Newsletter

Prosthetics and Orthotics Clinic

Vol. 5, No. 4 1981 Autumn (Issued Quarterly)

Rehabilitation Engineering and Prosthetics/Orthotics

Anthony Staros, MSME, PE*

The words "Rehabilitation Engineering" are now commonly used to mean a paramedical practice which in its job characteristics and their demands, in the basic technical background needed, in its high activity level, and in its human service slant, is an extrapolation of professional prosthetics and orthotics. Prosthetics and orthotics are in fact very significant components.

Rehabilitation engineering is defined as that broad discipline having as its ultimate objective the *application* of technology to enhance life's quality for the disabled. It includes subsidiary goals in research, development and education. But one doesn't need to be an engineer to *practice* rehabilitation engineering!

With the recent advances in technical aids, prosthetics and orthotics included, there has been increasing need for those who currently serve the disabled with technology to expand the range of their commitment requiring a persistent demand for more knowledge. At the same time, there are counterpressures:—the potentially harmful low rates of increase in the numbers of practitioners. Fewer people are trying to do more while also needing more information for what they do. The effects that Government budget restraints will produce in this situation are difficult to predict, but clearly seen is that the pressures will be greater, that there will be real need for increased efficiency in all parts of society and more so for us committed to the delivery of high quality service to the disabled: increased productivity and more knowledge are conjointly required.

Much of what rehabilitation engineering means in real practice is the selection of devices, the making of special systems, or the design of environments, and then the delivery of these, customizing them even further when necessary, and applying them to assist the disabled. Demanded is the achievement of independence through function and/or access with both comfort and control maximized. Training of the client is essential. These efforts are effected in a precise and deliberate process with full understanding of the patterns of disability presented and a substantial awareness of the personal wishes of the disabled person being served (and his/her family).

Rehabilitation engineering includes aids fitted directly to the client as in prosthetics and orthotics, tools such as communication devices, and adaptations to environment, to work sites, to the home, or to the vehicles used to reach one or the other or to those mobility devices operated within an environment. Some of the technical aids may be very simple in design; most of those which are custom-made require biomechanically sound, creative, and often inventive approaches. The simplest may require the most creativity.

In the rehabilitation engineering applications process, in supporting the physician's role in prescription or in the selection of aids and then in their application, the knowledgeable and interested prosthetist, orthotist, and therapist (physical, occupational, speech) can play the key roles. Especially *productive* and *cost effective* is the involvement of the skilled technician, an essential member of the rehabilitation engineering team. The team concept is crucial in that the knowledge needed comes out of the sharing of training and experience—and the creativity sought can usually come from the synergism in the group, especially including the client. The actual "making" although involving all to various degrees becomes the special province of the technician, with the "fitting" itself being a product of the team. The required contribution to benefit the patient will be a scenario of analysis and synthesis, idea and response, search and research, give and take, and then plain work.

That which is rehabilitation engineering has been performed for many years, before it became stylish to use this

*Director, VA Rehabilitation Engineering Center
New York, N.Y.

expression to represent a special technology. But there is now in place an acceleration in the development of new technology in products and processes, many so recent that they are not known to members of the rehabilitation team who received preparatory training or post-graduate courses years earlier. Even now the newer information needed is not obtained in structured formats. Pathways should be constructed for each member of the team to broaden his/her own discipline to include constantly updated knowledge about all technology necessary for his/her personal professional contribution to the rehabilitation engineering team. And not to be overlooked is that the payers for services need to be instructed on the cost benefits of rehabilitation engineering.

We recommend that these professionals (the prosthetist, orthotist, and therapist) have their own societies' publications and conferences include the information about the advance in rehabilitation engineering. They should also participate in those societies which meld the team, the *Rehabilitation Engineering Society of North America* and the *International Society for Prosthetics and Orthotics*, thereby advancing the practice of rehabilitation engineering through contacts with the other team members. Special seminars need to be structured for the 3rd party payers.

In the team, or even in the individual practices, the added knowledge about rehabilitation engineering aids can only benefit. If the prosthetist or orthotist fitting a patient with an *upper-limb* deficit relates his fitting in part to the vehicle controls the disabled person may need to use, shouldn't he or she be knowledgeable about such controls and their installation? Beyond that, shouldn't both (prosthesis or orthosis *and control*) be "installed" under such professional supervision? Yet still, in this decade of rapidly advancing technology and of certification of those who dispense it, ordinary automobile repair garages install hand controls for licensed vehicles for disabled drivers. Why not the orthotist or prosthetist overseeing his/her technician?

