Accomplishments in Modern Orthotic Patient Management—Indications for the Future

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In considering the enormous magnitude and the uniqueness of the accomplishments that have been made in the prosthetics and orthotics professions within the past ten years, it seems appropriate that we review together and reflect upon these achievements in an effort to determine our directions and emphases for the future. A positive and exciting revolution has taken place in our field for which several important factors merit recognition.

First—The backbone of our profession—namely, the existing national and international schools of prosthetics and orthotics.

Second—The creation and close collaboration of our international professional organizations.

Third—The gifted foresight, wisdom and strong leadership demonstrated by past and present leaders of each of these organizations.

Fourth—The publication of professional journals, newsletters, and bulletins, disseminating new ideas resulting in improved orthotic and prosthetic clinical processes which, in turn, have had the effect of improving the individual orthotist's and prosthetist's services to his/her patients.

Fifth—The many meetings, in addition to existing international educational programs, taking form as seminars, assemblies, and international congresses such as this one.

Sixth—Numerous physicians, and others within the health care professions, who have taken an active and direct interest in our professional growth.

As a result of these efforts, orthotics and prosthetics have evolved from relatively little known professions (as compared to the older and more classical allied health professions) and have gained respect among all the rehabilitation disciplines. The orthotist and prosthetist are now important—and necessary—members of the clinical team because we have developed professionally to a fuller understanding of the great variety of patients, their disabilities and their needs, as these relate to our services. We can now, better than ever before, participate actively and effectively in the total rehabilitation management of the disabled patient. Physical restoration of the severely physically handicapped person cannot be achieved without the services of the orthotist and/or prosthetist.

I wish to review with you some of the achievements which are only indicators of
the progress made by many of our colleagues throughout the world. Naturally, some of these innovations and developments may not yet be in general use, but through dissemination of information and transfer of technology, they will be available to all our colleagues in time to come.

My discussion at this point will turn primarily to orthotic patient management as I am an orthotist and better versed in orthotics than prosthetics.

One of the best known accomplishments in our field in recent years is the development and use of new materials, especially thermoplastics—just to name a few, polypropylene, polyurethane and vitrathene, all having excellent physical properties and lending themselves to meeting the individual patient's orthotic requirements much more satisfactorily than conventional orthotic materials. These new materials are lightweight, have great resistance to fatigue, possess excellent moldability, afford improved hygiene and cosmesis, are available at a reasonable cost, and permit relatively simple working methods. A large patient population, with diagnoses of cerebral vascular accident (or stroke), polio, peripheral nerve injuries, and many other disabilities resulting in ambulation disorders, is now able to function with much less difficulty and without sacrificing safety because of the innovations in usage of such materials.

With the introduction of the variety of plastics, we are now able to do our job with great accuracy and proficiency. In addition, some of the devices lend themselves to central fabrication, thus simplifying the manufacturing techniques of systems that are individually adapted to the patient.

A good example is the simple drop-foot orthosis for which the orthotist takes the measurements of the patient's lower limb, identifying the standard module corresponding to those measurements, and individually tailors the orthosis for his patient. Results: elimination of the shoe-brace attachment, improved ambulation, less energy expenditure.

Fig. 1. Example of how new materials led to new design concepts is this ankle-foot orthosis.

In spinal orthotics, plastic material has made a fantastic impact by facilitating the central fabrication of devices such as the Milwaukee Frame. It is used for the entire device itself as a pelvic girdle replacing the steel bands and leather corset.

In traumatic spinal orthotics, a plaster-of Paris cast was formerly used to immobilize the spine for a period of eight to ten months. Now, the cast is routinely re-
placed by an upholstered plastic jacket that can be applied when the patient is sitting or maybe even ambulating, but can be removed while the patient is resting in bed. In addition to maximal spinal immobility, the jacket allows the patient almost normal hygienic activities that before were very complicated and time consuming. Furthermore, the patient becomes functional in his rehabilitation program at a much earlier stage than previously when the cast was in use.

Orthotists have developed a variety of techniques for handling the new plastics. One widely used technique is drape molding, which is used in conjunction with corrugation where material thickness must be carefully controlled to achieve either the necessary rigidity or flexibility. Another method of handling these materials is the familiar vacuum molding technique. This method produces a very uniform replica of the mold being used. After the fitting and fine tuning are completed on a patient with any of these devices, it is essential that the orthotist carefully instruct him as to wearing time during the initial period necessary to build up tissue tolerance because of the contour fitting technique used.

