Capabilities

Communicating the Science of Prosthetics and Orthotics

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A Computer-Based Simulation Tool for Assessing and Communicating the Design of Upper-Limb Prostheses

By Craig W. Heckathorne, M.S.

Scene 1: A man with an arm amputation is seated at a table. Next to him is a Certified Prosthetist, and both are looking at a computer screen. The man had a work-related injury a few months ago, and he has only a vague idea of what can be done prosthetically. The screen shows a figure, similar in appearance to himself except that the image has a prosthesis. The prosthetist describes the features of the prosthesis being shown. The client asks what other options are available. The prosthetist selects components from a menu, and the image of the prosthesis changes in response to the selections. The client questions how the newly displayed prosthesis is controlled. With a few commands, the prosthetist shows the image in motion, demonstrating the control method. While the image is in motion, the prosthetist changes the point of view and zooms in to clarify the action. As the session progresses, the client and prosthetist look at and discuss a variety of different prosthetic options, each represented on the simulated figure of the client and animated to show their operation. By the session's end, the client has a clearer idea of what can be done and agreement has been reached on the type of prosthesis to be fabricated for a diagnostic fitting.

Scene 2: A Certified Prosthetist is seated at her office computer. On the display is the figure of a client she provided with bilateral trans-humeral prostheses several years ago. The man's prostheses are in need of replacement, and the client has scheduled an office visit in the coming week to discuss options for upgrading his prostheses. Several new components have come on the market since the first set of prostheses were built, and the prosthetist is wondering if they might be of benefit to her client. On the computer monitor, she assembles a virtual set of prostheses incorporating some of those new components and displays them on the client's image. The computer shows her an estimate of the assembled weight of the prostheses, which she compares to the weight of the existing prostheses. Animating the image, the prosthetist checks where the client's image can reach using the prostheses. The display shows that the client will probably not be able to raise his right arm at the shoulder above 90° given the weight of the components selected for that prosthesis. The prosthetist makes a note to discuss this with her client. She tries several more configurations, checking the weight of each set of virtual prostheses, the range of reach they are likely to provide, and if they will enable the client to reach areas of his body for feeding, dressing, and hygiene. The prosthetist saves the configurations which have the most merit and appends notes highlighting points to bring up during her meeting with the client.

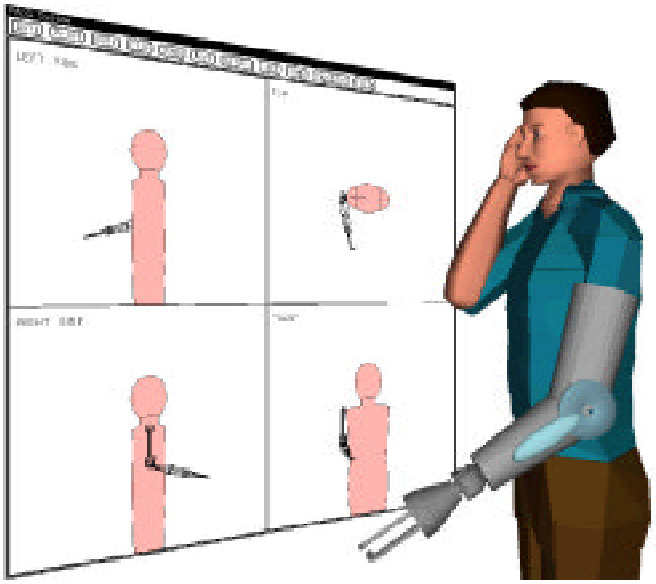

Figure 1: A second generation PADSS "client", with a generic trans-humeral prosthesis, contemplates the meaning of images from the original PADSS program.

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AComputer-based Simulation Tool for Assessing & Communicating the Design of Upper Limb Prostheses

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Scene 3: A prosthetics student is reviewing upper-limb prosthetics on his laptop computer. He is using a simulation program to show the control actions necessary to operate prostheses at different amputation levels. Earlier that day, one of his instructors used the same program to illustrate the biomechanics of cable-actuated arm prostheses. As the student reviews the section, he changes the routing of the control cable to observe the effect on the force and the excursion of joint movement needed to operate the prosthesis.

