

## PROSTHETICS COMMITTEES OF THE NATIONAL ACADEMY OF SCIENCES-NATIONAL RESEARCH COUNCIL

Some of our readers may not be familiar with the roles of the Committee on Prosthetics Research and Development (CPRD) and the Committee on Prosthetic-Orthotic Education (CPOE) of the National Academy of Sciences-National Research Council. These committees, supported in part by the Veterans Administration, serve in an advisory and correlative capacity in a nation-wide program of research and education in prosthetics and orthotics. To acquaint more people with the activities of these committees, we are pleased to reprint the Newsletter of July 17, 1964, prepared by Dr. George T. Aitken, Chairman, CPRD, and a report on progress and future plans prepared by CPOE. The appendices referred to in the latter report have not been included in this issue.

### COMMITTEE ON PROSTHETICS RESEARCH AND DEVELOPMENT

#### Chairman's Newsletter

July finds CPRD at the close of one year and the beginning of a new one. For your Chairman it is the end of two very pleasant, but strenuous, years. Since the usual tour of duty on this position is three years, there is one left in which to attempt to solidify some of the efforts that have been started.

During the past two years an attempt has been made to establish CPRD as a purely advisory and correlative body that is supplied with necessary information from its working subcommittees.

Since evaluation is a very major function, it seemed desirable to define a pattern for evaluating basic research, devices, and techniques. In December of 1962 such a plan was formalized and accepted by the Committee. Since then several opportunities for using this plan have presented themselves. The pilot project in orthotics evaluation to be done by New York University under the sponsorship of the Vocational Rehabilitation Administration is an excellent example. Under the guidance of Prof. Herbert Lissner the Subcommittee on Evaluation, through conferences, recommended a fine pilot orthotic-evaluation procedure. This was concurred in by Dr. Sidney Fishman, Director of the NYU project, and an orderly pre-agreed upon plan is in operation. This has permitted the parent group to participate in the planning of evaluation and the selection of devices and techniques to be evaluated, and agree *a priori* to the general methodology.

Such an arrangement would seem to permit more meaningful recommendations later. Certainly it has permitted the Committee as a group to be involved from the beginning, and this can hardly fail to make the whole procedure one in which the results will more clearly reflect Committee attitudes.

This intimacy of involvement is reflected in the preliminary NYU report to VRA\* concerning the American Institute for Prosthetic Research pneumatic upper-extremity prostheses. In this instance it was possible, because of improved liaison between evaluating agency and parent committee, to alter the technique of evaluation following a preliminary review. In this way the Committee could in a knowledgeable manner advise the sponsor that such a change in the project was desirable. From this will evolve the evaluation of pneumatic components in "hybrid" systems.

The Subcommittee on Evaluation is also involved in an effort to establish a numerical method of evaluation. Here an attempt will be made to objectify as nearly as possible through numerical grading all devices and possibly techniques. This is still in a draft stage, but the Committee believes it has merit and has encouraged Professor Lissner and his group to proceed with the plan and finalize it. Such a plan may improve the ever-disheartening but necessary problem of evaluation.

The Subcommittee on Design and Development is a new working subcommittee of CPRD. Under the aggressive and skillful leadership of Colin A. McLaurin, it has functioned actively both as a subcommittee and as sponsor for workshops in design and development. This group has, through their written and verbal reports, kept CPRD well informed concerning what is going on in the various participating laboratories. Further, the workshops have in their explorations of various problems made it very clear that there is much to be done. Their deliberations indicate that there is need for basic research in many areas and that some of our previously accepted concepts of prosthetic design need a "new look" and probably some very radical changes.

The increasing emphasis on the introduction of external power to prosthetic systems has necessitated some alterations in concepts of upper-extremity prosthetic design. From these group sessions will develop information of value to CPRD, plus stimulation of new projects by those directly involved.

The previously established Subcommittee on Child Prosthetics Problems has continued to be very active under the chairmanship of Dr. Charles H. Frantz.

The epidemic of teratologic defects secondary to the Thalidomide tragedy in West Germany has stimulated the need for an agreed-upon international nomenclature for limb deficiencies. The work originally done by Frantz

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\*Ed. note: Vocational Rehabilitation Administration.

and O'Rahilly is now being reworked with the assistance of the Association for the Aid of Crippled Children—trying to develop a classification that will be accepted internationally. Preliminary discussions were held at The Hague in the fall of 1963. If such a classification can be established, communication concerning types of anomalies, and their frequency and methods of treatment, will be materially improved.

The yearly conference of participating children's clinic chiefs was held in Chicago in January of 1964. This annual event has helped to maintain a strong group of teams available for clinical application studies. This group may be the nucleus for orthotic evaluation studies. A clinical application study of the Münster below-elbow and above-elbow suspension techniques in children through the cooperation of this group is planned. NYU will be the evaluation agency.

During the past fiscal year CPRD has had requests to review 16 proposals from sponsors. The VA presented 7; the VRA presented 8; the Children's Bureau 1. Sponsor reaction to reports from CPRD concerning these proposals seems to reflect a high regard for the opinion of the Committee. It is your Chairman's impression that our sponsors are currently very pleased with the activities of the Committee.