Obviously, the introduction of these excellent new substances and technologies resulting in new design concepts, has constrained the orthotist to acquire more comprehensive knowledge of patient disabilities as they relate to biomechanics, pathomechanics, and muscular dysfunctions. The acquisition of this knowledge has fostered a closer working relationship between the orthotist and the physician, as well as with others on the rehabilitation team including the patient himself.

Great strides have been made in restoring function to the upper limb for patients with spinal cord injuries, brachial plexus injuries, peripheral nerve injuries, and other impairments affecting the upper limb.

Prevention and/or correction of such deformities are predominantly accomplished by applying a three-point corrective pressure system to the flexion contracture, whether it be the fingers, wrist, elbow, shoulder or knees.

Electronics is now affording us new and
practical means of restoring hand function. The new systems are electronically powered and operated. Additionally, they have reached a high degree of reliability. One device, weighing only seven ounces, can provide a C5-6 quadriplegic with a controllable, but powerful, five-pound finger prehension. This is more than adequate to manipulate any objects used in daily living activities—even the telephone—from a wheelchair (sitting) position.

For the even higher C4-5 quadriplegic patient, where more sophisticated orthotic assistance is needed, pneumatically or electronically powered systems can help him attain some useful upper extremity function.

Along with these notable orthotic innovations, there are additional services emerging—namely, through biomedical engineering and the rehabilitation engineering groups.

There was an initial period when the rehabilitation engineer as well as the rehabilitation community were not sure how to interpret the engineer’s role in the overall patient management. The introduction of this new element into the system had a particular impact on the orthotist and prosthetist. After some eight years, it is evident that the biomedical engineer, and more specifically the rehabilitation engineer, does not supplant the orthotist and prosthetist, but instead each functions in a supportive role with the
other to enhance the quality of life for the severely handicapped.

Thus far, biomedical engineering has made its greatest impact in the area of *environmental controls*, which have proven immensely important and useful for people who need assistance beyond what an orthotist can provide. Through the use of a variety of electronic systems, the patient is able to control his environment very effectively, providing some degree of independence.

In rehabilitation engineering, *mobility aids* are valuable engineering contributions toward helping the handicapped return to an independent lifestyle. These devices are becoming very popular in the United States. A prime example of mobility aids is the highly sophisticated van that even the severely handicapped person can drive independently and which has a built-in wheelchair lift that he can control independently.

The foregoing has been a review of what we have accomplished and what we have to build on. But we are facing grave problems in the *sheer numbers* of people throughout the world needing orthotic and prosthetic services as contrasted with the number of persons available to meet those needs.

The few statistics that are available to us on an international basis are surely incorrect—or at best, incomplete.

As professionals and members of our various professional orthotic and prosthetic organizations, we have a clear obligation to set about providing the additional manpower to serve those in need. Our obligations and responsibilities now extend beyond merely assuring that we ourselves are professionally are technically competent. We must become advocates for the changes which are vital to diminish the horrendous and unacceptable chasm between the people we have taken care of and those yet to receive our help.

It is not for us to say, “Can we afford to do it?” Rather, we must answer the question, “Can we afford *not* to do it?”

Specifically, and on a practical level, we must first speak to the matter of education. I propose that we initiate an international student exchange program to provide dissemination of knowledge across national boundaries on both an undergraduate and graduate (continuing education) level. The program could be structured and conducted by a committee or group composed of members from our national and international organizations. It could best be funded by the federal governments of the participating members. Curriculum committees would be established so there would be as little duplication of effort as possible among the institutions; so that students would be
channeled to the institutions whose pro-
grams best meet their needs, the needs of
their patient populations, and degree of
technical sophistication extant in their
areas. Other groups chosen from our
membership would monitor quality of
teaching and effectiveness of the ex-
change programs.

Indeed scattered efforts have been
made by individuals and institutions or
organizations in various nations to con-
duct exchange programs from time to
time, but what we seek here is a concerted
and centrally coordinated effort under
the sponsorship of one entity.

Continuing with educational needs, we
must increase our sharing of orthotic and
prosthetic developments and expand the
knowledge base—in the news media,
where appropriate, to the general pop-
ulace, and in our professional and tech-
nical publications to health professionals.
We must increase our efforts to work with
other medical professional organiza-
tions—the orthopedic surgeons, for one
example—to educate those disciplines to
the need and proper use of orthotic and
prosthetic services for their patients.