These three scenarios illustrate possible uses for a computer program — The Prosthetic Arm Design and Simulation System — under development in our laboratory. The program, referred to by its acronym PADSS, has its origins in the late 1980s when the National Institute on Disability and Rehabilitation Research funded our center to develop a "computer-based prehensor positioning" tool. The tool was intended to help prosthetists assess and compare different prosthetic configurations for persons with high-level and bilateral arm amputations. The idea was to reduce the cost and amount of time expended in building different diagnostic prostheses to be evaluated by these clients. By modeling, in software, the prosthesis (or prostheses) and the intended user, the prosthetist would be able to try different arrangements of components and examine the likely functional effects of those choices without having to build each possible configuration.

The first version of the PADSS was completed in the early 1990s. The program ran on a UNIX-based Sun SPARCstation (at the time, a computationally-powerful high-end workstation). The program displayed four-views (front, top, left and right sides) of a graphical representation of the client and a proposed prosthesis. The prosthesis was built up from components previously modeled and stored in a library of parts. The PADSS calculated and displayed the volume of space around the client's body that could be reached with the prosthesis. It also produced a map of the area on the body that could be touched by the tip of the prosthetic prehensor. In order to have the reach volume and surface map computed in a reasonable time (less than five minutes), it was necessary to simplify the geometry of both the client and the prosthesis.

This prototype version of the PADSS allowed us to model the reach characteristics of some prostheses, such as those with electric-powered components, very well, but it did not allow for accurate modeling of cable-actuated prostheses. The program also lacked verisimilitude in the depiction of the client and prostheses. Although computationally manageable, the displayed appearance of the client and prostheses were too simple to convey any real sense of how a prosthesis might look to a user and, therefore, was inadequate as a medium for communication between a prosthetist and client. It was clear from clinical evaluations of the prototype PADSS that considerably more development was needed and that much of that development would have to come from outside the prosthetics field with improvements in ıe computational power nputers and in graphics-ftware.

Figure 2: The volume of space a "client" can reach using a generic trans- humeral prosthesis as modeled with the Jack software.

Throughout the 1990s, we continued to develop the PADSS concept, defining its features and attributes, collecting anthropometric data, and documenting prosthesis configurations and component specifications. At the same time, we monitored developments in commercial Computer-aided Design and Computer-aided Engineering (CAD/CAE) application programs, particularly graphics and modeling

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Development of Outcome Measures for Prosthetics and Orthotics Users

By Camille M. O'Reilly
Northwestern University, Evanston, IL. USA

In a recent two-part article, Judith Otto of O&P Business News brought to light the subject of outcome measurement in prosthetic and orthotic services (December 15, 1999 and January 1, 2000). Although she described much of the recent work undertaken to identify or develop outcome measures for the fields of prosthetics and orthotics, she neglected to mention a current project underway in the Rehabilitation Institute of Chicago's (RIC) Rehabilitation Services Evaluation Unit (RSEU). In concert with the Rehabilitation Engineering and Research Center (RERC) grant in Prosthetics and Orthotics headed by Dudley Childress, Ph.D., the RSEU has been working to develop an integrated set of data elements for the assessment of prosthetic and orthotic services. For over a year Allen Heinemann, Ph.D. and his RSEU staff have been creating, testing and refining outcome measures to be implemented as part of the database.

Standard measurements were much needed

Over the years various attempts have been made to gather data to describe the provision of P&O services. And the work continues. After a review of the literature it was clear that standard measures of impairment, function, client satisfaction and costs did not exist in a cohesive format for use in P&O clinics. The RSEU task since then has been to locate or develop sound, reliable measures and to weave them into an integrated data set to evaluate these services.

The system used by the Department of Veterans Affairs currently collects data regarding component utilization and costs over its entire Prosthetic and Sensory Aids Service network. Their system, the National Prosthetic Patient Database (NPPD), has been in use since 1997 with future applications planned for other VA services such as home modifications and automobile adaptation. As yet, the NPPD data is not linked to impairment or functional outcomes. In the future though, the ability to evaluate the types of components purchased in concert with patient specific functional abilities would make for some powerful outcome data.

