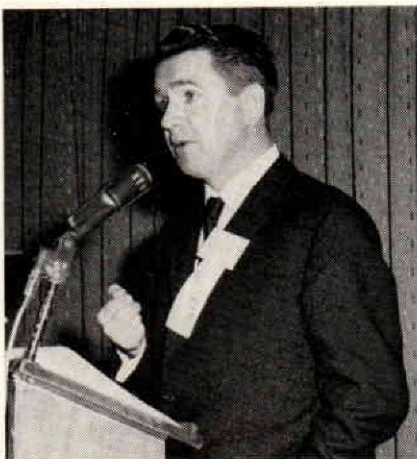


Prosthetics in Denmark

By ERIK LYQUIST



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Since fitting and fabrication techniques are largely based on the same principles as used in this country, I shall not be concerned with technical principles, but concentrate on information about Financing of Prostheses, The Danish Association of Prosthetists and Orthotists, The Education Program, How Our Workshops Are Organized, and How We Evaluate and Adapt Ideas from Other Countries.

Evaluation of the information will to a certain degree depend on some knowledge of Denmark. I would therefore like first of all to give you a very brief introduction to my country. Denmark is the smallest of the Scandinavian countries. It covers a territory, excluding the Faroe Islands and Greenland, of 43,000 sq. km., or about 16,800 sq. miles. If we compare the territory of Denmark with the territory of California, we will find that California is approximately nine times bigger. The population is well over 4½ million; California has, as you know, about three times as many. Approximately 25% of the population live in Copenhagen, the capital of Denmark, well known to American tourists for its main attractions—Tivoli, The Little Mermaid and (not to forget) thousands of young blond girls on bicycles.

Denmark has insular climate. Some 100 days a year the temperature is below the freezing point, but fortunately, as I had to explain to a little girl in the neighborhood the other day—we have no polar bears walking around in our streets.

Compulsory education covers seven years. Nearly all children receive their general education in municipal or state schools and the instruction is free. Advanced education at universities and most other institutions of higher education is also free.

It might also be of interest to you to know, that for every 1000 inhabitants there are 10.5 hospital beds; 3.5 nurses; 1.3 doctors and 0.008 certified Prosthetists and Orthotists.

Rehabilitation work is carried out by different agencies: by a number of public bodies, by the handicapped themselves through their organizations and by other voluntary organizations and agencies. It covers widely different fields, such as nursery schools, schools, medical treatment, industrial rehabilitation, vocational training, employment services, and residential care.

In Denmark, social security is largely regarded as the responsibility of society, a view that has met with wide political agreement. The social security schemes which have been developed in this country have more and more assumed the character of public services and facilities, which in principle are available to the entire population regardless of the financial conditions of the individual person. At the same time, the principle of prevention has received increasing attention, and there has been a shift of emphasis from the mere payment of allowances to the handicapped towards efforts of rehabilitation.

National health insurance is available to the entire population granting free hospital treatment to all insured persons. Free medical care is granted to all persons under a specific income level, while persons above that level are reimbursed for a substantial portion of their expenses. Subject to a very few exceptions, hospital service is a public service.

The Disability Insurance Court has been an important factor in the development of rehabilitation services. The first Disability Insurance Act, which was passed in 1921, provided for assistance by the Disability Insurance Court for training of disability pensioners. In 1927 the Disability Insurance Act was amended so as to comply, in a larger measure, with the principle of prevention, but still only insured persons were eligible for payment of training allowances, etc. The Rehabilitation Act of 1960 has no provision at all requiring the claimant to be insured against disability in order to qualify for rehabilitation services. Any Danish citizen who is in need of special care or medical, vocational or social rehabilitation is eligible for such assistance, subject to no formal conditions. The type of assistance depends on the circumstances of the individual case. It may consist in, for example, provision of a prosthesis or brace. If a person becomes an amputee, he will have the right to be fitted with a prosthesis without any costs to him. Maintenance also is paid for. If the amputee is able to work and thereby support or partially support himself and perhaps a family, he will be entitled to two prostheses of which one is considered a spare. A housewife with a family to take care of is also entitled to two prostheses.

A new prosthesis can be prescribed for any amputee as soon as the surgeon and the prosthetist agree that further repairs or refitting of the old one no longer is economically sound. Although no citizen of Denmark will be considered a non-prosthetic candidate due to problems of financing, of course the physical condition of the amputee might lead to such a conclusion.

