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REHABILITATION SERVICES TO WAR WOUNDED IN EL SALVADOR

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TO THE READER
AS AN INTRODUCTION

I am a physician specialized in the evaluation, diagnosis and treatment of physical disabilities, a physiatrist.

This first part of the report will orient the reader on the subject of medical rehabilitation, its terminology, scope, etc. This is important because I will be making recommendation on medical and paramedical personnel, the acquisition of suction tubes, balance apparatus, alignment apparatus, prosthetic components and construction materials needed in the fabrication of prosthesis. This information is indispensable to the administrators at the decisions level so that they can make adequate decisions and conclusions.

The subject is presented in simple and direct language slog that tends to confuse the laymen. I hope my goal is attained.

REHABILITATION

For the physician, the term "rehabilitation" has meant for many years "the restoration of the handicapped to the maximum of his physical, mental, social, vocational and economical capabilities". This term has lost most of its meaning, since it is used to describe correctional programs in modern prison institutions, economic and social rehabilitations in countries devastated by the war, etc. With the new emphasis on physical restoration of the handicapped, a new term is being used that describes the process more clearly and more virile, the term "**the third stage of medical care**".

The modern concept of the third stage of medicine, takes the patient from the hospital bed to his job. It had a direct and indirect beginning in the second world war. A good exercise program stops the secondary deconditioning phenomena which arises from prolonged bed rest. Physical rehabilitation techniques and retraining of the severely handicapped has had profound implications in handicapped civil population which is increasing.

An amputees rehabilitation program should include evaluation, diagnosis, treatment and rehabilitation of the amputee, a handicapped who, by the nature of the trauma, present a series of problems secondary to amputation which at the present time have not been taken into consideration.

The rehabilitation program of the handicapped should include a complete program of physical medicine and rehabilitation, including: surgical phase, postsurgical phase and rehabilitation. Rehabilitation not only on the physical aspect but also retraining, psychosocial adjustment, vocational evaluation and orientation. It

should be a comprehensive program of physical therapy, occupational therapy, physical rehabilitation, social service, orientation, vocational tests, vocational and psychological tests, designed to help the amputee "to learn to live within the limits of his disability" but to the maximum of his capabilities. We shall need facilities for the care of the patient during the evaluation, prescription and training phase of the amputee. It is necessary to emphasize on training, exercises, standing, walking on parallel bars, walking with crutches and those activities inherent to daily life.

Medical rehabilitation practice is based on the philosophy that the doctor's responsibility does not finish when the acute illness or surgery is finished. It really ends when the individual goes back to society with the maximal use of what was left.

We should assume responsibility of preparing the patient as a whole and not limit our work to deliver a prosthesis, we should walk the second mile.

IMMEDIATE POST SURGERY PERIOD

During the rehabilitation of the amputee we should give special attention to the immediate postsurgical period while the stump is shrinking. It is indispensable the psychological, social and vocational evaluation prior to the prescription of the socket which should be connected to the terminal prosthesis device. During these 6 to 8 weeks, while the handicapped is being evaluated, he shall receive conditioning exercises to condition his muscles and extremities to walk with crutches, the preparation of the stump and upper extremities for its use during the training with prosthesis. During this primary phase the development of anatomic deformities caused by contractures should be avoided. It has been

scientifically established that an above knee amputee as a general rule, will not be able to be trained to use a prosthesis unless he is able to use crutches with "swing-through" gait.

The physician should frankly clarify to the patient the real goals to be achieved according to his age, physical and mental condition, with an adequate training program. If any contraindication should exist, the doctor should inform it to the patient.

A good training program is absolutely essential if the patient is to be successfully rehabilitated.

Medical therapy, in general, is directed toward the correction of the symptoms of the patient, it has a negative focus. In rehabilitation the important part is the residual capacity, not the morbid process. General medicine forgets the patient, does not take him out of bed, activities of daily living and personal care are forgotten and, as a result, the handicapped loses his ability to walk, etc.

General hospitals forget the training of activities of daily living, they treat on the basis of: "first comes first". Independence and activities of daily living are the base of the rehabilitative process.

THE REHABILITATION TEAM

A rehabilitation program for amputees, if possible shall include the following phases: pre-surgical, post-surgical and rehabilitation. This program shall revolve around the patient and his needs.

In the pre-surgical phase, at all times, the patient will be oriented towards the realities he will face after the amputation, no mechanical replacement will be mentioned. The surgeon, physiatrist, social worker, psychologist, nurse, physiotherapist, occupational therapist and other specialists will openly discuss with the patient, everything relative to the loss of the limb: how it will affect his economical productivity, his family, house rental, monthly payments, etc. The occupational therapist and the physiotherapist will teach him how to dress, undress, how to perform his daily activities. In the gymnasium he will undergo an exercise program to strengthen his upper limbs in order to be able to bear his weight while walking with crutches. He will be trained walking in the parallel bars a three point gait. He will continue walking with wooden crutches, axillary type. At all times the patient will be informed that he will not need wheelchair. When the patient discovers that he is being treated as an individual, that there is a rehabilitation team of duly trained professional personnel that care for him and are ready to answer all his doubts, it will be easier for him to accept his loss and become involved in the solution of his future using what he has not what he lost.

VOCATIONAL REHABILITATION COUNSELOR (A)

The Vocational Rehabilitation Counselor will evaluate the patient taking into account his educational level, skills, working history, personality, motivation (verbalized and unconscious). With this information, the counselor may establish educational and laboral

goals at work. He will orient the rehabilitation team regarding the amputee on the following questions: can he go back to work?, is he trainable?, is he positively or negatively motivated?, what can be done to guide him to reach the maximum, within his handicap?, how? etc.

SOCIAL WORKER (A)

The Social Worker will evaluate the immediate family factors which could contribute in a positive or negative way to reach or obstruct the rehabilitation of this patient, from the family or social aspect. The report of the social worker will orient the rehabilitation team on the following points: personal history of the amputee, family history, married?, how many wives?, how many children?, has he any legal obligation order by court related to his children?, salary?, debts?, pensions?, relationship with his wife, children, parents, in-laws?, neighbors?, friends?, how is his house?, does it allow a wheelchair in?, any other architectonic barriers?, alcoholism?, drug abuse?, sexual orientation?, AIDS?, etc. He/she will make special recommendations in the evaluation whether the patient can be rehabilitated to go back to his previous work or vocationally.

PSYCHOLOGIST (A)

The psychologist will evaluate the amputee in order to determine his intelligence level (IQ), his learning capacity, internal and external motivations, family values. He will also determine the acceptance level of the physical handicap by the amputee, trying as, much as possible, to establish how much the improvement is affecting his self esteem. Will also investigate how threatened he feels with his anatomical change?, how threatened he feels with his anatomical loss?, debt?, not being able to return to job?, how is he dealing with the castration complex?, does he want to return to

his job? Negative motivation to rehabilitation such as: does he use his loss for profit?, alcoholism?, drugs?, sexual orientation?, AIDS?. He will make special recommendation as to: is the patient rehabilitable for a job or vocationally because of his emotional, cultural, educational and psychological attitude: does the patient want to be rehabilitated?,

OCCUPATIONAL THERAPY

In the amputees with loss of a part of an upper extremity, the occupational therapist, under the order and supervision of the physiatrist, will render a written inventory-report on the range of motion of the joints on both upper and lower extremities, muscle test on the preserved muscles in both upper and lower extremities. The inventory will include a diagram of the stump up to the tip of the same, description of the skin, description of the scar, painful points, neuroma, etc. At all times he will remind the patient about what was saved, what he has, and will stimulate the patient to: "Thank God for all he still has left".

In the occupational therapy unit, whenever possible before the amputation, the patient will receive a training program emphasizing activities of daily living (to shower, to dress, to undress, to get his shoes on, to brush his teeth, to clean up, etc.) trying to avoid the emotional fixation on the missing part; there will be an emphasis on the use of non-affected limbs. As the result of the evaluations is not known (medical, psychological, vocational, social, etc.) the patient will not be told, at any point, about the replacement of the missing limb. At this stage it is important that the amputee accepts the loss and recognizes he still has a lot ahead with what he still has.

PHYSIOTHERAPY

In the disabled with loss of part of the lower extremity, the physiotherapist, under the orders and supervision of the physiatrist, will render a written report/inventory on the range of motion of both, lower and upper extremities, muscular test of the preserved muscles in both lower and upper extremities. The inventory will include a diagram of the stump describing: length of the preserved bone, length of the stump to its tip, a description of the scar, painfull points, neuroma, etc. In every instance the patient will be reminded of what he has she will stimulate the patient to "Thank God for all that was left."

At the physiotherapy unit, whenever possible before the amputation, the patient will receive a training program emphasizing activities of daily living (to shower, to dress, undress, get shoes on, brush his teeth, clean up, use of toilet paper, etc.) if the surgical wound were not healed, he will receive whirlpool bath with "Bethadine", and if possible, will begin the use of an elastic bandage as soon as possible in order to shrink the stump.

While the wound is healing: progressive resistive exercises to both upper and the preserved lower extremity. Will start training on ambulation in the parallel bars, the day after surgery, and walk with wooden crutches axillary type and walk on three points.

The physiotherapist will instruct the patient at all times to take care of the wound not keep the stump in flexion, adduction and external rotation while in bed, crutches or chair.

In order to avoid emotional fixation of the patient on the missing part instead of what was preserved, the therapist will emphasize the use of the non-affected limbs. Since at this point the results of the evaluations (medical, psychological, vocational, social, etc.) are not known, at no time should the patient be told of the

possibility of replacing the missing limb with a prosthesis. It is important for the amputee to accept the loss and learn to use to the maximum what was left.

NURSING

Besides normal nursing care, the nurse will instruct and see that the patient with an amputation does keep the stump on a pillow (in flexion, adduction and external rotation). The stump will be kept in extension at the hips and knee at all times.

Nursing personnel will encourage positively the amputee emphasizing what he has and not what was lost. He/she will encourage the patient to "Thank God for what was left".