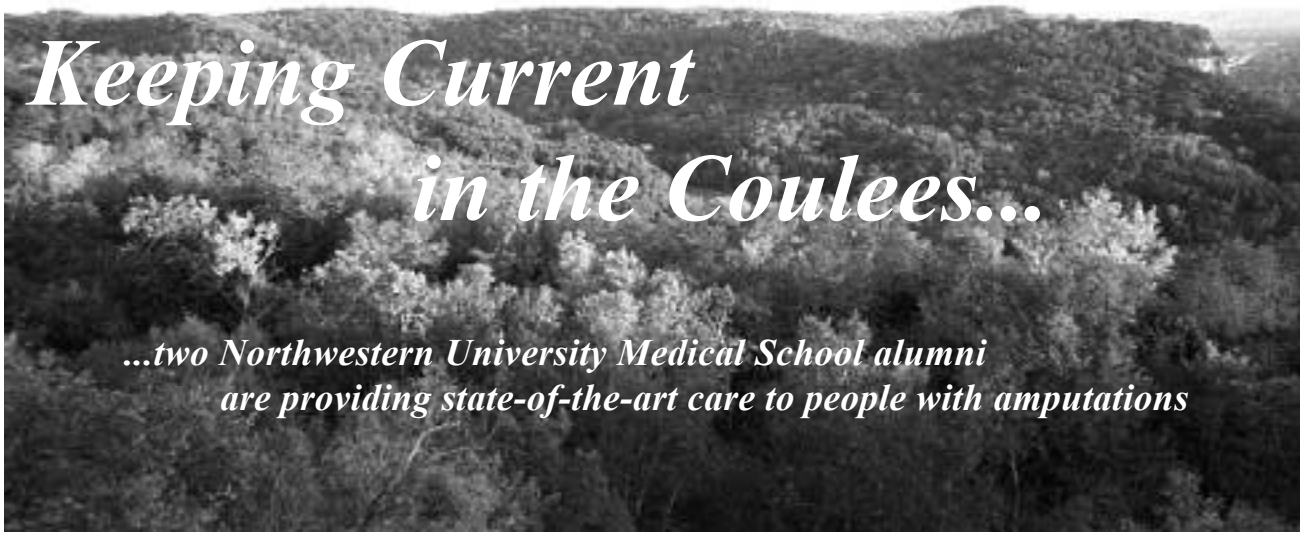
Measuring the functional abilities of patients coming to a P&O clinic is currently fraught with problems. Often clinicians are both pressed for time and insufficiently trained to put a patient through a standardized set of functional activities. In addition, these assessments are usually thought to be the domain of physical therapists or physicians. And to further muddy the waters, a standard activity measure that is widely accepted by the field hardly exists.

Fourteen point scale is used to measure ability

In culling all available literature on the subject, the RSEU discovered Christiane Gautier-Gagnon's lower extremity Locomotor Capabilities Index. This measure uses a four-point scale to evaluate a lower extremity amputee's ability to perform 14 different activities such as getting up from a chair or walking outside on uneven ground. Over time, with prosthetic adjustments and physical training, one would expect gradual functional improvement in many of these activities. The Locomotor Capabilities Index is currently being assessed as part of the RSEU project and may prove useful as a standardized functional assessment tool for lower extremity amputees. Identification or development of tools specific to upper extremity amputees or orthotics users is ongoing.

By assessing a patient's ability to perform specific activities at the start of services, at the completion of services, and at a follow-up point, in conjunction with data pertaining to components, complimentary services, and costs, a clinician is able to evaluate various aspects of the patient's rehabilitation. Did different components need to be used because of unforeseen problems with failure, reimbursement, or patient specific issues? Was physical therapy effectively utilized and was there sufficient coordination of services to bring about the desired outcome? How could things be improved? With the use of an integrated set of outcome measures, one can better answer these and other such questions.

Creating such a database has been the focus of RSEU's efforts on behalf of the RERC grant in Prosthetics and Orthotics. Initial testing of various functional tools, psychosocial measures, and patient satisfaction questionnaires has been completed and refinement of the tools continues. Further testing is scheduled for this spring with widespread distribution of the database planned for later this year. Those interested in this project are encouraged to contact Allen Heinemann, Ph.D. at a-heinemann@northwestern.edu. ❖



Keeping Current in the Coulees...