The trade of fabricating artificial limbs and braces cannot be followed further back historically than to the middle of the nineteenth century, where we meet Camillus Nyrop. The firm, which Nyrop founded in 1838 as a combined surgical instrument and prosthetics-orthotics shop, still exists and is now the largest private enterprise in Denmark in this field. In Nyrop's workshop, the apprentices learned how to fabricate artificial limbs and braces, although fabrication of surgical instruments was the main portion of their work. It should be mentioned that Camillus Nyrop acquired the title of professor at the University of Copenhagen in 1860.

In the middle of the nineteenth century several other orthopedic workshops were founded throughout the country and some of them still exist.

In 1872 "The Society and Home for Cripples" was founded by the Rev. Hans Knudsen but not until the beginning of this century did the Society and Home for Cripples make itself notable as far as manufacturing of Prosthetics and Orthotics were concerned. At this time the trade became separated from the trade of surgical instrument making and furthermore was divided into two areas; the orthopedic mechanics and the orthopedic leather worker each with an apprenticeship time of five years (later reduced to four years).

The men who carried out the work with patients and doctors were normally chosen from among the best of the craftsmen, but the men had no special education in, for example, anatomy, except what they could gain by working with doctors and from self-study.

At the end of World War II, we had a group of highly skilled craftsmen, but the education of the men, who had to take care of the patients and work with doctors, still had a long way to go.

Communication between the leaders or owners of the different workshops was poor. However, in 1946 a group of people met to try and form an association of prosthetists and orthotists. After several meetings the association was founded in the autumn of 1947 and was named "The Association of Prosthetists and Orthotists of 1947" (in Danish "Bandagistsammenslutningen of 1947"). Besides the skilled leading orthopedic technicians, who all had experience in working with patients, owners or managing directors of the firms were admitted.

The primary task of the Association has been to lay out rules for education and to revise these rules when needed. We are aware that our educational program as it is today, after the latest revision which took place in 1955, is still not perfect. At present a committee is working on a new revision. I had the honor of serving on this committee until I left Denmark in November of last year—and at the same time served on a Scandinavian committee, which was formed to investigate the possibilities of establishing common requirements for the education of prosthetists and orthotists in the Scandinavian countries.

After the latest revision our training plan is as follows:

Article 1:

Qualifications required for being admitted as a trainee.

- a) Education: General certificate, "O"—level
- b) Practical foundation:
Complete apprenticeship, terminated by a journeyman's test, as a locksmith or as a saddler, in either case with orthopedic work as the specialty. In addition, the applicant must have worked for two years as a journeyman in his trade.
- c) The applicant must have completed his 22nd year.
- d) The journeymen in kindred trades: In addition to fulfilling the requirements set out under (a) and (c), the applicant must have worked for three years as an orthopedic mechanic or orthopedic leather worker and have passed a special test before the Association of Prosthetists and Orthotists of 1947, corresponding to the journeyman's test in the trade in question.

Article 2:

An applicant who has served his apprenticeship as a mechanic or saddler, respectively, (c.f. Article 1) must work for six months in an or-

thopedic leather workshop or an orthopedic mechanical workshop, respectively, in order to acquire supplementary knowledge of the trade.

The Association has in the past in cooperation with the Society and Home for Cripples arranged several follow-up courses which have been extremely important for furthering the cooperation between colleagues. Furthermore the Association has awarded to many of its members short or relatively long study tours to Germany, Britain, Italy and the United States. The Association has proved to be useful to the government authorities. Today no prosthesis or brace will be paid for by the authorities unless it has been made under the supervision of a prosthetist/orthotist, who fulfills the requirements for membership of the Association (i.e. has completed the training program) although he does not need to be a member.

Today the Society and Home for Cripples is the leader in prosthetics and orthotics in Denmark. The Society has eight orthopedic workshops spread over the country and produces about 80% of all prostheses and braces manufactured in Denmark. The largest of these workshops is located in Copenhagen at the Orthopedic Hospital, which has 250 beds in addition to an out-patient clinic which receives some 200 patients a day. The prosthetic/orthotic workshop has some 70 employees including prosthetist/orthotists, orthopedic technicians and administrative personnel.