In order to avoid an emotional fixation on the missing part and not on the remaining by the patient the use of non-affected limbs will be emphasized. At this stage the results of the evaluations (medical, psychological, vocational, social, etc.) are not known, at no time will the patient be told that he will receive a prosthesis. It is important that the amputee accepts the loss and recognizes that he will have to learn to use the remaining limbs to their maximum.

ETHICS IN THE REHABILITATION TEAM

In the Rehabilitation Amputee Clinic all the personnel involved are bound by the medical ethics. Individual and joint efforts of all participating workers, both in the clinical and administrative phase, is aimed towards the welfare of the patient, with an amputation.

Each and all persons involved in the treatment of an amputee patient, are subject to medical ethics. They have pledged to protect the privacy of the patient. All information, or related material on a rehabilitation patient, both in the medical and administrative phases, are covered by the rules of strict medical privacy.

No-one, I repeat no-one, in the administrative or medical phase can discuss or reveal information related to the patient without an authorization from the patient.

The physician, physiotherapist, occupational therapist, psychologist, vocational counselor, prosthetist, secretarial personnel, administrative personnel, etc. of the program will behave with the patient and family of the opposite sex, with respect. Under no circumstance the personnel will be sexually provocative as disrespectful.

Each member of the rehabilitation team will be proud of his role, his functions and under no circumstances, will he permit the patient to call him doctor. There cannot be doubt in the mind of the patient and his family as to who the doctor is. Not doing so would be deceitful and interfere with the medical/patient relationship.

The cubicle where the patient changes his or her clothing, where the prosthesis technicians measures the stump, and where the socket

will be fitted, should be clean. This is necessary while measuring the stump to protect the privacy of either male or female patients. Female patients will be accompanied by a female person during the measuring stage.

All and each of the persons working in our rehabilitation program will help the patient to accept his handicap use the prosthesis following medical instructions. The prosthetist will abstain from making comments, suggestions, on the prosthetic components available in the market.

The rehabilitation guide and the orientation of the amputee and relatives, the training on the use and control of the prosthesis, will be in the hands of the physician, psychologist, vocational counselor, social worker, physical or occupational therapist according to the order of the physiatrist.

To avoid the exacerbation of the castration complex in a depressed patient with deep guilty feelings, the prosthetist will abstain from discussing components or prosthesis with the patient or family. The important thing is the patient, not the prosthesis and its components. The prosthetist will protect by all means the physician/patient relationship and shall not interpose himself between the patient and the medical prescription.

CONSIDERATIONS TO BE TAKEN INTO ACCOUNT
BEFORE PRESCRIBING A PROSTHESIS

CANDIDATE

There are many factors to be taken into consideration before prescribing a prosthesis. The fact that a wounded person has lost one limb does not necessarily indicate that he is going to improve by using a replacement device.

In some patients the prosthesis is contraindicated from the following points of view:

Neurological: (Patients with cerebellar syndrome, Parkinsons disease, cerebral atherosclerosis, ataxies, hemiplegia, spinal cord lesions, etc), Medical: muscularly dystrophy, senility, diabetes, hemophilia, etc. Orthopaedic: contracture post fractures, ankylosis of the ankle, knee or hip etc. Psychiatric: demency, disorder of personality, etc. Rheumatological: rheumatoid arthritis, lupus erythematosus, ankylosis. Dermatological: atopy, neurodermatitis, etc. Surgical: neuroma, periphero-vascular insufficiency, etc.

Patients with multiple deformities, some blind patients, mentally retarded, patients who are used to the wheel chair and will not try the effort to walk independently.

Patients who can not learn for any other reason to walk with crutches.

Patients with over-protective families, who do not want his relative to free himself with a prosthesis.

Socio-cultural:

Some patients will reject rehabilitation to continue receiving aid from Government agencies.

SURGEON

The surgeon is the most important member of the rehabilitation team, he initiates the relay that will culminate if possible, with the maximal, physical, social, vocational and psychological rehabilitation of the amputee. His mission is to prepare an adequate stump within surgical possibilities (determined by what was not destroyed). He will preserve the joint, the maximum bone length, most of the viable muscular tissue, within surgical possibilities without risking the patient's life. He will try his best to deliver an adequate stump both in length and muscular control so that HIS REHABILITATION TEAM can bring the patient to the maximum of his capabilities.

IMMEDIATE PROSTHESIS

The concept of immediate prosthesis pretends to deal with the amputated limb and not with the patient, the patient leaves the operating room with the replacement device. This focus does not consider the patient as a whole, does not take consideration his social, vocational and emotional condition. The process of rehabilitation of an amputee begins when he accepts his handicap.

PRESCRIPTION OF THE PROSTHESIS

The prescription of a prosthesis, is a medical order, is the product of an evaluation where medical, vocational, psychological and social factors, specific for each patient were taken into consideration. It may not and it will not be changed by the prosthetist.

The prescription includes:

Type of socket
Type of suspension
Type of knee
Type of foot-ankle

The physiatrist will evaluate the prosthesis before delivery to the amputee in order to check whether it complies with the prescription.

The second evaluation will be performed with the prosthesis fitted on the stump of the patient to determine if the socket is fitting properly, that the weight transmission is through the bone, the alignment, the degree of initial adduction and flexion, etc.

PROSTHETICAL TRAINING

After approving the two evaluations, the patient will receive a training program in the use of the prosthesis at the local level.

The program shall include exercises, training in the bandaging and walking with the prosthesis.

The amputee will be evaluated six weeks after delivery of the prosthesis. The gait, fit of the socket to the stump and the condition of the prosthesis will be examined. The changes in the stump, pain or sensation of a phantom limb, neuroma, electrical shock sensations, excessive perspiration, skin lesions, abnormalities in the gait.

THE AMPUTEE REHABILITATION TEAM

The Amputee Clinic will consist of, when the program is completely operational, physiatrist, director of the clinic, physical therapist, occupational therapist, prosthetist, psychologist, and vocational counselor. All of them will work under the direction of the physiatrist who submit recommendations in the social, vocational, psychological, laboral, and rehabilitation fields. It will be understood the physiatrist is responsible for the prescription and device delivered to the amputee.

The Function of the Therapist in the Team for Amputees

The job of the occupational and physical therapist will begin immediately after surgery. They will instruct the patient on the exercises for the stump and muscles of other limbs, according to the physician's prescription. The main goal will aim to attain maximum of mobility in the shoulder, wrists, hip or knee etc. In the process of elaborating the recipe, the physiatrist will alert the surgeon on possible problems and their solutions.

The clinical team, as a group, is responsible for determining if the prosthesis is fulfilling all the established standards in respect to the coupling of the socket to the stump and its function. The test is performed by the therapist. She will note her findings in the check-out form for verification of the prosthesis, which later will be reviewed by the team and signed as accepted by the physician.

The therapist is responsible of the training of the patient on the use and operation of the controls of the prosthesis and by delegation in some cases will perform the final check-out of the prosthesis and its training.

PROCEDURES TO BE FOLLOWED WITH THE PATIENTS
WITH AN AMPUTATION OF A LIMB

PRIMARY PHASE

(Initial Hospitalization)

We will call Primary Phase of the Rehabilitation Program for Amputees to the care given to the wounded patient population coming to a general hospital, after their injury. This includes the hospitalization time previous to the amputation, the immediate hospitalization phase.

To avoid the development of a reactive depressive reaction, secondary to the loss of a limb, in the amputee, their rehabilitation should be started as soon as possible. If feasible it should begin prior to the amputation. The rehabilitation will be provided under the physiatrist in charge of the rehabilitation department. He will evaluate the patient and alert him on what to expect after the amputation. In those emergency cases when surgery does not permit the physiatrist to orient the patient prior to surgery he will do it after the surgery. This orientation will include all relevant aspects of the what the patient will have to go through during the rehabilitation process.

The pre-surgical stage is the ideal moment for the physician with the help of the psychologist, social worker, vocational counselor, physical therapist, occupational therapist, etc., to guide the wounded and his relatives to accept openly the anatomical, social and economical loss. They will help him in how to use his emotions in a constructive manner, taking in account the impact the loss will represent in the future of the patient and family. The patient will require a great deal of help in order to reach psychological as well as vocational and laboral adjustment necessary to face the crisis. It is is a crucial stage in his

life, he is feeling in his own flesh the pain of having lost a part of his body, the pain in his wounds, the foul smells coming out of the wounded body.

At this point he is very receptive to medical, psychological and vocational orientation. This orientation should be provided by professionals, experts on the subject, to help him set new goals while planning his future life, preventing him from developing false expectations.

During this phase of reactive depression no mention will be made of immediate replacement, as this could trigger an the development of a castration complex, and exacerbate negation as a defense mechanism, very frequent in these type of patients. The technicians are not qualified to deal with the psychological reactions of the amputee.

During his daily round the surgeon in charge of the patient will cheer him up, stimulating him to go ahead. He will be watchful for symptoms of reactive depression and will alert the physiatrist and rehabilitation personnel to deal with that. In extreme psychiatrist may be required. In general the physiatrist will orient the medical personnel on how to deal with these kind of patients.

During hospitalization after surgery, under the direction of the physiatrist, the patient will be evaluated by social workers, vocational counselors, psychologists, and if needed, a psychiatrist to determine the pschyo-social and economical status of the patient to establish the strategy to be followed in his rehabilitation.

Were it be feasible, after evaluating the general medical condition (heart, vascular, central neurological as well as peripheral, psychological, educational, social and vocational), the prosthesis will be prescribed.

FUNCTIONS OF THE PHYSIATRY DEPARTMENT
IN A GENERAL HOSPITAL

The director of the Department of Physical Medicine and Rehabilitation in a general hospital, the physiatrist, will be responsible, at the local level, for the initial rehabilitation pre and post surgical of amputees being treated by the general or the Orthopaedic surgeon. Usually no more than two weeks. On discharge the surgeon or Orthopaedic surgeon will request an evaluation from the Rehabilitation for Amputees Program.