...two Northwestern University Medical School alumni are providing state-of-the-art care to people with amputations

By Jan Little

Bob Lotz, CPO, a graduate of the Northwestern University Prosthetic-Orthotic Center (NUPOC) in 1979 and Fellow of the American Academy of Prosthetics & Orthotics, finds his job is one third prosthetist, one third teacher and one third researcher. John Morrisey, MD, who graduated from Northwestern University Medical School in 1981, finds his practice in orthopaedic surgery covers a wide range of medical conditions and amputations are a small percentage of his surgery. When there is an amputation to be treated and a prosthetic system to be designed, Dr. Morrisey calls on Lotz. Their teamwork is the critical factor for people in the Coulee Region of Wisconsin, Minnesota and Iowa. If those people are to be able to have the advantage of the most recent research and developments in prosthetics, Lotz and Morrisey must have learned about it.

To be valid, the time and funding spent in conducting research into how prostheses interact with and emulate the function of the human body must be made available to people with amputations. In urban areas, such as Chicago, Cleveland, Atlanta and similar high-population areas, prosthetists and orthopaedic surgeons have several advantages. They may well be able to specialize in fewer areas. An orthopaedic surgeon may be able to concentrate on joint replacement, trauma or amputation. A prosthetist may be able to work with numerous examples of similar conditions.

A 100 miles circle from La Crosse has 300,000 people

The Coulee Region is named for the deep Coulees — or valleys — between the bluffs and ridges of southeastern Minnesota, northeastern Iowa and middle western Wisconsin. Coulee Region residents may drive a hundred or more miles to shop for groceries, clothing, appliances and other products. Many live on a farm or in a town that has less than 7,000 residents.

Bob Lotz and John Morrisey serve a population of less than 300,000 that is spread over several hundred square miles. Lotz has prosthetic laboratories in La Crosse, WI and Rochester, MN, which serve people in 10 to 12 counties. Finding Bob to talk to him is a challenge. He may be in the midst of the 70-mile trip between La Crosse and Rochester. Or he may be coping with snow-covered, winding roads on steep hillsides to fit hip orthoses to 10 children in Decorah, Iowa. He may be heading 100 miles south of La Crosse at 6:00 p.m. because that time fits the schedule of a small rural clinic.

Clinics are spread miles apart

Dr. Morrisey, on staff at Franciscan Skemp Healthcare (FSH), may operate on several knees at the FSH Clinic in Sparta and see miscellaneous orthopaedic conditions in the morning, then drive the 30 miles back to La Crosse for a full afternoon of surgery and office visits. Morrisey and the other two FSH orthopaedic surgeons cover FSH clinics in Prairie du Chein, Tomah, and Arcadia, Wisconsin and Waucon, Iowa.

"Amputations are only a small percentage of the procedures I do," Morrisey said. "And, it's hard to find a lot of CME (continuing medical education) on amputations and prosthetics. That's why Bob and I work as a team." Lotz usually is present in the operating theatre when Morrisey does an amputation to observe the preparation of the residual limb. Morrisey uses a plaster cast for lower limb amputations and usually utilizes a posterior or Burgess flap brought to the front of the limb to avoid a scar at the end of the bone.

Patients are walking in three to five weeks after surgery. Both Lotz and Morrisey have observed that there is a low incidence of swelling and of patient complaint of pain.

Driving along the lonely roads of the region and through towns with names like Norwalk, Wilton and Mindoro, which have populations of a few hundred, the visitor may think medical care is scarce. But the area offers advantages that people in Chicago, Los Angeles or New York may not have. Access to medical care is remarkably fast. Surface transport of an ill or injured individual is minimal because outlying clinics operated by FSH, a Mayo Clinic partner, and Gundersen-Lutheran Medical Center, the other medical system in the region, are numerous. One week, the medical evacuation helicopters fly people with serious medical conditions to La Crosse to Gundersen-Lutheran, the next week, to FSH La Crosse.

A slower, kinder pace of life

In addition to fast access to medical treatment, residents of the region have a level of care which is not always found in this day of managed care. For example, waiting more than week or two for a noncritical medical appointment is considered intolerable.

"My mother lives in Chicago," Dr. Morrisey said. "Waiting three months for an appointment with an orthopaedic surgeon is commonplace."

The person who has an amputation has extensive follow-up care. Bob Lotz explains, "An amputation is second only to losing a spouse in terms of emotional trauma. We work with the person from before the amputation and through their hospitalization period." Then, Lotz visits the person the day they go home and once a week thereafter until he and Morrisey are satisfied that the person has mastered the use of his or her prosthesis. "It's impossible to write up instructions for the home care people that can include what we know from experience about how to avoid falls, how to control edema and how to learn to use the prosthesis." Lotz also does the gait training of people with lower limb prostheses.