The prosthetist/orthotist is actually the supervisor of the orthopedic technicians and does not do production work himself. To further explain his work, let us follow, for example, a Patellar-Tendon-Bearing Below-Knee Prosthesis. The prescription is made by the doctor in cooperation with the prosthetist and other members of the prosthetic team. The cast is taken by the prosthetist, who does as well the cast-modifications and fitting and aligning. All of the procedures in between will be done by the orthopedic technician, and not involve the prosthetist's time.

Since all kinds of amputations and orthopedic diseases are seen at the Orthopedic Hospital in Copenhagen (for example since 1957 some 40 Canadian Hip Disarticulation Prostheses have been fitted) it is only logical that training of prosthetists/orthotists takes place in this hospital. However, since the number of trainees is rather small it is difficult to plan the training in a rational way.

Some years ago, the managing director of the Society and Home for Cripples, Mr. Poul Stockholm, conceived the idea of establishing a Scandinavian School for education of prosthetists/orthotists. The possibilities are being investigated by the committee previously mentioned, but I believe there will still be a long way to go until this idea can be realized.

It is evident that to a small country like Denmark international cooperation is very important. We have been very fortunate that the International Committee on Prostheses, Braces and Technical Aids, a subcommittee of the International Society for Rehabilitation of the Disabled, has its headquarters in Copenhagen with Dr. Knud Jansen, M.D., as chairman.

The Society and Home for Cripples has as a consequence been host to four international courses—three on prosthetics and one on braces. In 1963 the Society was host to the 9th World Congress of I.S.R.D.

These international activities have given us a chance to meet outstanding persons whose work relates to prosthetics and orthotics. Our benefit from these courses has been enormous, but at the same time we feel that we also will have to assume the responsibility of being up to date at any time. As one of the means to do so, a new department of the orthopedic workshops was established in 1960 and I had the privilege to become the technical head of it. It is the responsibility of this department to keep in contact with as

many prosthetic/orthotic centers in the world as possible and to adapt ideas, evaluate and teach the results to our prosthetists/orthotists as well as to members of the Association. Furthermore, the same department does some research work of its own, but unfortunately the effectiveness has been limited due to lack of personnel. In 1962 we were fortunate in having Professor C. W. Radcliffe, University of California, Berkeley, working with us for almost a year. The result of Professor Radcliffe's stay with us was an important step forward and I am sure that my stay at the Biomechanics Laboratory for a period of two years will add another forward step.

I think I can conclude that the prosthetic situation in Denmark is good. Due mainly to the International Committee on Protheses, Braces, and Technical Aids, which has its headquarters in Copenhagen, we have contact with many of the most important prosthetic centers in the world. In addition the administrative leaders have proven their readiness to invest money in education of prosthetists/orthotists as well as other members of the prosthetic team and thereby keep the door open for further progress.

This of course has been a brief orientation about prosthetics in Denmark, but I hope you will now have an idea about what has been done in my country in order to keep up with the standards in other countries.

Acknowledgements:

In preparation of this paper information from the following publications has been used.

- 1) "Rehabilitation and Care of the Handicapped in Denmark."
Published by International Relations Division, Ministries of Labor and Social Affairs, Copenhagen. Edited by Eugenie Engberg and Carl Lange.
- 2) "Bandagistfaget i Danmark" (The trade of prosthetists and orthotists in Denmark) by K. K. Kristensen (Published in Danish only).
- 3) "Orthotics and Prosthetics in Denmark" by W. Kragstrup.
Published in "Protheses, Braces and Technical Aids," issued by: International Society for Rehabilitation of the Disabled, Committee on Protheses, Braces and Technical Aids.

In Memoriam



MICHAEL STONE

Michael Stone, Vice President of R & G Orthopedic Appliances, Inc., of Washington, D. C., died suddenly June 7, 1964, in Washington.

Mr. Stone was born in 1912 and began his apprenticeship in orthotics and prosthetics in Hungary at the age of 15. He came to the United States in 1949, and was certified in orthotics in 1953, holding Certificate Number 324.

Mr. Stone is survived by his widow and a son and a daughter.

Mr. Charles Ross, head of R & G Orthopedic Appliances, paid tribute to Mr. Stone as a skilled orthotist and prosthetist and a loyal partner. AOPA was represented at the funeral services by Executive Director Lester Smith.