explicitly. Moreover, the presence of the auxiliary helps the doctor who is usually quite busy. He will also guarantee proper follow-up.

The patient also will benefit from a more thorough consultation than if he had come on his own, even with a referral note.
5. Management

Good management means ensuring the relative self-financing of a centre, curbing expenses, and trying to cover the costs of building and heavy equipment with a special budget.

5.1. The minimum essential ordinary budget

Overwhelmed by three years of financial burdens, a director simply advised: “No accommodation, no food, no clothing!”

“No food” has two aspects:
- Reduce financial charges to a minimum by having outpatients. Thus for several years the Goma Centre, with 120 beds, admitted annually more than 1,100 patients, of whom only 250 were in-patients. The out-patients could create a widespread social movement, through the accommodation of handicapped people by local families.
- The in-patients admitted are not fed when they are accepted with their families as in hospitals. This means that helpers must have access to kitchen space and to storage facilities for food and fuel.

If there is a lodging house, it should be traditional, that is adapted to the habits of the various tribes admitted, in terms of food (type of utensils, cooking habits, meal timetable), and bedding (mats or mattresses made of leaves) so that each member feels respected and respects the others.

5.2. Local means, and staff with simple qualifications

Financial problems are always likely to set limits to community rehabilitation and its continuity. Therefore one must look for local possibilities and self-financing.

It goes without saying that each treatment should be applied at the lowest cost, while covering basic needs.

For simple tasks, the use of auxiliary personnel can also help reduce salaries and accommodation costs considerably.

Even when no outside financial help is available, the careful use of local resources will help to bring about small but effective achievements, which may be overlooked by most observers, but which offer true solutions, because they are adapted to the environment.

The main point is to enable the handicapped to feel some improvement, however modest, in their way of life.

At the beginning things must often be done without remuneration; however, as work progresses, the beneficiary and the supporting agencies can pay for treatment and keep, provided that the sums asked for correspond to the local economic level.

An effort must be made to manufacture equipment locally, at low cost. An ordinary orthopaedic table can for example be adapted to place a redressing plaster cast of the hip, or to set up the Physiotherapy room.

Simple orthopaedic appliances, with no articulation at the knee and requiring no moulding, can help more patients than can more sophisticated ones.

Electrotherapy, which requires costly equipment, is not a priority although it is recommended for stimulation after a paralysis or in cases of shingles because of its very positive effect on post-zosterian pain (Whardez, 1984).

5.3. Self-financing and differentiated fees

Self-financing tends to mean that the care and training costs are covered by the patient, his family or his community, who can do some work for the centre and thereby reduce its running expenses.

The centre may arrange for the handicapped to cover some of the care and treatment costs with part of the income from their craftsmanship work. On the other hand the centre may supply equipment, such as a sewing machine, so as to facilitate the patient’s social reintegration.

Also, in order to apply some distributive justice, the richer can be charged for services to cover amortization or administration costs, while the poorer will pay only for the direct costs of material and personnel, according to diversified rates.

5.4. The participation of external donors

Local participation in salaries and running costs is important, but one should be careful to avoid paying unfair salaries when receiving external financial help.

On the other hand, buildings, heavy equipment, the launching of projects, and certain types of training can hardly be self-financed, and should be left to philanthropic organizations, churches or international institutions.

One should however be careful to remain relatively free vis-à-vis any financial sources which would try to impose their views, without consideration to the well-being of the handicapped.

6. Coordination

To develop rehabilitation efficiently in a region or a country, and even over several countries, it is of course essential to ensure coordination of efforts, actions and their planning.
6.1. Coordination in the rehabilitation centres

In a centre, unity of views is the key to success, especially when facing difficult problems. The basis of efficient rehabilitation is to consider everybody’s opinion in order to make the best use of all suggestions.

In a medical centre, nurses will join doctors, physiotherapists and auxiliary physiotherapists in coordinating the aspects of treatment and solving all the social problems of reinsertion.