Many times, Bob Lotz assumes the role that a social service person might handle in an urban area. He and Dr. Morrisey write the justification for funding. An indication of their success may be the fact that Lotz is currently involved in providing three Otto Bock "C" legs to people with amputations in the Coulee Region. The first one has been fully funded by Minnesota Blue Cross/ Blue Shield. The funding agency for the second person has verbally assured funding and the third is pending. The cost of a "C" leg is approximately $40,000.

Lotz also arranges peer support for the person who is either facing an amputation or who has experienced traumatic injury resulting in amputation. "There seems to be little or no interest in forming a support group for social purposes," he said. "But there's never a problem finding one of our clients who's willing to come in and talk. One woman, who was in deep depression, began her total recovery after a visit from a beautifully-dressed, pretty young woman who walked into her hospital room — and removed her prosthetic leg. The woman with the new amputation had a different outlook after that."

The team of Lotz and Morrisey also demand funding for prosthetics no matter what the age of the patient. Lotz tells of a woman in her 70s who had bilateral, transtibial amputations. She returned to her small town shortly after the surgery and again took over running church functions, getting her own groceries and housekeeping — and lovingly nagging her husband — while refusing to use a cane. It got in her way. Another man — well over Medicare age — returned to his farming immediately after having a transfemoral amputation. He didn't feel he could trust the care of his farm and his cows to other folks.

Keeping abreast of P & O developments is challenging

Bob Lotz attends national meetings and seminars relating to prosthetics and orthotics. He brings all the information he gets back to share with the orthopaedic surgeons. However, when asked what they would choose to make their jobs easier, they don't mention shorter hours or less travel. They don't talk about more funding. Their biggest need is for more and easier access to the results of research.

Keeping current in the Coulee Region exemplifies a challenge which will become increasingly more critical to the prosthetic and orthotic profession. With the internet and electronic communications, more people who may previously lived in urban areas are choosing to live in smaller towns and more rural areas. They expect the same level of access to prosthetic developments as those who live near the research centers. The challenge is to develop means to let the prosthetists and surgeons in rural areas have access on the internet that is literally a virtual visit to the research laboratories. ❖

The OTTO BOCK C-Leg features a fully microprocessor-controlled prosthetic knee, providing both hydraulic stance control and hydraulic swing phase damping. Multiple integrated sensors stream gait analysis data to the on-board microprocessor which automatically adjusts the stance and swing phase characteristics of the knee 50 times per second.

Craig Heckathorne Teaches as Visiting Lecturer at Hong Kong Polytechnic University

Craig Heckathorne returned to the Hong Kong Polytechnic University again this year as Visiting Lecturer in the Bachelor of Science in Prosthetics and Orthotics program.. Heckathorne taught the week-long elective course in "Myoelectric Control" from February 28 tp March. The course included 28 hours of lectures and laboratory spread over five days. Twenty two students attended the course which features topics including introduction to myoelectrics, myoelectric control, socket design and suspension alternatives for the adult and child at arm amputation levels. In addition, this year's course included a laboratory in which students were able to fit myoelectrically-controlled prostheses to patient demonstrators.

Margrit Meier Joins NUPRL&RERP as Post-Doctoral Fellow

Margrit Meier, PhD, who has been a practicing prosthetist/orthotist in Zurich, Switzerland, is joining the Northwestern University prosthetic/orthotic research programs staff as a post-doctoral fellow for two years. Dr. Meier has an MS in prosthetics and orthotics from the University of Strathclyde, Glasgow, Scotland. She recently earned her PhD at the University of Sherbrooke in Canada.

Hansen and Childress Present Grand Rounds

Andrew Hansen, MS, and Dudley Childress, PhD, presented a progress report on their research project titled, "Roll-Over Shapes of Human and Artificial Feet: Shape as a Key to Function or Dysfunction" at Grand Rounds on March 1, 2000. Grand Rounds are an opportunity for physicians practicing at the Rehabilitation Institute of Chicago or other hospitals affiliated with Northwestern University to benefit from research findings.

