

A Programme For The Establishment and Training of Orthopaedic / Prosthetic Appliance Technicians in Hong Kong*

By J. A. E. GLEAVE

*Harcourt Health Centre
Hong Kong*

Until 1959, the making of orthopaedic appliances and artificial limbs in Hong Kong had been limited to attempts by local untrained artisans to produce such articles. To meet the pressing need of the many disabled in the colony the Government Medical Department decided to set up an orthopaedic workshop and fitting department to provide limbs and appliances. In most cases it provided them free or at a nominal charge where circumstances indicated this.

The workshop was set up in 1960 and at the same time plans were made to build an Orthopaedic Medical Rehabilitation Unit, which would include the initial Orthopaedic workshop, a Physiotherapy section and an Occupational Therapy section. This unit was to be sited at a central government hospital where some 300 beds would be reserved for patients requiring orthopaedic treatment. The unit would provide the various stages of rehabilitation to the point when the patient could be referred elsewhere for vocational training.

To implement this plan it was necessary to appoint and train staff and to develop an effective scheme of co-operation between the medical and paramedical personnel involved.

The choice of staff for the orthopaedic/prosthetic unit presented particular difficulties since there were no trained personnel available. The issue was complicated by the pressing need to begin production as rapidly as possible. It appeared impracticable to adopt a formal apprenticeship scheme since this would take too long. Equally it seemed unsatisfactory to send men abroad for a short intensive course because of their complete lack of initial experience. Yet at the same time any training should be such that the ultimate knowledge and status of the technicians would be equivalent to that of technicians elsewhere. Preferably their qualifications should be recognized by a professional body or society.

The ultimate numbers of staff, both technicians and artisans, which would be required was assessed and the following plan chosen for their training. Initially two technicians were to be appointed, who would be given intensive training until, as their ability progressed, a gradually increasing number of technicians and artisan staff would be appointed.

Selection

It was necessary to select men whose education was sufficient for them to follow lectures in Anatomy, Pathology, and Physiology yet who had sufficient ability and manual skill to follow and execute the various stages of production and fitting of appliances and prostheses. Since many of the

problems associated with orthopaedic and prosthetic manufacture are of an engineering nature, it was decided to select young men between 18 and 30 years of age, of suitable character and education, who had completed a five year apprenticeship in mechanical engineering (or its equivalent). Accordingly the short listed candidates were given character, practical, and aptitude tests and a careful selection made.

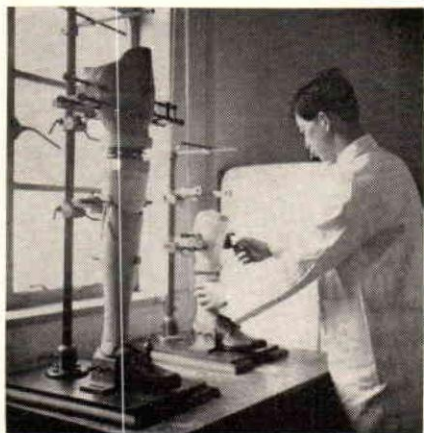
The training programme was devised so that the ultimate knowledge of the technicians would include engineering (including simple electronics) bio-mechanics, the practical techniques of production, materials use and selection, a knowledge of the structural or kinesiological functions of parts of the body, as well as the intimate knowledge of the design, fitting and essential criteria for all types of brace or prosthesis.

The background Medical knowledge is provided at the school for Physiotherapy. Here the student technicians attend on average five hours weekly over a period of one year. They hear formal lectures in Anatomy, Physiotherapy and Pathology, apart from gaining detailed knowledge which is essential to their work, this enables them to grasp some of the problems of the other members of the rehabilitation team and to observe and discuss the anatomical and physiological problems caused by disease or trauma.

Concurrent with the lectures is the practical study of limbs and appliances. As work started, specific instructions and demonstrations were given in cast taking, measuring, construction, fitting and the interpretation of prescriptions. The relationship of the technician with other medical and paramedical personnel is explained and stressed. General instructions are given in the use of plastics, leather, wood and other materials, and the nature, properties and chemistry of these materials explained.

With these principles in mind the technicians began under supervision to deal with patients, each taking casts, measurements etc., making and fitting the appliance; when it was complete to the satisfaction of the supervisor the technician attended the orthopaedic clinic with the patient for the surgeon's assessment.