The staff as a whole should meet every week after the main consulting day, to decide on the help to be given to each new patient and to refer particular problems to the management.

6.2. Coordination with other ministries

As various departments and ministries (Public Health, Social Affairs, Education) come into play regarding the care of the handicapped, their actions for the handicapped should be well coordinated.

6.3. National associations

Coordination between various centres or institutions for the handicapped is an important factor for progress.

6.3.1. The Association of Centres for the Handicapped in Central Africa

This association helps to organize exchanges and coordination, in order to make better use of specific techniques adapted to Central Africa.

6.3.2. The Union of Zaïrean Physiotherapists (UKZ or Union des kinésithérapeutes du Zaïre)

This association plays an important role in the rehabilitation of the handicapped of the locomotor system.

With over 400 members, working in Rwanda as well as Zaïre and mostly trained in the Kinshasa Centre, it checks the quality of training, provides refresher courses for its members by means of Physiotherapy Days, and ensures representation of the profession within the medical corps and vis-à-vis the State.

The UKZ, with its numerous members of whom many are among the best working in the Rehabilitation Centres, hopes that, in order to improve the country’s standard of re-education still further, the University of Zaïre will be soon in a position to organize training at a higher degree and even at doctorate level.

BIBLIOGRAPHY

CENTRE SHIRIKA LA UMOJA (1968-1990), Rapports du Centre, Goma.
CENTRE SHIRIKA LA UMOJA (s.d.), Conditions d’engagement.
CMC (1986), Disabled Village Children; Part of Primary Health, — Contact, 91, pp. 1-14.
Confédération Mondiale de Physiothérapie (1970), Le rôle de la physiothérapie dans traitement de la lèpre (maladie de Hansen), (Notes suggérées pour les cours de physiothérapie), London, Confédération Mondiale de Physiothérapie, 33 p.
COUETELIER L. (1970), Lecture notes.
REHABILITATION OF THE HANDICAPPED

DELTOUR M. (s.d.), Orthèse, Montpellier.
DELTOUR M. (s.d.), Prothèse du membre inférieur, Montpellier.
DUICK P. (1992), Méthode de tannage, — Homme comme Toi, 1, pp. 2-8.
LABORATOIRE FISCH (s.d.), Les appareils plâtrés en chirurgie et orthopédie, Paris.
MARTIN L. (s.d.), Rédadaptation en Afrique Centrale, in press.
REPUBLIQUE DU ZAIRE, DEPARTEMENT DE LA SANTE PUBLIQUE (1988), Les maladies prévenues par


RULINDA P. (1991), La kinésithérapie au service des maladies mentaux, – Homme comme Toi, 1, pp. 4-5.

SMALL G. (1951), La rééducation des traumatismés, Liège, Desoer, 279 p.


DISSERTATIONS


BROUSMICHE C. (1972), Le mal de Pott et son traitement kiné aux Cliniques Universitaires de Kinshasa, UCL, Institut d’Education Physique, 224 p.


PINCART F. (1991), Le Rwanda; approche géographique; étude de la situation sanitaire et de la réadaptation, UCL, Institut d’Education Physique, 87 p.


SEYNAVE B. (1982), Poliomyélite au Zaïre; socioculturel aspect; huidige situatie van de ziekte; revalidatiecentra en dossiersstudie, KUL, Instituut voor Lichamelijke Opvoeding, 141 p.


RECOMMENDED READINGS

DELTour M., Orthèse, 6, rue Levat, Montpellier

DELTour M., Prothèse du Membre Inférieur, 6, rue Levat, Montpellier

DELTour M., Prothèse du Membre Supérieur, 6, rue Levat, Montpellier


ENCYCLOPEDIE MÉDICO-CHIRURGICALE

- Appareil Locomoteur
- Kinésithérapie
- Neurologie
- Psychiatrie


GRASSET A. (1968), L’enfant épileptique, P.U.F.


OLLIER M. (1971), Technique des plâtres et corsets de scoliose, Masson