In patients with amputations of both lower extremities, a standard for amputee wheelchair will be prescribed. In amputees of a single lower extremity (with no other limiting disease) wheelchair will not be authorized.

It is indispensable not to interfere with the acceptance of a handicap by the patient. It is necessary that he accepts and recognizes the loss of a part of his body. We will not stimulate him to hide away, deny his missing part. It is necessary that he accepts himself the way he is.

The emotional, physical, social and vocational rehabilitation of the amputee patient begins at the very moment he accepts the permanent loss of one part of his body and decides to use to a maximum what he still has.

The prescription of a prosthesis will not be used as a decoy to hide the reality. The patient must accept his problem, his amputation. Generally speaking, in his thoughts the amputee regards himself as useless, crippled, no longer a man (or a woman), that he is worthless, that he will be a burden to his family, etc. However, the absence of a leg or an arm is not an impairment for the rest of the individual to function.

During the surgical and post surgical phase we will:

- Orient the patient on his future regarding the amputation.
- Answer any doubts in the mind of the patient and relatives.
- Hasten the healing of the surgical wound.
- Control the edema in the stump.
- Prevent the development of contractures in the stump.
- Prevent the development of decubitus ulcers.
- Develop muscular strength in the preserved limbs.
- Start crutch walking the day after amputation.

Physiotherapy Treatment:

The program will consist whirlpool bath with Bethadine, edema control of the stump. The patient will be instructed on correct positioning of the stump while in bed, sitting or walking. He will be trained in the use of wooden crutches, axillary type.

SECONDARY PHASE

We will call Secondary Phase of the Program for the Rehabilitation of Amputees to the care given to an amputee population that after being discharged from the acute phase, develop complications in the affected limb that require a late amputation, correction of the length of the stump, to eliminate scars or redundant tissue which interferes with the fit of the stump in the socket. These cases are no medical emergencies, they will be considered elective surger.

¿ WHAT IS A PROsthESIS, HOW IT IS MADE ?

DEFINITIONS

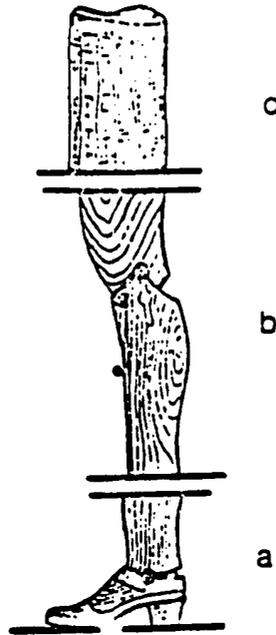
1- "Prosthesis" is a mechanical device, assembled with different commercial components, assembled to the distal portion of a socket.

2- "Socket" is a reproduction, the mold manufactured from a stump taking in consideration the anatomic basis and biomechanic principles. It is an artifact in the form of a cavity which houses, receives and adjusts to the stump of the amputee. It receives, transmits force, weight and movements from the stump.

3- "Stump" is the portion salvaged of an amputated extremity: it consists of bone, periostium, muscles left without insertion, muscle with insertion (functional), subcutaneous tissue, skin, scar and neurovascular bundle.

4- "The Walls of the Socket" these are solid structures placed in definite positions of the socket, they receive and transmit forces. When they obey the human biomechanical laws they allow, by the fitting of the stump, an efficient voluntary control.

The walls of the socket of a prosthesis consists of a contoured surface that takes the shape of the stump. The socket adapts to surface of the stump of the amputee. When we use a quadrilateral socket, designed at the University of California, it provides a standard contour at the level of the ischium but changes while it goes down in a distal direction. This is due to the amount of muscles and subcutaneous tissue which varies in each amputee, and varies in form, position and size of the stump according to the patient.



PROSTHETIC SYSTEMS

Originally every prosthesis was hand made, individually, from the basic materials, leather, steel, wood or the like.

As the years passed over the production improve as the concept "component" was taken into account (foot, knee, etc.)

These industrially produced components are attached to the individually fabricated socket following alignment guidelines, and taking into account the individual's anatomical configuration.

A conventional system is used to produce prosthesis when using either wood or plastic. The prosthesis walls are used to carry the load and provide strength to the leg.

The components of an above-knee are:

- a) Prosthetic foot
- b) knee-leg components
- c) socket made to individual's anatomical configuration

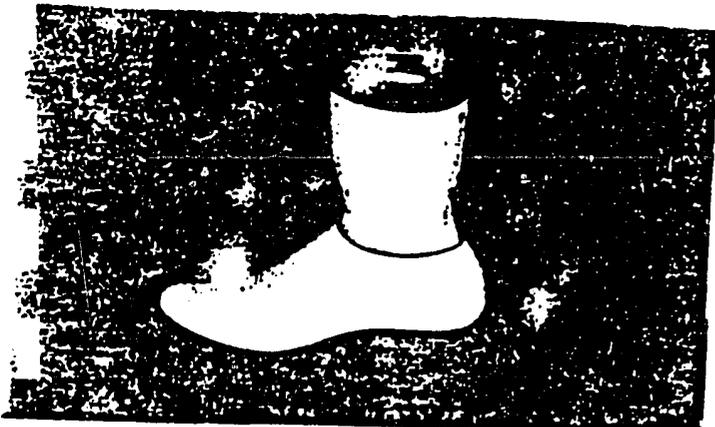
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PROSTHETIC COMPONENTS

The industrially fabricated parts, from which the prosthetist assembles and constructs the individual prosthesis, are called components. To make an above knee prosthesis it is necessary to use a knee-leg component and a foot component.

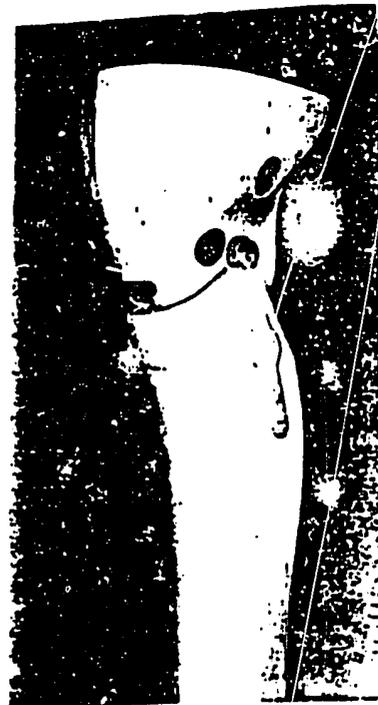
The foot

The foot is of special significance. Its functional properties and its adjustment to the other component parts of the prosthesis determines the static and dynamic behavior during standing and walking.



The knee:

The prosthetic knee joint must ensure stability during standing and during the stance phase of walking this is attained by means of passive mechanisms and must control the pendulum movement of the distant prosthetic section during the swing phase.

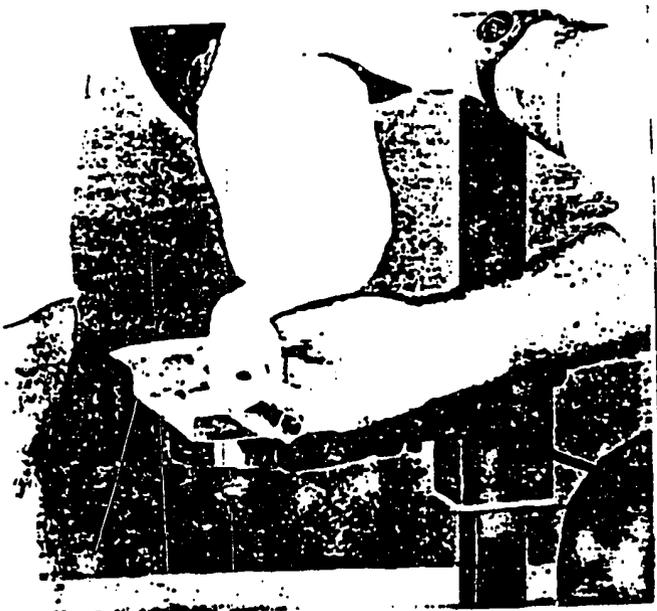


In single axis knee joint knee stability is achieved by positioning the knee center of rotation posterior to the weight bearing line. At heel strike this must be supplemented by contracting the hip extensor of the residual limb.

Using friction mechanisms which are dependent on weight bearing increases knee stability. Reduced muscular activity may be compensated for in this way.

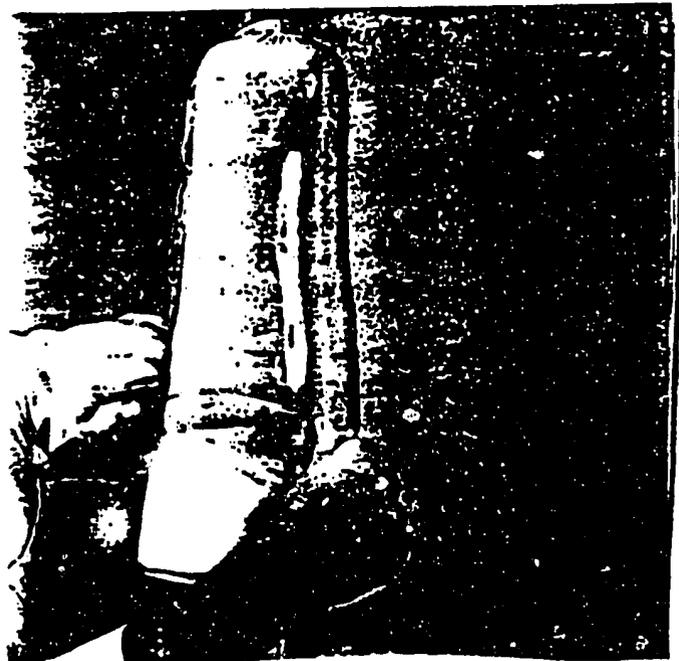
FABRICATION OF THE PROSTHESIS

The fabrication of a prosthesis starts with an accurate measurements taken of the patient's body and a functional plaster impression of the residual limb. This phase is known as the taken of a negative cast.