Recently the Veterans Administration requested of the NAS-NRC, through channels, that CPRD assume the advisory and correlative functions relative to the VA Sensory Aids projects. With approval of the Academy-Research Council, the Committee agreed to accept this responsibility. A Subcommittee on Sensory Aids is planned. Professor Robert Mann has agreed to chair this group. The personnel of the subcommittee will be selected following some discussion and conferences with key people in some of the areas involved. It is anticipated that it will require nine to twelve months for this group to become sufficiently oriented to permit recommendations to be meaningful value judgments. This time requirement has been discussed with Dr. Stewart at VA and he concurs.

In the past year there has been increasing awareness on many persons' part of a technique for immediate postoperative fitting of lower-extremity prostheses. This concept was first propounded by Dr. Marian Weiss of Poland at the Sixth International Prosthetics Course in Copenhagen, Denmark, during June 30–July 5, 1963. Last fall Doctor Weiss was in the United States and was at the University of California-San Francisco where he described his technique.

CPRD is aware of this technique and believes it may be a precursor to major changes in both surgical and fitting procedures. An *ad hoc* committee to establish a plan of reviewing the Weiss technique and to collect information relative to its use has been appointed. Dr. Verne T. Inman is chairman of this *ad hoc* group. Their work is progressing splendidly. It is believed that by the end of the summer a very satisfactory method of data collection concerning such cases will be available.

Dr. Inman has expressed the hope that some mechanism for encouraging the cooperation of surgeons will be evolved. Dr. Stewart of VA has indicated that he will do all possible within the VA structure to develop a methodology that will produce a well-organized and controlled clinical experiment.

As your Chairman, it is my sincere hope that the current operating procedure of CPRD has been acceptable to all. It is my personal belief that our three major subcommittees have, by their activities, made CPRD a better-informed group and have facilitated the value judgment function that it is necessary to exercise.

May I take this opportunity to thank you, each and all, for the cooperation that you have extended. Without this there would be no Committee. It has been my pleasure to have been associated with you, and I send you my best personal wishes.

GEORGE T. AITKEN, M.D.,  
*Chairman.*

JULY 17, 1964.

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## COMMITTEE ON PROSTHETIC-ORTHOTIC EDUCATION

### Progress Report and Future Plans

At the annual meeting of the Committee on Prosthetic-Orthotic Education, on October 26, 1963, and the Steering Committee meeting on May 7, 1964, there was a critical reassessment of the prosthetic and orthotic educational needs of this country. The Committee was organized in 1958 at the request of the Training Division of the Office of Vocational Rehabilitation (now the Vocational Rehabilitation Administration) and the Veterans Administration, with two broad general missions:

1. To develop a varied educational and informational program to complement the activities of the prosthetic schools in the interest of improving the rehabilitation services of amputees and other orthopedically handicapped individuals.
2. To serve as a vehicle for the collection of information relating to clinical practice in prosthetics and orthotics.

At that time, limb prosthetics, although having a relationship to medicine, was not identified with the processes of medical education. The practicing physicians of the United States were largely unaware of the results of the government-sponsored research program that had revolutionized amputee care and management. The multidisciplinary amputee clinic team concept was not generally recognized, and wide areas of the country were without these specialized facilities for nonveteran amputees. Although a purely educational program is not normally a proper function of a National Research Council committee, in this instance a need existed for a neutral group, such as characterizes a committee of the National Research Council, to work with other agencies and organizations in a national effort to better inform the medical and paramedical groups concerning the modern concepts of the care of this form of orthopedic disability.

As a result of a number of favorable factors, this situation with respect to prosthetics has materially improved in the past five years. Whereas, in 1958, very few orthopedic residency programs provided training in prosthetics, a recent survey has documented the fact that over 85 percent of these programs now train their residents in the management of amputees (Appendix C). During this period, a great many prosthetics clinics have been organized so that there are no longer wide areas of the country that do not provide clinic team services for nonveteran amputees. As organized medicine, especially orthopedic surgery and physical medicine, assume the responsibility for the dissemination of this knowledge, the efforts of the Committee can very well undergo a transition. This modification in the mission of CPOE is reflected in the following outlined plans of the three standing subcommittees.

Subcommittee on Prosthetics in Medical Education

This group was originally organized to promote the teaching of prosthetics in medical education. Now that this form of disability is a part of the medical education process, the group devotes its efforts to the production of audiovisual and other prosthetics teaching instruments. The increased emphasis that is being given to amputations in medical and paramedical education has resulted in a heavy demand for this material on the part of instructors, in order that they can more effectively utilize the time that is allocated to this subject in the curricula. The following items are under preparation:

1. *Prosthetics Teaching Slides.* After reviewing over 1,500 slides, a master set of some 350 views of devices and components has been prepared. Specialized sets for various purposes will be assembled from this master set. For example, the set for schools of occupational therapy will consist largely of upper-extremity items.