World Health Organization Fellows Visit NU P & O Laboratories

Dr. Bum-Suk Lee, and Mr. Ki-Il Lee, health care professionals with the Ministry of Health and Welfare (MOHW) of the Republic of Korea, visited Northwestern University PRL&RERP February 24, 2000 as part of a four week training program sponsored by the World Health Organization (WHO). Dr. Bum-Suk Lee is chief of the spinal cord injury rehabilitation program at National Health Rehabilitation Center , Seoul, Korea. Mr. Ki-Il Lee is Deputy Director, Disabled Person's Rehabilitation Division or Korea. In their four-week tour of the United States, the WHO Fellows visited Washington, DC, New York, Chicago and Los Angeles.

NU PRL&RERP Web Site Named "Pick of the Day"

The Internet web site of Northwestern University Prosthetics Research Laboratory and Rehabilitation Engineering Research Program was named "Pick of the Day" on March 17, 2000 by HMS Beagle, a biweekly webzine for biological and medical researchers. The on-line service publishes a daily digest of the highest-quality Web resources and published materials. The "Pick of the Day" provides a link to that web site and includes the site as one of Beagle's "Favorite Web Sites" for 30 days.

The NUPRL&RERP web site was developed by John Steege in 1994 and launched on January 12, 1995. Since the launch, the site has been used to disseminate progress on research projects conducted at the laboratories. Over 4,000 people use the site each month with many visitors using the "Help Line" feature to request additional information and resources.

You may visit the Northwestern web site at http://www.repoc.northwestern.edu. HMS Beagle may be accessed at http://www.hmsbeagle.com.

Chuck Chevillon: A Pioneer in Rehab

He believed technology was the tool for expanding opportunities for people with disabilities

By Jan Little

Northwestern University PRL &RERP and people with disabilities lost a friend and champion on February 18, 2000 with the death of Chuck Chevillon.

Chuck Chevillon believed that people with disabilities could lead lives very similar to those without disabilities if they were given the right tools. Throughout the 50 years that Chuck was a presence in the rehabilitation equipment field, he fought to make commercially available many of the tools used today to "level the playing field" for people with disabilities.

For example, Chuck worked closely with Dudley Childress' Northwestern University rehabilitation engineering staff to make sure power wheelchairs controlled by the sip and puff controllers developed at Northwestern were available nationwide. Working with his MED Group of distributors, Chuck pulled together pieces of the system that would enable people including Margaret Pfrommer and Christopher Reeves to regain an important measure of independence.

If it didn't exist, Chuck would find it

Often, as with the automatic reclining mechanism for a power wheelchair, Chuck would find a product that amounted to little more than a crude prototype, then bring it to Dudley Childress, John Strysik, Ed Grahn and Craig Heckathorne to smooth out the rough spots. He frequently spent nights and weekends working closely with the person who would use the specially equipped power wheelchair, environmental controls and other items. As far as we knew, Chuck was the only person who would take three power wheelchairs complete with reclining systems and respirators apart, load them in his Cadillac and drive 500 miles to help several people who lived in a rural area.

Chuck paid as much attention to the seemingly minor aids for people with disabilities as he did to the highly sophisticated electronic systems. He commissioned a series of transfer boards because not everyone could use the same type of transfer board.

Born May 13, 1918 in Carthage, IL, Chuck joined the U.S. Army despite the fact that he had lost a significant amount of function in his left leg as a result of blood poisoning contracted in childhood. He was posted to Alaska where he met his wife, Vivian, at the USO. Their love of Alaska resulted in Chuck and Vivian spending a year lecturing to promote statehood for Alaska.

Chuck joined Abbey Rents in San Diego after leaving the lecture circuit. Typical of Chuck, the first day on the job, he completely dismantled a wheelchair — then decided there were a lot of things that could be done to wheelchairs to make them better. Chuck ordered so many customizations to wheelchairs that one wheelchair manufacturer's engineering department had a drawer of prints marked, "Chuck Chevillon's Changes".

Starting a distribution system for new products

Chuck often told people, "I get tired of going to see a person with a disability and having to tell them there isn't anything for them." In 1969, Chuck was instrumental in bringing together a group of medical equipment dealers who were willing to develop and distribute products which manufacturers felt had a demand too low to justify the cost of development. The group became MED and was a major factor in introducing technology.

Members of the MED group still laugh as they look back at the days when Chuck would lock them in meetings until each member had committed to buying and demonstrating his quota of whichever product Chuck was determined to introduce that month.