Fabrication of the negative cast

The negative cast is filled with gypsum to produce the positive cast. afterwards the cast is modified for patient's weight bearing distribution phase. It is covered by a vinyl bag and several coats of nylon are put one above the other (it can be used either nylon or cotton, it is covered then with a transparent plastic bag and epoxy is applied on the nylon.



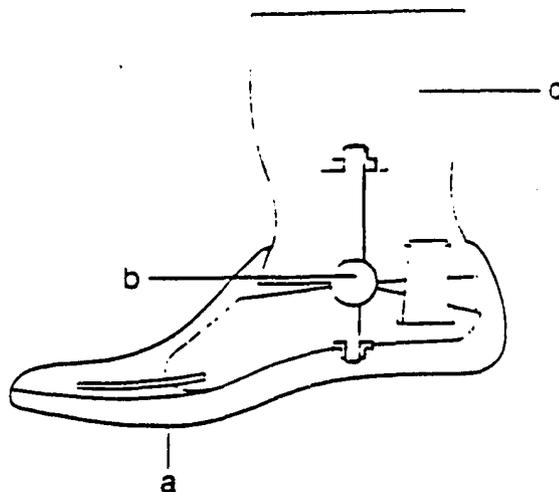
Application of the epoxy to the nylon over the positive mold on a suction tube.

After testing the fit, length and align the components, the completion procedures are: shaping, reduction of the wall thickness, surface treatment with nylon cover to prepare it for resin laminate.

By completing above phase the above-knee prosthesis is completely fabricated.

CUADRILATERAL PROSTHESIS FOR AN
ABOVE KNEE AMPUTATION

PROSTHESIS FOR BELOW KNEE
AMPUTATION



SINGLE AXIS STANDARD FOOT

Functional properties:

The foot is provided with (a) recesses for the single axis joint (b), which connects the foot part with (c) the ankle block.

This foot has rubber bumpers that allow some dorsiflexion and plants flexion. It is the one indicated the elderly and in person walking on hilly terrain.



ASSEMBLY OF THE COMPONENTS

After the completion of the laminated socket and using the patient as model, the knee and foot components are assembled together in the alignment apparatus.

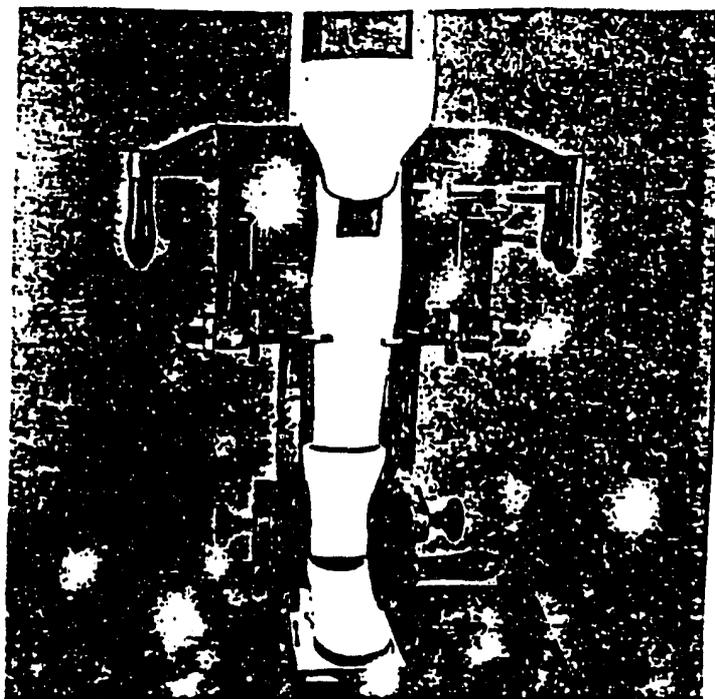
During the adjustment phase the foot prosthesis is tested on walking to fit the adjustment of the socket, length of the prosthesis and relative position of the components.



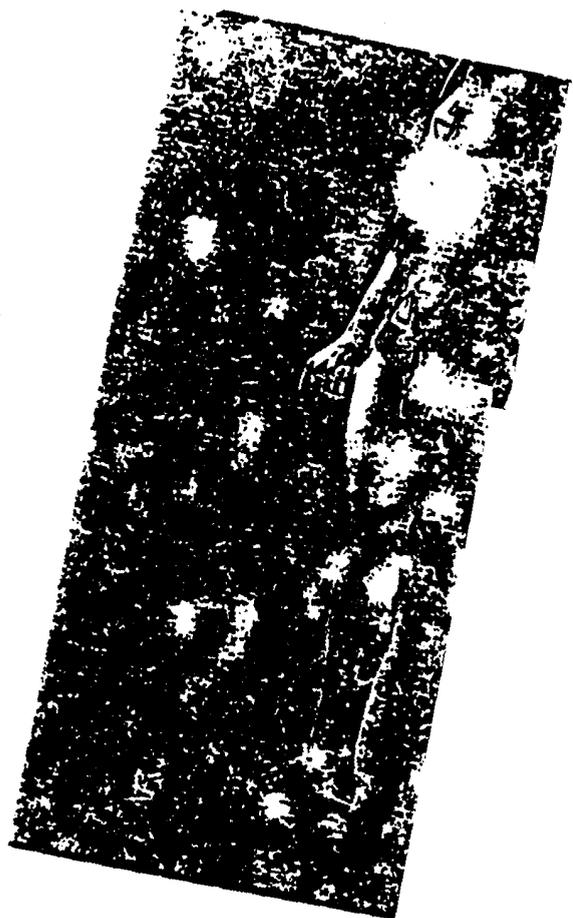
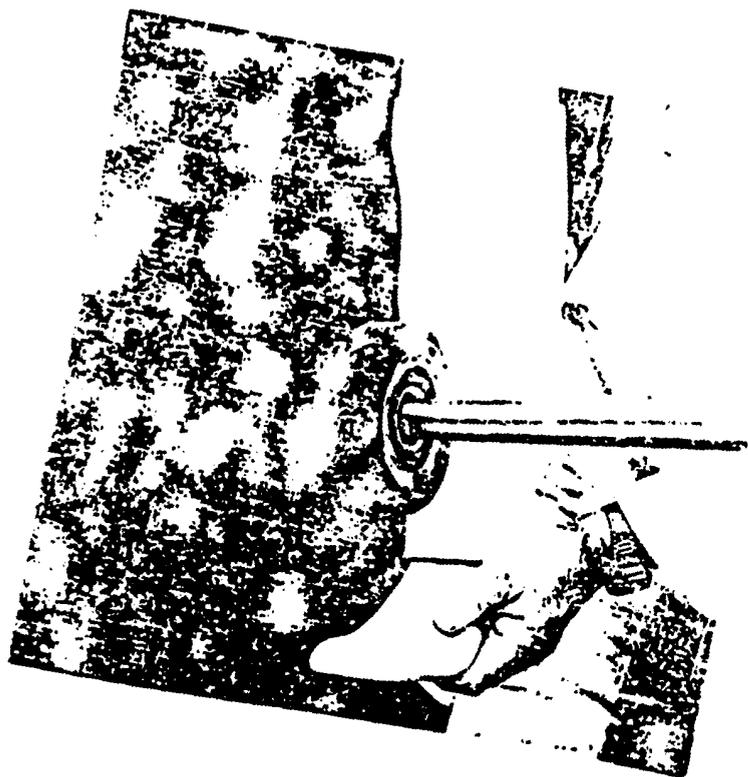
Testing the adjustment of an above knee prosthesis in the balance apparatus.

ASSEMBLY OF THE COMPONENTS

After determining the alignment and conclude that the socket fits, all components are assembled in the alignment apparatus.



We see here the knee, leg and foot components in the transference apparatus taking into account the measures obtained with the dynamic alignment apparatus. During this phase the wooden components are glued together.