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Prepared by the American Academy of Orthotists and Prosthetists, 717 Pendleton St., Alexandria, Virginia 22314. Second class postage paid at Alexandria, VA and additional mailing offices. Subscriptions: Domestic: $10 per year. Foreign: $11 per year.

There are often frustrating limits to the mobility which can be provided in lower limb orthotic or prosthetic care. Under what circumstances does one use a wheelchair as a supplement or as a last resort? How is it selected? In what way should it be modified if at all? What kind of buttock and trunk support are required? Here the prosthetist, the orthotist, and the therapist should be involved for aren't these the professionals who can be and should be closely associated with wheelchair prescription and modification? In a national workshop held in 1978, WHEELCHAIR I,* mention was repeatedly made about the need for a "wheelchairist", a person to be concerned exclusively with wheelchair prescription and fitting. If prosthetists, orthotists, and therapists are indeed responsible for other aids for mobility, why not then the wheelchair? Isn't a functioning rehabilitation engineering team the "wheelchairist" sought?

From the clinic team setting or from the counselor's desk, the usual site for the final selection and customization of technical aids and then their application is not unlike a prosthetics/orthotics laboratory, there blessed with talented technician support. In a recent paper,** we recommended that the prosthetics/orthotics profession develop the practice of rehabilitation engineering:

"Recommended is that prosthetics and orthotics, with their foundation in clinical technology, constitute the basis for the establishment and certification of a broadly based rehabilitation engineering capability in the United States. Indeed, it would be well for prosthetists and orthotists to start expanding their scope to include the other technical aids in rehabilitation engineering and in collaboration with other members of the rehabilitation team, especially the orthopedic surgeon, provide the means for a wider coverage in the delivery of technology to restore independence and function to many handicapped individuals who are not now receiving the full, broad spectrum services they deserve."

Is there then really need for the engineer, the graduate of a formal engineering curriculum to be the *applier*, the "clinical" practitioner of rehabilitation engineering? The rehabilitation *engineer* has a role: in design, development, research, and perhaps in management. The prosthetist, orthotist and therapist especially with technician support, as a team and as individuals can and should respond to the total technical needs of the patients presented to them; rehabilitation engineers should identify with the other (consulting) members of the medical-technical professional structure in the overall rehabilitation effort. To be called on only in the case of *special*, more complex problems, the engineer should be mostly involved in leading generalized design and development efforts, these to include others of the team as well.

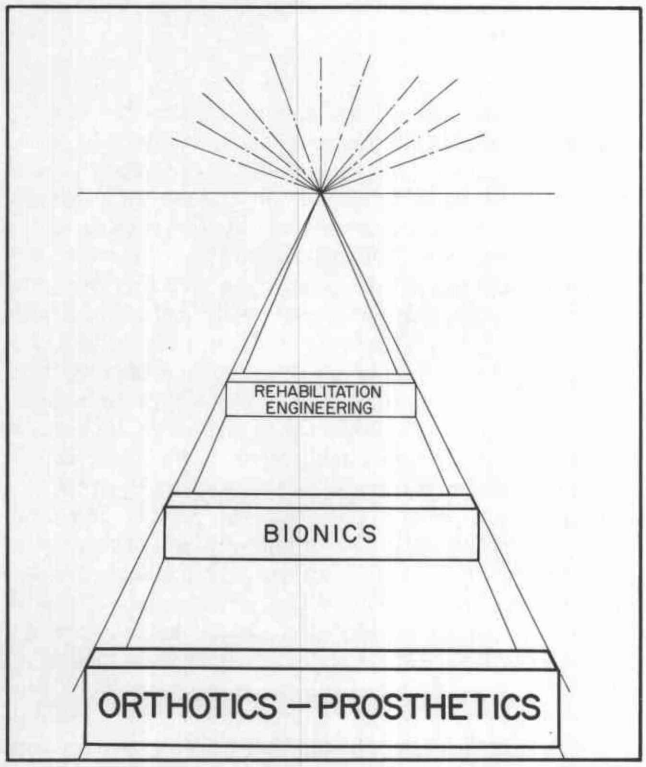
Total need, as the prosthetist, orthotist, and therapist well know, includes "tender loving care," this in the past demonstrated by the experiences of these professionals in analyzing then defining the problems of the disabled. For patients with the severer disabilities, those requiring broader rehabilitation engineering efforts, good practice requires more of such empathic yet deliberate reasoning to seek solutions: devices which yield function in a real sense and are more than just tolerated, used for their novelty, or accepted to please someone else. Seating, wheelchair