Chuck wasn't afraid to import communication devices from Sweden long before speech pathologists recognized alternative communications. He wasn't hesitant to write specifications for equipping the new Rehabilitation Institute of Chicago building so that only his company, AAMED could fill the bid.

Most of all, Chuck Chevillon wasn't afraid to give all of himself to help others. In the many tributes that have come from the people he knew and worked with over the years, the most frequent remark is, "Chuck Chevillon was the most generous person I ever knew." ❖

Cranial Molding Helmets: Reshaping Infants' Heads

By Jennifer Richards
Orthotics Instructor
Northwestern University Prosthetic-Orthotic Center

In recent years, pediatricians have begun instructing parents to have their infants sleep on their backs, due to concerns of Sudden Infant Death Syndrome (SIDS). This change in the recommended sleeping posture has led to an increase in the incidence of positional plagiocephaly (an asymmetrical shaping of the head) in infants. Positional plagiocephaly typically presents as a rhomboid-shaped head. It is usually caused by late gestational or postnatal deformation.

When an infant's soft head is maintained in a nearly fixed position against the uterine wall or the mattress, the cranium is progressively flattened. Often, spontaneous improvement will occur within a few months. However, for approximately 10% of affected infants, the plagiocephaly persists as a mild-to-severe deformity. This plagiocephaly, in some cases, can lead to mild ear and facial asymmetry.

Incidents of plagiocephaly is rising

Although the actual incidence of plagiocephaly is undetermined, it has often been quoted as one in every 300 births. This is significantly higher than the numbers from just five years ago. Therefore, the demand for treatment of plagiocephaly is gaining increasing attention within the orthotic community as well as with pediatric plastic and neurosurgeons. In most cases, a major skull reshaping surgery is unnecessary. Therefore, the management of plagiocephaly has fallen into the hands of the orthotists.

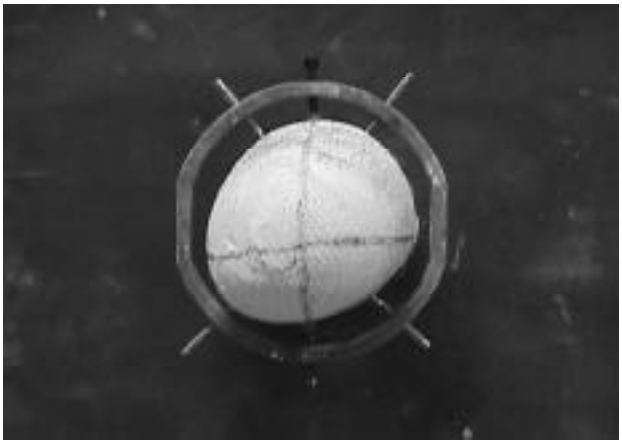
The currently accepted management for plagiocephaly is an orthosis called a cranial molding helmet. Cranial molding helmets are custom made for each infant. They hold the convex surfaces of the head in their present position and allow space for the flattened areas to grow. The helmets are typically worn 23 hours a day for two to seven months. The wearing of a cranial molding helmet can begin as early as four months of age and as late as 15 months (even later if the child was born premature).

A cranial molding helmet

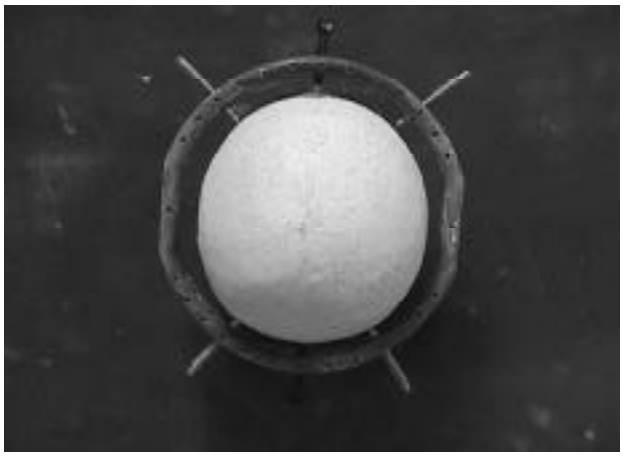
Though the success of the helmets is not yet well documented (since their widespread use is still fairly new), early results indicate an improvement in cranial symmetry. Mildly to severely misshapen heads can become almost completely round within a matter of months. In fact, often, noticeable results are seen after the first month of helmet treatment.