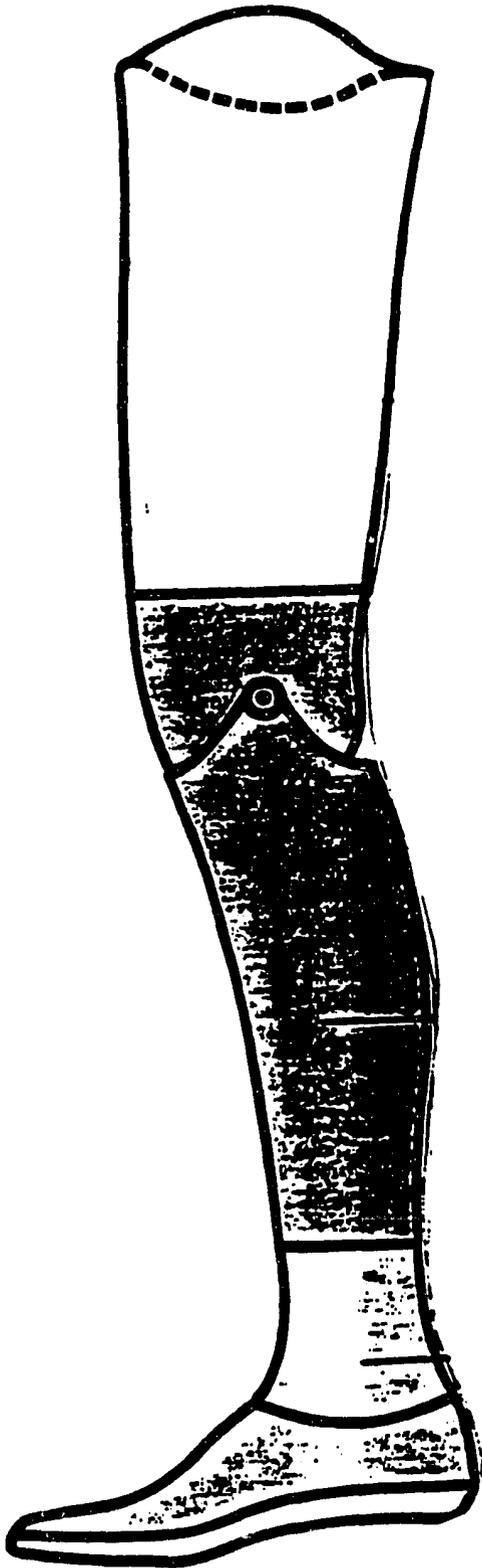


CONCLUSION

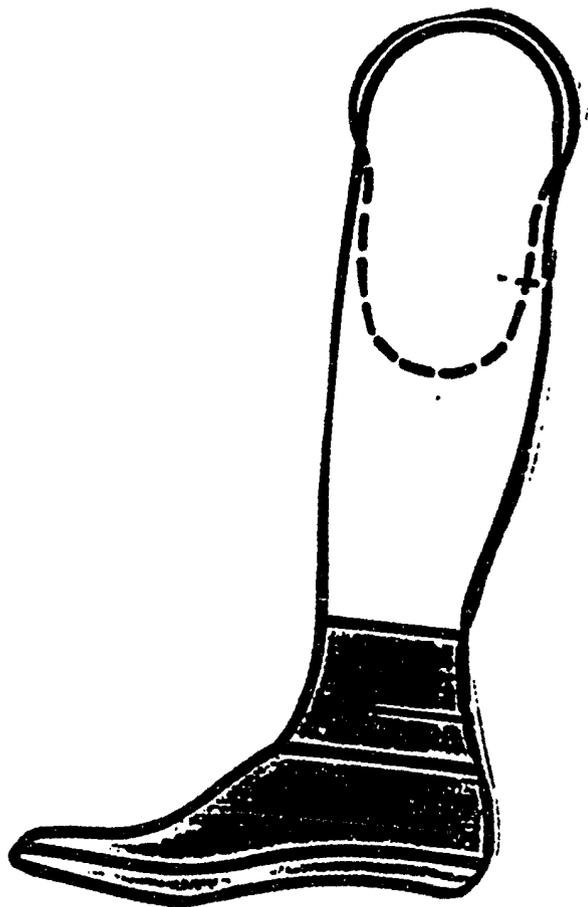
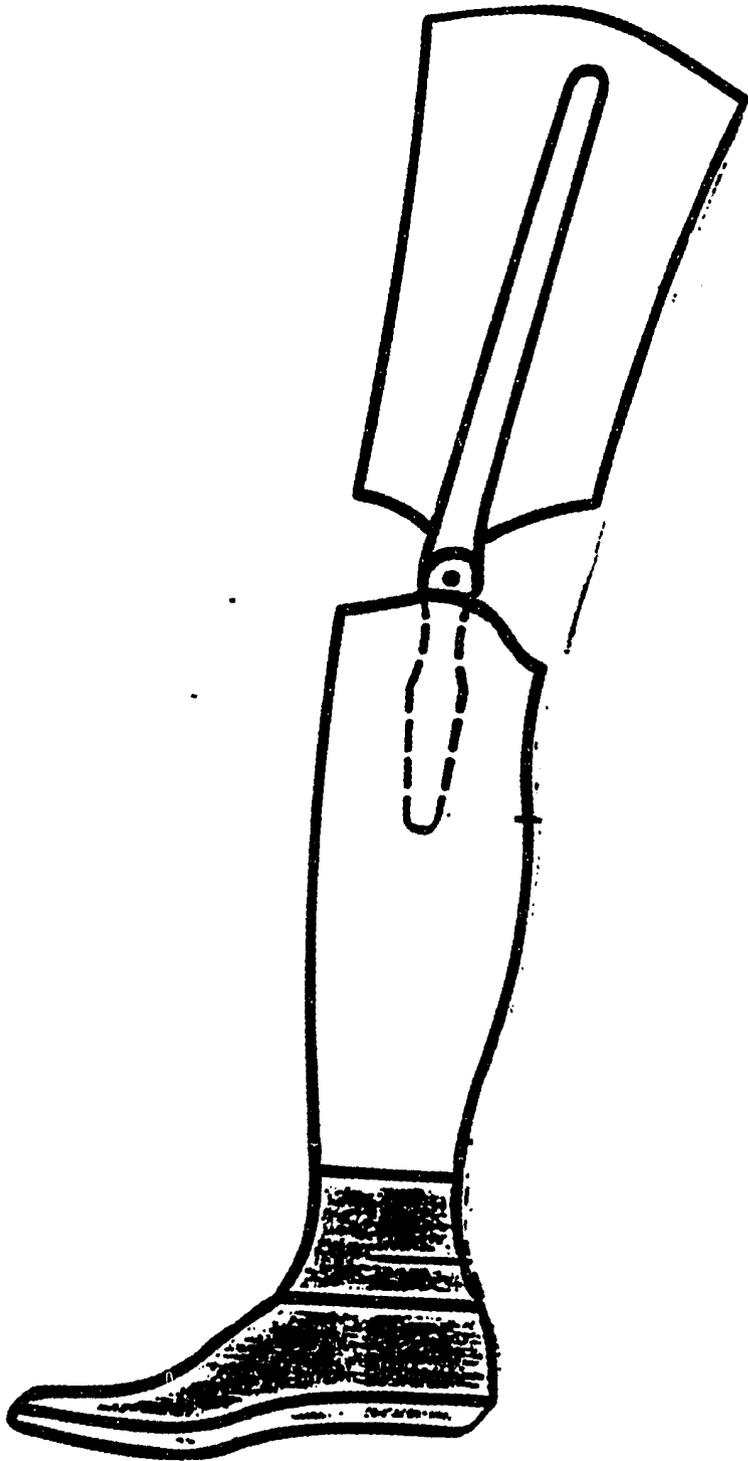
In view of the above review of the construction of a prosthesis we can state: no matter the number of prosthetist working in the program of the amputee weekly production will depend on:

- 1- The number of suction tube available in the prosthetic shop.
- 2- The number of balance apparatus.
- 3- The number of alignment apparatus.

CUADRILATERAL PROSTHESIS
FOR ABOVE KNEE AMPUTEE



PROSTHESIS BELOW THE KNEE



EVALUATION OF PHYSICAL REHABILITATION
AVAILABLE FOR THE ARMED FORCES MILITARY HOSPITAL ROOSEVELT

AVAILABLE REHABILITATION SERVICES FOR THE ARMED FORCES

Rehabilitation Services

2 psychiatrists working 4 hours a day 5 days a week.

Some time ago there were many devices in service, now we will have to refer to:

Centro de Rehabilitación de la Fuerza Armada
(Rehabilitation Center for the Armed Forces)
CERPROFA

The patient arrives to the physiotherapy unit with a prescription for treatment. The psychiatrist is a civilian. He spends two hours (one day) per week for evaluation and finds.

Physiotherapist:

Number of physiotherapists	16
Area for treatments	7,500 sqf
Number of beds	15
Whirlpool tanks	4
Hubbard tank	1
Compressor for 16 dressings	2
Parallel bars	4

They attend amputees daily (during the post surgical phase). On discharge the patient is referred to CERPROFA.

In CERPROFA they house 300 patients in their rehabilitation program.

Every therapist deals with 3 patients per hour, 18 per day and works 6 hours a day. They treat 200 patients per day.

Occupational Therapy with 1,250 sqf of area	2
Speech therapy 255 sqf	2

MILITARY HOSPITAL ROOSEVELT

SAN SALVADOR

EVALUATION OF AREA AND PERSONNEL

Number of full time physiotherapist 16
Treating 200 patients per day
Each therapist deals with 12.5 patients per day.
(3 per hour)
Area for thermotherapy
Beds for treatment
Hot dressings (24 dressings) 2
Hydrotherapy area
Whirlpool tank 4
Gymnasium area 1,500 sqf
Quadriceps table 1
(they should have) 4
Parallel bars 4
(they should have) 4
Set of weights
(they should have metal and sand sets)
15 Therapists should have 40 cubicles
Occupational Therapist Area 1,250sqf
Physicians (only 2 hours per week) 2 Physiatrists
Orthosis workshop IN CERPROFA
Prosthesis workshop IN CERPROFA
The area is more than enough; there is plenty of room for a
prosthesis workshop.
1 physiotherapist earns \$175.00 US Dollars per month.

SAN LUIS MILITARY HOSPITAL

SAN SALVADOR

They are using the premises temporarily

EVALUATION OF AREA AND PERSONNEL

Number of full time physiotherapist	2
Each deals with 20 patients per day.	
Area for thermotherapy	1,250 sqf
Beds for treatment	4
Hot dressings	1 tank of 12 with 9 dressings
They should have for hydrotherapy	One 9 ft tank with 1 hydrocholate with 6 cold dressings
Whirlpool tank	
Gymnasium area	1,250 sqf
Quadriceps table (they should have)	1
Parallel bars (they should have)	1
Set of weights	1 set of sand and 1 set dumbbells (they should have metal and sand sets)
2 Therapists should have	6 cubicles
Occupational Therapist	
Physicians	2 Physiatriests
Orthosis workshop	Prosthesis are sent to CERPROFA

MILITARY HOSPITAL SAN LUIS

Full time physiotherapists	2
Physiotherapist assistant	1
Patients treated per day	8
Patients treated per month	800
Number of patients treated daily for each Physiotherapist	20
Gymnasium area	1,250 sqf
Number of treatment beds	4
Hot dressings	9
Tank for cold dressings	6
Average of daily patients	38
Patients per month	760
Salary	\$1,550.00

CENTRO DE REHABILITACION PROFESIONAL
LAS FUERZAS ARMADAS (CERPROFA)

Number of full time physiotherapists	7
Number of leatherworkers	1
Number of prosthesis above the knee produced per month	2-4
Number of prosthesis below the knee produced per month	35
Number of prosthesis for the upper limb produced per month	1-2

The patient is admitted to the Clinic and he will be receiving his prosthesis on Friday during the ward round.

The cost of a prosthesis above the knee	\$822.00 US Dollars
The cost of a prosthesis below the knee	\$588.00 US Dollars

Components are obtained from knit-Write, Hosmer and Otto Boch in the U.S.