In the interests of efficiency exact procedures were devised which would compensate for the students' lack of experience; and a research and development programme runs concurrently with the production schedule, in which new procedures and mechanisms for dealing with given conditions are evolved, i.e. alignment jigs for upper and lower extremity prostheses, devices



1. Using vertical alignment jigs for lower extremity prostheses.



2. Setting up a BE socket in the upper extremity alignment jig.

for taking pre-shaped and aligned casts, apparatus for the forming of plastic materials. The plan of any experiment is explained to the group and each technician is given specific tasks to perform, thus the students fully understand the principles of any device and foresee its ultimate use.

Specific Training

However, problems of the production schedule do not present themselves in a logical or scientific order for discussion, and so although certain basic techniques are described at this stage and much valuable knowledge and experience is gained it is supplemented by a parallel intensive training scheme which treats the whole subject from the scientific, rather than the objective viewpoint.

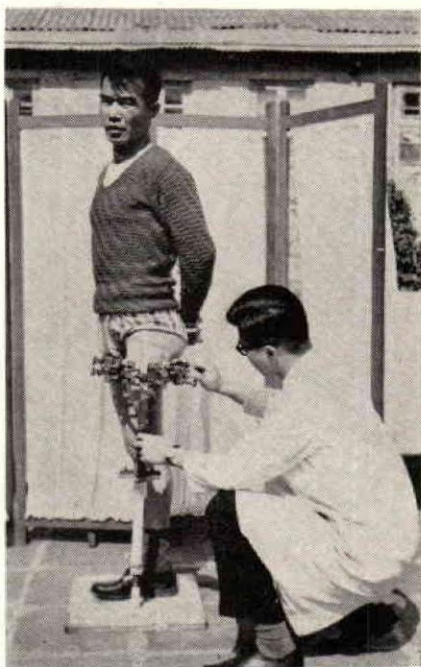
This training scheme consists of formal workshop lectures and demonstrations, in which appliances and prostheses for various parts of the body are described, the basic principles of their design and purpose stressed, and the already studied Anatomy, Physiology and Pathology are applied. The bio-mechanical problems are stated. Finally the measuring and fitting procedures and criteria, which have probably been stated at an earlier date in the production schedule, are re-iterated, discussed and assessed.

In this way the students build-up a background of practical experience and at the same time they develop an increasing scientific knowledge of the problems of their work, so that at the end of their training period, they are capable of making and supervising the making of all known types of artificial limbs or orthopaedic appliances; as well as being able to modify or design for individual needs; or to initiate research projects as appears necessary.

The patients here, as in most of Southeast Asia, present many problems;



3. Fitting a pair of leg braces with moulded ischial seats.



4. Fitting the universal socket for casts of AK stumps.

some are of neglect; in others disability may have occurred years previously with consequent muscle atrophy or deformity; others more recently disabled are unable to attend for pre or post prosthetic training; and social, economic, educational and religious factors also present problems. The majority of patients live in crowded unhygienic conditions under which what might be considered "standard" prostheses deteriorate rapidly. A fisherman would find difficulty in rowing his boat using a hook terminal device. A leg amputee would not wear his prosthesis for fear of spirits associated with it. SACH feet deteriorate rapidly in paddy fields. How can a man with deformed hands use a plough, the origin of its design lost in antiquity? These are some of the problems, answers have been found for many, and many more await investigation, and it is the continuous work of the department to find materials, components, and designs to meet the demands of S.E. Asia.

The concept of team work is well fostered since the technicians co-operate with the physiotherapists in class instruction. The technicians co-operate with the Occupational therapists too, when an arm amputee has been fitted the technician attends at the initial arm training sessions to ensure all controls are properly adjusted. Equally they co-operate with the medical social worker in assessing social background in indicated cases. The surgeons too take part in the programme; orthopaedic registrars spend one month in the department during which time they observe the various procedures of measuring fitting and construction, assessment procedures, prescription and the functional possibilities and limitations of the various types of prostheses and appliances. At the same time the technicians benefit from their presence in the department, for they can receive immediate information of the possibilities and limitations of surgery in individual instances.

* ACKNOWLEDGEMENT:—

Dr. The Hon. D. J. M. Mackenzie,
Hon. Director of Medical & Health Services.
For permission to publish