2. *Film on Upper-extremity Harnessing.* Directors of schools of PT and OT have expressed a need for this item, since actual patients with the various kinds of upper-extremity amputations are usually not available at the time this subject is presented. This film is now being prepared by the Northwestern University prosthetics school, and it is expected to be available this coming fall.

3. *Film on Human Locomotion.* An understanding of the basic principles of locomotion is essential in the training of physicians and physical therapists in the management of lower-extremity amputees. This film is under preparation by the UCLA prosthetics school. An estimated completion date is not now available.

4. *Reference Pamphlet on the Above-knee Quadrilateral Socket.* A pamphlet being prepared by the Northwestern University prosthetics school will provide the physician with an understanding of the more common prosthetic causes for fitting problems and the adjustments in the socket that the prosthetist must make to correct them. This guide is needed by clinic chiefs in areas where highly trained limb makers are not now available.

5. *A Primer of Basic Concepts of Amputation.* This pamphlet is designed for use in undergraduate medical education. Its development was postponed this past year pending the publication of the article, "Limb Prosthetics Today," by Mr. A. Bennett Wilson, Jr., in the journal of *Artificial Limbs*. The subcommittee decided at a recent meeting that, although Mr. Wilson's article is an excellent orientation of the field of prosthetics, it does not stress the basic concepts that should be taught to medical students. It is hoped that the subcommittee's brochure will be available for reproduction in a few months.

### **Subcommittee on Prosthetics in Paramedical Education**

This subcommittee held its annual meeting on April 27-28, 1964, the proceedings to which are attached as Appendix B to this report. Especially noteworthy are the recommendations for the production of audiovisual aids to be used in PT and OT schools. The group is sponsoring a three-hour prosthetics presentation at the annual meeting of the American Occupational Therapy Association's annual meeting next October in Denver. Plans for the prosthetic and orthotic orientation of social workers and rehabilitation nurses are under study.

### **Subcommittee on Prosthetics Clinical Studies**

It has been recognized for some time that the most serious gap in the government-sponsored prosthetics program is the relative absence of the results of well-controlled clinical studies. Factual data bearing upon what is actually being achieved in the rehabilitation of the various categories of amputees is largely lacking today. Such information would be very useful to the prosthetics research program. Feedback data is needed in the evaluation of new devices and techniques. It was for these reasons that the Subcommittee on Prosthetics Clinical Studies was organized with the broad mission of collecting basic data relating to prosthetics, of recording and correlating the results of current prosthetic clinical practices, of making special studies of certain problem areas, and reporting the experiences of the cooperating amputee clinics in the use of new devices and components.

The basic effort of this group, composed of the chiefs of 17 prosthetics clinics, is a long-range followup study of their amputee cases. For this purpose, the participating clinics are using precoded data forms to facilitate the transfer of the information to punch cards. Over 1,000 cases have been recorded at the present time.

Last October, the subcommittee completed a statistical study termed the Amputee Census, consisting of some 12,000 new amputee cases. This was conducted through the member facilities of the American Orthotics and Prosthetics Association. This study has provided a picture of the relative incidence of amputation on a national basis by age, sex, site of amputation and cause of amputation. When mass data is first collected on any subject, it is to be expected that there will be revealed problem areas that are worthy of further study. This generalization is true of the Amputee Census. Of special interest to the subcommittee is the evidence from this study that altogether too many older-aged individuals with peripheral vascular disease are being amputated above the knee instead of below the knee. The preservation of the knee joint in terms of the rehabilitation potential of these geriatric cases is all-important. Studies are under way to throw more light on this problem.

A study of the end results of all amputations performed at the Massachusetts General Hospital during calendar year 1962 was conducted this year. The Amputee Census did not provide information on cases who were not fitted, nor did it give data on the rehabilitation results that were achieved. This type of information can only be obtained from hospitals. A number of additional similar studies at other hospitals are needed to provide statistically sound data on these aspects of the amputation problems.

The Amputee Census documented the fact that the limb facilities of the United States are an invaluable source for collecting certain types of prosthetic information on a mass basis in a relatively short period of time. At the suggestion of CPOE, the American Orthotics and Prosthetics Association has organized a Conference of Prosthetists, who will devote their interests exclusively to professional matters pertaining to the practice of prosthetics. This group of professionally dedicated individuals is now available to work with the Subcommittee on Prosthetics Clinical Studies on projects of mutual interest.

#### **Publications Issued During Fiscal Year 1964**

"Amputee Census," a paper presented before the Southern Medical Association's annual assembly, November 19, 1963, in New Orleans, Louisiana, and published in the proceedings.

#### **Committee Participation in National and Regional Meetings**

A three-hour presentation at the American Congress of Physical Medicine and Rehabilitation, August 1963, in Dallas, Texas.

A prosthetic-orthotic exhibit for the annual meeting of the American Academy of Orthopaedic Surgeons, held in January 1964, in Chicago, Illinois.

Presentations before the regional meetings, American Orthotics and Prosthetics Association, as follows: Region VIII, San Antonio, Texas—March 15, 1964; Region III, Baltimore, Maryland—April 10, 1964; Region V, Cleveland, Ohio—April 19, 1964; Region I, Boston, Massachusetts—May 1, 1964.

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