The useful life of a SACH foot	2 years
The useful life of above the knee prosthesis	3-4 years
The useful life of below the knee prosthesis	2 years
For a peasant the useful life of a prosthesis is	1 year

INVENTORY OF THE TIME NEEDED TO MANUFACTURE
A PROSTHESIS AT CERPROFA

Each prosthetic technician produces 3 prosthesis below the knee and one above the knee per week.

Take mold in plaster	15 minutes
Filling mold and hardening	45 minutes
Modification of positive molding	60 minutes
Filling and lamination of socket	120 minutes
Bench alignment in boot table	120 minutes
(the socket has been filled, verified, aligned etc.)	
Static alignment	20 minutes
Dynamic alignment (done by physiatrist)	20 minutes
Passing on transfer machinery	100 minutes
Finishing	240 minutes
(to glue the rough block, shape and sand the piece, filling, polishing, laminating, and the setting of the suspension)	
TOTAL	740 minutes
	12.3 hours

It takes 12 hours of work to produce a single prosthesis

EVALUATION OF PHYSICAL REHABILITATION SERVICES

AVAILABLE FOR THE CIVIL POPULATION

HOSPITAL ROSALES

SAN SALVADOR

EVALUATION OF AREA AND PERSONNEL

Number of full time physiotherapists	6
Each therapist deals with 8-12 patients per day.	
Area for thermotherapy	791sqf
Beds for treatment	2
Hot dressings	None
They should have	16
Hydrotherapy area	2
Whirlpool tank	
Gymnasium area and pool area	342 sqf
Quadriceps table	None
(they should have)	
Parallel bars	1
(they should have)	
Set of weights	2 incomplete sets
(they should have metal and sand sets)	
6 Therapists should have	18 cubicles
Occupational Therapist	None
Physicians	1/4
Orthosis workshop	None
Prosthesis workshop	None

THE EASTERN INTEGRAL REHABILITATION CENTER
OF THE SALVADORIAN INSTITUTE FOR
HANDICAPPED REHABILITATION
 SAN MIGUEL

EVALUATION OF AREA AND PERSONNEL

Number of full time physiotherapists	12
Each therapist deals with 6-12 patients per day.	
Area for thermotherapy	1,300 sqf
Beds for treatment	12
Hot dressings	12
They should have	40
Hydrotherapy area	
Whirlpool tank	6
Gymnasium area and pool area	31,000 sqf
Quadriceps table	1
(they should have)	4
Parallel bars	2
(they should have)	2
Set of weights	1
(they should have 3 metal and 3 sand sets)	
12 Therapists should have	30 cubicles
Occupational Therapist	2 or more (3 patients per hour) very few modalities, 72 per day
Physicians	None
Orthosis workshop	
Prosthesis workshop	None

The area is more than enough, there is plenty of room for a prosthesis workshop.

They come to San Salvador to FUNTER for taking molds and delivery of the prosthesis; as there is no place for lodging, the patient takes his prosthesis without any training.

HEALTH CENTER OF CHALCHUAPA
WESTERN ZONE OF EL SALVADOR

EVALUATION OF AREA AND PERSONNEL

Number of full time physiotherapists	1
Each therapist deals with 15-19 patients per day.	
Area for thermotherapy	625sqf
Beds for treatment	2
Hot dressings	10
They should have	12
Hydrotherapy area	None
Whirlpool tank	None
Gymnasium area and pool area	625 sqf
Quadriceps table	None
(they should have)	2
Parallel bars	2
(they should have)	2
Set of weights	3 dumbbells and 6 sand
(they should have metal and sand sets)	
1 Therapists should have	3 cubicles
Occupational Therapist	None
Physicians	None
Orthosis workshop	FUNTER
Prosthesis workshop	FUNTER

The area is more than enough, there is plenty of room for a prosthesis workshop.

Monthly salary \$183.00.

HOSPITAL SAN JUAN DE DIOS

SANTA ANA

EVALUATION OF AREA AND PERSONNEL

Number of full time physiotherapists	3
Each therapist deals with 9-10 patients per day.	
Area for thermotherapy	700sqf
Beds for treatment	2
Hot dressings	1 with 12 racks refrigerator for cold ones
They should have	
Hydrotherapy area	700 sqf
Whirlpool tank	4
Gymnasium area and pool area	700sqf
Quadriceps table	None
(they should have)	
Parallel bars	1
(they should have)	
Set of weights	1
(they should have metal and sand sets)	
3 Therapists should have	9 cubicles
Occupational Therapist	None
Physicians	None
Orthosis workshop	None
Prosthesis workshop	None

40

HOSPITAL SAN RAFAEL

SANTA TECLA

EVALUATION OF AREA AND PERSONNEL

Number of full time physiotherapists	3
Each therapist deals with 14-15 patients per day.	
Area for thermotherapy	1,200sqf
Beds for treatment	8
Hot dressings	1 tank with 6 dressings
They should have	
Hydrotherapy area	2 tanks
Whirlpool tank	Not yet installed
Gymnasium area and pool area	2,400sqf
Quadriceps table	None
(they should have)	
Parallel bars	2
(they should have)	
Set of weights	Various dumbbells
(they should have metal and sand sets)	
3 Therapists should have	9 cubicles
Occupational Therapist	None
Physicians	None
Orthosis workshop	None
Prosthesis workshop	None, they are sent to FUNTER

They take care of 700 patients a month.

HOSPITAL SANTA TERESA
ZACATECOLUCA

EVALUATION OF AREA AND PERSONNEL

Number of full time physiotherapists	1
Each therapist deals with 20-24 patients per day.	
Area for thermotherapy	650sqf
Beds for treatment	2
Hot dressings	6
They should have	12
Hydrotherapy area	
Whirlpool tank	
Gymnasium area and pool area	1,200sqf
Quadriiceps table	None
(they should have)	
Parallel bars	
(they should have)	
Set of weights	2
(they should have metal and sand sets)	
1 Therapists should have	3 cubicles
Occupational Therapist	None
Physicians	None
Orthosis workshop	None
Prosthesis workshop	Yes

The area for the prosthesis workshop is very small and lacks activities as well as measurement transferer. It has a damaged vacuum pump.

Salary of a physiotherapist \$182.00 US Dollars
(She must treat private patients to make a living)

HOSPITAL SANTA TERESA

ZACATECOLUCA

EVALUATION OF AREA AND PERSONNEL OF PROSTHESIS WORKSHOP

Number of full time prosthetic technicians	1
Area of workshop	150 sqf
Working tables	1
Number of patients per month	6

First consultation is done in San Salvador for team evaluation, however patients can not go there for lack of money.

HOSPITAL ROSALES

The physiatrist faces three problems:

- 1) Some physicians do not accept this specialty.
- 2) Lack of Physiotherapist.
- 3) Physiatrists lack time for patients. Administrative work and electromyographies take most of his time.
- 4) Salary for half a day of work is \$164.00 US Dollars per month.
- 5) At present time the therapist does the evaluation and the treatment. They are doing the work of the physician and the therapist.
- 6) This is a hospital for acute and sub-acute cases. Persons are discharged after a few days.
- 7) With two prosthetic technicians and room and equipment, we will be able to produce 20 prosthesis per month.

VISIT TO THE CLINIC "LA NUEVA ESPERANZA DE LOS MATIRES"

IN GUARJILA AND TO SAN JOSE DE LAS FLORES

OCTOBER 27TH, 1992

After travelling 3 hours by road in a four wheel drive vehicle, we arrive to a remote place of the Republic of El Salvador. There, a large number of families are living, many youngsters, women and children. Houses are small, 12 x 20 foot, with walls made out of bamboo with dried mud, tin roofed.

We did a clinical evaluation on several amputees. One, 62 years old showed us a new prosthesis provided by FUNTER, he pointed to me that he could not use it because he was not taught how to use the elastic bandage to control the oedema of the stump and he was not provided with a sock to be pulled through the hole of the suction valve.

Another patient had a prosthesis above the knee, modular construction made in Cuba, very good prosthesis, but after 5 years he was in need of a new one.

Another patient with bilateral amputation in both wrists, he had been operated in Germany, had had kineplasties and used both extremities with crab holds; impressive results.

A patient with an amputation below the knee using a prosthesis made in FUNTER, should have a conventional foot with a single axis and not SACH foot.

Doctor Bowen examined three patients who need radiological evaluation for a probable surgical repair.

The clinic is equipped with several beds, several out-patient clinics, a clinical lab with 3 microscopes, a rustic operating room and a room with a pressure cooker used as an autoclave.

The doctor (female) was absent, the personnel who received us obviously without any academical background, was very cooperative and kind.

My evaluation would have been incomplete without these interesting experiences.

PROSTHESIS WORKSHOP

AVAILABLE FOR CIVIL POPULATION

TELETON PROSTHESIS FACTORY

STATISTICS

60% of patients seen have been amputated below the knee.

40% of patients seen have been amputated above the knee.

70% of patients are males.

30% are females.

Among all these 10% are children.

WORKSHOP

Equipment:

- 3 work tables
- 1 belt sander
- 1 vertical saw for cutting plastics
- 2 parallel bars
- 1 drum sander
- 1 reamer
- 1 metal lathe
- 1 band saw
- 4 copying routers
- 1 metal cutter
- 1 bench drill to molding post with suction band
- 1 set of molds for a square socket

Since May 5th, 1988 to October 16th, 1992, the workshop has manufactured 2,032 units, averaging 42 prosthesis per month. During the last 5 months average production has been 38 prosthesis and 30 repairs. Out of these prosthesis they manufacture an average of 5 per month.

PERSONNEL

The center has 10 full time prosthetic technicians, earning a monthly salary that varies from \$212.00 to \$424.00 US Dollars.

Prosthetic technicians are able to manufacture 2 - 3 prosthesis per week and no less than 2.

Having 3 prosthetic technicians, they should produce 80 prosthesis a month.

There are 2 prosthetic technicians doing research.

4 of them have to go once a week to the Eastern part of the country to take between 15 - 20 molds of amputees.