designs, licensed vehicle modifications, electrical stimulation for pain relief or function, and home and job modifications are all parts of an armamentarium which spans the spectrum from modifications to the shoe to those to the motorcar, for mobility; from a mouth stick to a robotic system, for independent "prehensile" function; from a simple word-display board to synthetic speech, for communciation.

Then, do we really need to cultivate large numbers of graduate engineers for rehabilitation engineering practices (other than for the employment of some smaller number in research and development)? Yes, if the prosthetist/orthotist does not accept the alternative recommended: proper management of his/her practice integrating it with those of other team members and with the very significant role of their skilled technicians who become key constituents in that practice.

Apparently some prosthetists and orthotists see an expanding future. The excellent document describing the professions of prosthetics and orthotics and recently published by the American Academy of Orthotists and Prosthetists*** refers to the directions being taken by its professions, based for now on "bionics" referring specifically to automatic control of knee function and myoelectric control of powered upper-limb prostheses. These are presented as steps toward encompassing more and more technology, components of a rehabilitation engineering commitment. In fact the logo of this publication (shown here) presents the transition from orthotics and prosthetics to rehabilitation engineering over a natural pathway (or track) for growth.

The essential initiatives now have to come from the current practitioners. In fact they could also abdicate their "clinical" role to the rehabilitation engineering equipment dealers!



*Moss Rehabilitation Hospital (REC) *Wheelchair I*; Report of a Workshop sponsored by RSA and VAPC, Dec. 6-8, 1977, Philadelphia, Pa.

**Staros, A. and G. Rubin, *The Orthopedic Surgeon and Rehabilitation Engineering* in Orthopedics, March/April 1978, Volume 1/Number 2, Charles B. Slack, Inc., Thorofare, N.J.

***The Academy brochure can be ordered from the National Office for $1.25 each.

Meetings and Events

Please notify the National Office immediately concerning additional meeting dates. It is important to get meeting notices in as early as possible. In the case of Regional Meetings, check with the National Office prior to confirming dates to avoid conflicts in scheduling.

1981, October 27—November 1, AOPA National Assembly, Sahara Hotel, Las Vegas, Nevada.

1981, November 20—21, AAOP California Seminar Workshop, Pasadena, California.

1981, December 9—12, AAOS Seminar, Sheraton, Miami Beach, Florida.

1981, December 12—13, AAOP Seminar, Sheraton, Miami Beach, Florida.

1982, February 18—20, AAOP Annual Meeting and Round-up Seminar, Royal Sonesta Hotel, New Orleans, Louisiana.

1982, April 16—17, AOPA Region I Meeting, Marriott Hotel, Worchester, Massachusetts.

1982, April 29—May 2, AOPA Regions VII and VIII Combined Meeting, Alamada Plaza, Kansas City, Missouri (Tentative).

1982, May 6—9, AOPA Region IV Meeting, Radisson Plaza Hotel, Nashville, Tennessee.

1982, May 10—13, Advanced Course on Below-Knee and Through-Knee Amputations and Prosthetics, ISPO, Copenhagen, Denmark.

1982, June 4—6, AOPA Region IX, COPA, AAOP California Chapters Combined Regional Meeting, Harrah's, South Lake Tahoe, Nevada.

1982, June 10—13, AOPA Regions II and III Combined Claridge Hotel, Atlantic City, New Jersey.

1982, June 17—20, AOPA Region VI Meeting, Indian Lakes Resort, Bloomington, Illinois.

1982, September 8—10, Second Annual Advanced Course of Lower Extremity Prosthetics, Nassau County Medical Center, East Meadow, New York.

1982, October 17—24, AOPA National Assembly, Shamrock Hilton, Houston, Texas.

1983, May 12—14, AOPA Region II and III Combined Meeting, Colonial Williamsburg, Williamsburg, Virginia.

Summer Honorarium

Warren Frisina, BE and James A. Reeve, BS have been awarded the $100 honorarium for their article, "Feedback For Electrically Powered Prostheses and Orthoses."