Lastly, in our discussion of educational
needs, we must work through our na-
tional organizations and our national
governments for the establishment of
additional schools for undergraduate
training. This might include both an in-
crease in the number of technical schools
as well as establishment of orthotic and
prosthetic programs within our colleges
and universities.

We also face the task of capturing the
young person, at the time of career
choice, for the prosthetic and/or orthotic
sciences. Ours is a solid, scientifically-
based health service, and we must convey
that fact to the students we are seeking to
attract. However, the teaching curricula
must continuously be updated to follow
the rapid changes in technology and ser-
vices. In addition, the quality of instruc-
tors must be re-evaluated at various
times, to insure that the student receives
training that provides him with the
proper base from which to exercise his re-
sponsibility as a professional.

Second, in concert with our educa-
tional endeavors, is the need for more
and better organized petitioning of our
national governments for increased re-
search and development funds. It is not
inconceivable that we will reach a stagna-
tion point as more and more funds are di-
verted to other purposes, or to other dis-
ciplines within the medical area.

As to the actual practice of our profes-
sions, I re-emphasize the need for more
collaboration among all of us. If we are
to standardize, if we are to achieve cen-
tral production of modular units, if we
are to attain a high level of quality not
only in production of actual appliances
but also in provision of professional con-
sultative services, we must work one with
another so that we do not become isolated
and in-grown. Through these efforts, we
would also have the mechanisms for eval-
uation of systems developed throughout
the world. This is imperative if we are to
increase the physicians' confidence and
interest in us and in the merit of our ser-
vices; if we are to convince the politicians
of the need for governmental support;
and most importantly, if we are to pro-
vide the genuinely useful services that our
patients have every right to expect from
us.

We have much to be proud of, but we
also have weaknesses and areas where im-
provement is desirable. We still have
much to learn in the area of professional
relationships both among ourselves and
with other health practitioners. A fair de-
gree of the unsatisfactory working rela-
tionships in the past has stemmed from
the fact that some of our activities were
viewed as being strictly commercial while
others were recognized as being academic
or professional.
We must take a look at ourselves and scrutinize our own participation in the health care delivery system. We are no longer simply providers of a physical product. That is an outmoded concept. We provide professional services of which the actual physical product is only a part. We are full-fledged members of the clinical patient management team. And being so, we must make available to the patient the highest quality services resulting from our experience, training, and education in a highly specialized field. As the initial manifestation of our changing role, the prosthetist and orthotist must become more active in the prescribing process of orthotic and prosthetic devices. It is folly to expect all physicians to be knowledgeable and current, not only in their own milieu, but also in our profession, considering the myriad of refinements and alterations that have been made in traditional devices as well as the many entirely new and sophisticated systems that have been developed.

Consequently, it is up to us to accept this responsibility without delay in order that the patient will receive the very best orthotic and prosthetic services and systems tailored specifically for him.

From the foregoing discussion, I have thus extracted the following points which are put to you for consideration as GOALS of our professional society, as well as for us individually:

1) To enhance educational opportunities in the prosthetic and orthotic sciences, especially to promote student exchange.

2) To update teaching curricula and re-evaluate instructor training methods.

3) To petition for government funding for prosthetics and orthotics research and development.

4) To develop and increase collaboration among ourselves.

5) To conduct an international survey to include: number of disabled; nature of their disabilities; number of physically handicapped being served; number of those only partially served or not served at all; number and distribution of orthotists and prosthetists, those in private practice and those in academic programs.

6) To enlarge the role of the qualified prosthetist and orthotist in prescribing prosthetic and orthotic services.

7) To enhance the professional image of the orthotist and prosthetist by formal recognition of colleagues making outstanding contributions in our profession.

I sincerely believe it is a proper and vital task for our association to address itself to these goals through the creation of study groups, operating committees, and secretariats. We are now strong enough to become even stronger. Although we are old as far as our unique work is concerned, we are young in organization and few in number.

But, if we stand united behind our goals, we will surely grow. There must be universality of purpose among us; we must all strive for the same high level of excellence.

I challenge you to see your individual role in an enlarged sense; you will then have taken the first step toward fostering recognition and acceptance of the professional orthotist and prosthetist throughout the medical and allied health professions.

Footnotes

1Keynote address presented at the Eighth Congress of the International Association of Orthotists and Prosthetists; October, 1978; Madrid, Spain.

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