4 prosthetic technicians in the near future shall take a several months' course to train them as Orthotists.

PROFESSIONAL INTERVIEWS

MEETING WITH PROSTHETISTS AT THE FUNTER PROSTHESIS WORKSHOP

October 26, 1992

I hold a meeting at the workshop with 8 or 9 Prosthetists to discuss my findings and impressions as obtained from my previous visit to the prosthesis workshop.

I indicated them that based on the workshop monthly production of Prosthesis it only can be justified to have three Prothesists. I mentioned that I was sorry to mention that they have 7 extra Prothesists. They were very alarmed. I mentioned that just taking into account the transference units, same conclusion can be reached.

I expounded my idea to separate them in couples to work in little workshops that are cooperating with ex-combatants amputees. This project included to visit camping sites together with the Physician and Therapist to provide care to amputees which are located in the concentration areas.

After this conversation all of them agreed to participate in this project at the moment when it would be developed.

The Prothesists mentioned they were worried about their salary, and they informed me that they received a monthly payment of

\$212.00 to \$424.00 (per 7 working hours) which means from \$1.52 to \$3.03 per hour (they earn an hourly rate which is more than the salary earned by the Therapist and Psychiatrist). I explained them that my recommendations where limited to medical topics but I assured that this situation will be mentioned.

SUMMARY OF THE MEETING WITH THE SALVADOREAN ASSOCIATION OF
PHYSIATRIST

On October 26th, 1992 I had a meeting with 4 members of the Salvadorean Association of Physiatry to discuss what they thought about the project that brought me to El Salvador. We talk frankly and without any difficulty.

I explained to them that during my interviews with the Physiatrist, Prosthetist and Physicians, it seemed to me that they did not have a clear knowledge, on what was the role of the Physiatrist in the rehabilitation of the amputees, in the hospitals where they were working. They complained that the services, provided by the physiatrist to his patients were from 2 to 3 hours, 1 day a week.

Some of them were not at ease, then I proceeded to read some of the interviews I made and they accepted part of them.

We discussed the Physiatrist salary which is \$182.00 dollars a month, and when they apply the deductions and taxes it came to be only \$147.00. If we calculate \$8.50 per \$1.00 dollar for lunch daily in a period of 20 working days, it came to be only \$127.00 dollars a month. From then, we began to discuss the Physiatrist's salary working 4 hours, part time, in a month they made \$165.00 dollars. That is to say \$2.05 dollars an hour. (In Puerto Rico a field worker makes the minimum wage of \$4.60 an hour).

Currently, a Physiatrist, in his private clinic makes more than

what he makes in 4 working days. I pointed out that my recommendations would be worthless in the participation of a physiatrist in the rehabilitation team, if they, as a Professional Association, were not involved. The association agreed to support the concept and said, that they would meet with Dr. Noemi de Tinetti to be at her service and participate in the program.

COMMENTS

It seems impossible and almost ridiculous, to pretend that a Specialist works 4 hours daily for only \$8.00!!!!.

MEETING WITH DRA. CLARA DE ALMANZA

FRENTE 16 DE ENERO

On October 28th, 1992 I discussed with doctor Clara de Almanza the project to provide services to the wounded ex-combatants that have had amputations in the area where they are living. The needs to train staff at local levels was explained in order to be prepared pre and pro-prosthetist. I informed her about the differences between the conventional foot and the SACH foot and its indications.

I asked if it was possible to get lodging for the Physiatrist, Therapist and Prosthetist when they go to the concentration areas, where the amputee patients were. She indicated that there was no problem with that, but that it was not fair to assign a person to that area and get her out of the place of work without any salary. I told her that they should talk to Dra. Noemi de Tinetti of FUNTER, since that was not a part of my mission to discuss.

The problem we were discussing was of medicine nature and that we should not allow the administrators and politician to interfere in a medical decision. "All this problem could be summarized if we communicate from Physician to Physician". I invited her to meet with Dra. Tinetti of FUNTER and she accepted.

MEETING IN FUNTER

WIHT DRA. NOEMI DE TINETTI

While we were having some coffee, Dra. Tinetti took the draft with my recommendation to AID.

- "I agree with 90% of all this", she said.

- I asked besides the economical factor involved, which foot was indicated for a peasant?

- "The conventional foot with unique axis" She answered.

Dra. Tinetti clarified that there would be no problem, that FUNTER could pay an Assistant Prosthesis and an auxiliary Physiotherapist. We agreed that all the medical doubts of the projects would be cleared up.

A G A P

A GAP

The relationship between the patient and the physician probably is a problem we have to face, and we must anticipate, the implementation of a general program for the rehabilitation of the war amputees ex-combatants of the guerrilla forces.

On October 20th, 1992 while I was talking to several Prosthesisists in the TELETON Prosthetist factory one of them asked me: "Dr. Saez, why is it that the physicians do not discuss with us these cases?"

I answered: " The physician is a very proud person, if he doesn't feel well in situation that he does not control, he doesn't feel at ease. That is a normal defense mechanism, and the reason why, TELETON is going to subsidize a special course on amputees for the physicians."

During my interviews with Therapist and physicians, in different centers and hospitals, I discover almost a total absence of physician participation in the rehabilitation of patients with amputations. We could summa their complains as follows:

"It makes me uncomfortable to handle amputees ex-combatants since they are very non-conformist people, they complain about everything and they are ungrateful patients, therefore I prefer to stay away from them".

We should close this breach, which is the absence of indispensable personnel for our goal, if we are going to carry out an entire rehabilitation of the amputee patient.

Among the considerations that have to be taken into account is the fact that, our patients are from the agricultural sector, mostly illiterate, they are not properly oriented in regard to this problem. They use the loss of one or several extremities to concentrate their frustration, their aggressiveness against themselves, their family, community and against the medical and rehabilitation services, in general.

HOW TO SOLVE THIS PROBLEM:

- A) In order to understand and accept the situation, the patient must realize:

The level of his amputation, the condition of the skin of the stump, muscular strength, the condition of the other extremities and his balance, etc. It could be contraindications for the use of a prosthesis.

- B) An artificial leg or arm is an aid, a small solution to his problem, but it will never substitute completely the function of the extremity that he lost.

- C) The physician, The prosthetist, the therapist, etc are human beings that want to help them, they are not their enemies.

PROSTHESIS PRICES

ORTHOMEDIC
MEXICO CITY

January 30th, 1992
\$1.00 = 3,050.00 pesos

1. The prosthesis for tibial amputations (below the knee) with a PBT system, supracondylar belt and SACH type foot, OTTO BOCK model 1537.

The prices with different components:

Conventional finish	\$ 879.70
Steel modulary system	\$ 1,803.50
Titanium modulary system	\$ 2,295.10
PVC modulary system	\$ 1,311.50

When the dynamical or articulated foot instead of the SACH foot, the price shall be increased in \$ 294.90.

2. Prosthesis for femoral amputation (above the knee) with a quadrilateral socket in acrylic resin, suction valve, silesian band, and SACH foot, OTTO BOCK model 1537.

Prices with different types of knees:

With a free knee model 3P1	\$ 1,475.50
With a (jupa) knee model 3L11	\$ 2,131.20
With geriatrical knee model 3K9	\$ 1,803.30
With locking knee model 3P4	\$ 1,640.00
Steel modulary system	\$ 3,279.00
Titanium modulary system	\$ 3,935.00

3. The prosthesis for dismembered hip joint, with a pelvic basket done in soft and hard resins, type SACH foot.

Prices with different types of knees:

Free knee model 3P1	\$ 2,132.00
With (jupa) knee model 3L11	\$ 2,787.00
Steel modulary system	\$ 4,263.00
Titanium modulary system	\$ 4,920.00

Both in No. 2 and 3 listing, prices shall increase by 750,000 pesos = \$246.00 if a dyanmical or articulated foot is used.

FUNTER

El Salvador, San Salvador

The price of a prosthesis for the general public:

Above the knee	\$353.00 - \$471.00 US Dollars
Below the knee	\$212.00 - \$306.00 US Dollars
Above the elbow	\$518.00 - \$741.00 US Dollars
Below the elbow	\$294.00 US Dollars

Temporary prosthesis:

Above the knee	\$188.00 US Dollars
Below the knee	\$141.00 US Dollars

Price Comparison with other countries

PROSTHESIS	BELOW KNEE US\$	ABOVE KNEE US\$	ARMS US\$
Puerto Rico	1,875.00	3,500.00	8,000.00
Mexico	819.70	1,475.50	
Venezuela	308.33	808.33	1,416.67 (below elbow)
El Salvador			
FUNTER	236.00	352.00	470.00 (above elbow)

CONCLUSION

Based on the price disproportion of prosthesis in different countries, when you compare the cost in El Salvador, having components and materials quoted in Dollars, we can conclude that institutions for economic reasons are sacrificing service to the handicapped patient because they are not paying a reasonable amount to specialized physicians and technical personnel. This results in a lack of service or/and their denial to participate in our rehabilitation programs.

Duration of a prosthesis:

The prosthesis is manufactured by FUNTER who, I can assure, are top quality from the manufacturing point of view, are unbeatable. Nevertheless the fact is that at present time they only use the solid foot and ankle (SACH foot), violating a biomechanical rule when prescribing it to a patient who must climb hills. They should use the standard foot with a single axle which enables dorsiflexion and plantar flexion of the foot, indispensable for climbing up and down hills.

Analyzing the useful life of a prosthesis above the knee in a peasant we find:

It needs a new socket	Every 12 months
It needs a new knee	Every 8 months
It needs a new foot	Every 6-8 months
It needs replacement of the silesian band	Every 4 months

The only component than can be replaced at the patient's home is the foot (by removing the nut from the bolt that keeps the old foot in place, the new foot is placed and bolted).

The silesian band can be repaired in the field if we carry with us a leather sewing machine.

Besides a prosthesis, the patient with an amputation of the lower limbs should receive a pair of crutches to rest the skin and walk while his prosthesis is being repaired.

The price of a prosthesis for the general public:

Above the knee	\$353.00 - \$471.00 US Dollars
Below the knee	\$212.00 - \$306.00 US Dollars
Above the elbow	\$518.00 - \$741.00 US Dollars

Below the elbow	\$294.00 US Dollars
Temporary prosthesis:	
Above the knee	\$188.00 US Dollars
Below the knee	\$141.00 US Dollars

ON PROsthESIS FOR THE PROGRAM

ON PROSTHESIS FOR THE PROGRAM

Prosthesis manufactured by FUNTER are of the best quality, are unbeatable. Nevertheless, because of the fact that at present they only the solid foot is used (SACH), biomechanical rule is violated. A standard foot with a single axle should be used for peasants. This foot allows dorsiflexion and plantar flexion indispensable for going up and down hills.

According to prosthetic experts, FUNTER prosthesis duration for prosthesis above the knee in peasants is:

Requires a new socket every	12 months
Requires a new knee every	8 months
Requires a foot every	6 - 8 months
Requires a new salicin band every	4 months

(Based on my observations evidently they last a much longer time).

The only component that can be substituted at home by the patient is the foot, (that holds the old foot is taken out, the new foot is put in place and bolted).

The salicin band can be repaired in the field if we carry with us a leather sewing machine.

Besides the prosthesis the patient with amputation of the lower limbs should receive a pair of crutches to rest the skin and walk while his prosthesis is being repaired.

Price of a prosthesis for the general public:

Above the knee	\$353.00 to \$471.00 US Dollars
Below the knee	\$212.00 to \$306.00 US Dollars
Over the elbow	\$515.00 to \$741.00 US Dollars
Below the elbow	\$294.00 to ---- US Dollars

Temporary prosthesis

Above the knee

\$188.00 US Dollars

Below the knee

\$144.00 US Dollars

RECOMMENDATIONS FOR THE ESTABLISHMENT OF A
REHABILITATION PROGRAM FOR
EX COMBATANT AMPUTEES

Based on my personal observations, visits and interviews I can conclude that at present FUNTER is the only entity in the Republic of El Salvador with administrative capability, ideal technical personnel and rehabilitation philosophy, capable of taking care of this task.

To be successful any rehabilitation program designed for ex combatants with amputees on the limbs shall revolve around the area of residence of the patient in order to develop and preserve a medical patient relationship. For this purpose, as much as possible, the medical and paramedical personnel assigned should offer the service amputees population in order to promote this medical patient relationship.

It shall be necessary that FUNTER decentralizes the prosthesis workshop in such a manner that the seven extra prosthetic experts they have are assigned to cover this new patient population.

The proposed rehabilitation program would absorb the cost of the equipment at the workshop, prosthesis manufacturing materials and all knee and foot components necessary to produce, repair and replace 3,000 prosthesis in a period of 2 years. From the material to be acquired, resin, activator and hardener, cannot be stocked for longer than 6 months. The inventory of resin, activator and hardener, shall be renewed every 6 months. Equipment, knee and foot components and manufactured materials necessary for the 3,000 prosthesis to be acquired in its totality and stock in San Salvador. In this manner it will guaranteed that the funds assigned will not deviate to other projects.

EQUIPMENT FOR SEVEN PROSTHETIC EXPERTS

Working tables	7
Dynamic aligning devices	25
Transference devices	7
Suction pump tubes	7
<u>Sets of quadrilateral molds</u>	
Right	7
Left	7

RECOMMENDED MATERIALS

We shall make a calculation of components and materials necessary based on production, repair and replacement of 3,000 prosthesis. In 2 years, the following shall be necessary:

1,500 feet with only one axles (different sizes)	1,500 right feet
1,500 standard feet with single axle (different sizes)	1,500 left feet

The proportion between amoutations at the lower and upper extremities is 40%, we will calculate 40% of 3,000 and divide it by 2.

Standard knee components (different sizes)	600 right knees
Standard knee components (different sizes)	600 left knees

MEDICAL AND PARAMEDICAL PERSONNEL RECOMMENDATIONS

Physiatrists:

In order not to overload work and functions done by FUNTER physiatrists I recommend to hire physiatrists in private practice. To recruit private practitioners, new schedules should be

established. This standard fee per day of 8 hours of work could be established taking as a base what the physician would earn if he received 10 patients per day (\$90.00 totalling \$900.00 per day, \$105.00 Dollars).

CALCULATING APPROXIMATE TIME NECESSARY
TO START PROJECT IMPLEMENTATION

These calculations start at the moment the project is approved and allocated economic funds are activated.

1- Personnel recruitment	30 days
2- Preparation of small prosthesis workshops (20x20 sqf) Preferably in hospitals.	60 days
3- Purchase and installation of equipment in workshops.	190 days
4- Establishment of medical contacts between FUNTER headquarters at level three with doctors and/or nurses at one and two levels.	90 days

COMMENTS

After approving the project at US AID there is no problem from the medical and technical point of view to start the programming 3 to 4 months. The first prosthesis would be delivered 3 weeks later.

PROSTHESIS WORKSHOP

For a prosthetic expert to do his work is needed:

Working table	1
Suction tube	1
Dynamic aligners	2

Transference device	1
Set of quadrilateral molds, left and right	1

PRICES OF EQUIPMENT FOR THE PROSTHESIS WORKSHOP

It is indispensable to equip each of the workshops in order to guarantee the correct and adequate use of technical personnel and provide a long term service.

	<u>Unit</u>	<u>7 Units</u>
Suction tube	\$398.00	\$2,786.00
Dynamic aligner	\$300.00	
(25 units)		\$7,500.00
Transference device		
(vertical)	\$883.70	\$6,185.90
Set of quadrilateral socket	?	?
7 rights		
7 lefts		
TOTAL	\$1,581.17	\$16,471.90

The rehabilitation team shall spend the night in the area of the first level to start receiving patients early in the morning and have enough time to evaluate them all.

During clinic visits, physiatrists and doctor at the first level shall evaluate the physical condition of the patient and the stump to establish whether he or she is in physical condition to receive a prosthesis or if the stump requires additional surgery, a program of articulation, lengthening, oedema control, etc.

If the stump were in good conditions and no medical contra indication of the physiatrist existed, the prosthesis shall be described. The prosthetic expert shall proceed to take the mold of the stump to later prepare the aligned socket in his workshop in San Salvador.

The rehabilitation team goes back to San Salvador in the afternoon. In San Salvador, the prosthetic expert prepares a positive mold and manufactures the aligned socket for each of the patients.

After having all sockets ready, the prosthetic expert gets in contact with the doctor and/or nurse of the first level to agree on a date to return and test sockets and dynamic alignment of patients.

The day of the Clinic, the prosthetic expert together with the doctor at the first level adjust the socket to the patient and carry out a dynamic aligning. During the visit, the prosthetic expert takes with his him the dynamic aligners necessary for the number of patients to be measured. When dynamic aligning is completed on the patients, the prosthetic experts comes back to San Salvador to finish the prosthesis in the workshop. When the prosthetic expert has all prosthesis complete, get in touch with doctor or nurse at the first level to agree on a return and together with doctor tests prosthesis on the patient and deliver

them. The prosthetic expert gives instructions to the "Therapist Assistant" at the first level on a program to carry on patient training. The Therapist Assistant shall be a person residing at the first level, selected by the first level doctor, to be trained by physiotherapist who shall go to the area.

The Therapist Assistant shall learn how to wash and take care of the stump skin of the patient; to apply the elastic bandage to the stump; to exercise articulation; to exercise the patient, etc.

The doctor at the first level gets in contact with the physiatrist at the second and third level if it is necessary that the rehabilitation team for amputees come back.

ORGANIZATION OF AMPUTEES CLINIC FOR EX COMBATANTS
AT THE FIRST LEVEL

A rehabilitation program for ex combatants with amputations must revolve around the amputee, his needs and home and not the service providing structures.

If the program is carried out this manner, we may eliminate the ubication and frustration problem we impose on the amputee, preserving the medical-patient relationship indispensable in every medical situation.

We should work with the patient in his own environment. I don't believe it is necessary that a licensed physiotherapist or occupational therapist gives the patient an appointment and make him come to San Salvador just to teach him how to wash the stump, set bandage on it, protect the skin, how to keep the stump while sleeping, how to exercise the muscles on the stump and other limbs, etc., "It will be a waste of time". From the medical point of view there is no barrier for teaching personnel in the immediate surrounding where the patient lives so they can perform is function.

Let's see:

The doctor or nurse in the immediate area where the amputee lives, who from now we shall call him first level, evaluate the stump and select patients for the amputee's clinic.

The doctor or nurse at the first level gets in contact with the physiatrist in FUNTER to get in touch on the day of the visit of the physiatrist, physiotherapist and prosthetic worker at the place where the doctor indicates close to the area where patients live.

The rehabilitation team shall spend the night in the area of the first level to start receiving patients early in the morning and have enough time to evaluate them all.

During clinic visits, physiatrists and doctor at the first level shall evaluate the physical condition of the patient and the stump to establish whether he or she is in physical condition to receive a prosthesis or if the stump requires additional surgery, a program of articulation, lengthening, oedema control, etc.

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The doctor at the first level gets in contact with the physiatrist at the second and third level if it is necessary that the rehabilitation team for amputees come back.

CONCLUSION

1. The Republic of El Salvador has the professional and technical staff as necessary to successfully carry out a rehabilitation program for amputee's ex-combatants
2. It is necessary to solve the staff remuneration area since the wages are too low to allow any Specialist to accept them.
3. The seven prosthetists currently working in FUNTER should be divided among all prosthesis workshops in San Salvador, preferably assigned in the Physiatics Departments currently working.
4. The program will provide each one of this workshops with two dynamic alignment apparatus, transference apparatus, a tube with a suction bomb, a working table, two sets of metallic molds for knee sockets, etc.
5. The knee and foot components that are recommended in this report will be procured to stock.
6. FUNTER should organize, direct and control at national level the program for the rehabilitation of ex-combatants that are suffering member amputees.