Even in severe cases of plagiocephaly in which full correction cannot be achieved, significant improvements can be made. Helmet therapy can result in not only visibly noticeable improvements, but also very satisfied parents. Infant skulls grow quickly and are easily moldable and, therefore, cranial remolding is not a difficult task. The most important factor in the success of treatment is early detection and early management. The earlier helmet therapy is begun, the shorter the treatment time and the greater the chance for cranial symmetry.

The pictures below show the shape of one boy's head before and after wearing a cranial molding helmet for three and a half months. ❖



A cast of a four-month-old's head before helmet therapy



A cast of the same infant's head after helmet therapy

Amputee Coalition of America (ACA) 10th Annual Meeting & Exposition Planned for July 7-9

"Bridges to the Future" is the theme for the Tenth Annual Educational Meeting of the Amputee Coalition of America (ACA) to be held July 7-9, 2000 at the Clarion Plaza Hotel in Orlando, FL. A new feature of this year's meeting is Youth Initiative focused on children from 8 to 18 years old.

The Youth Initiative will feature fun activities including track and field competitions, a leadership gathering, barbeque, disco and visits to Sea World and Disney World.

For the parents and other adults, the meeting will be filled with opportunities to learn, network and meet new friends at social events.

The meeting will begin with a keynote address by Bonnie St. John Deane, an Olympic champion skiier who uses a prosthetic lower limb. Other sessions will focus on topics including insurance, selecting a prosthetist, organizing home tasks, a fashion show and sessions on diabetes, cancer and vascular disease.

As in the past, the meeting will also feature an exhibition of commercially available products for people with amputations. Manufacturer's personnel will be on hand to demonstrate products and answer questions.

To find out how to register for the ACA Tenth Annual Meeting, please call ACA at 1-888-267-5669. ❖

The VA Presents

News from the Department of Veterans Affairs

Lower Extremity Complications

By: Robert M. Baum
Prosthetic Network Manager, P&SAS SHG,
VA Headquarters, Washington D.C.

Veterans Health Administration (VHA) Prevention, Amputation Care and Treatment Program Directive 96-007, notes the high prevalence and cost of amputations in the VA and emphasizes the importance of a system approach in preventing lower extremity amputations in the veteran population. It is believed that over half of the amputations occurring within VHA are associated with patients with diabetes. Therefore, the Healthcare Analysis and Information Group (HAIG), located in Milwaukee, is conducting the second phase of an amputation project to determine what prosthetic items were distributed to patients undergoing distal amputations and then concentrate on those items that the experts agree might have had potential for preventing the amputation.

Prior to this study, no corporate information on overall amputation rates for persons with diabetes or for the general VHA population existed. With the use of the National Prosthetic Patient Database (NPPD) and other data associated with unique patients undergoing amputation within VHA facilities over the last eleven years, this study is made possible.

Partnering with Centers for Disease Control

In order for Veterans Integrated Service Networks (VISN) to appropriately implement local strategies for improvement, they must have current and accurate data regarding amputation rates and resource utilization. To accomplish this goal, VHA's Office of Patient Care Services and the Office of Policy and Planning, Healthcare Analysis and Information Group (HAIG) have partnered with the Centers for Disease Control and Prevention, Division of Diabetes Translation; the University Health System Consortium, and Diabetes Quality Enhancement Research Initiative. The second phase of this project is still in its' initial stages, however, amputation demographics, rates, progression, and length of stay data for each VISN have been determined and can be located on VA's Intranet http://vaww.va.gov/health/nccc

Gerald Hawley, R.N., M.S.N., is the Project Manager for this analysis. Hawley works for HAIG out of the Milwaukee VA Medical Center. Questions or comments may be addressed to him at: Gerald.Hawley@Med.VA.Gov

The report is titled "Lower Extremity Complications in VHA (FY89-99) Part I: LEA Rates, Progression, and Utilization".This report will help us to identify the best methods of preventing amputation. Please help us in spreading the word about prevention and let's save a leg today.

Veterans Millennium Health Care and Benefits Act

VHA Directive 2000-006, Change in the Eligibility for Care of Veterans Awarded the Purple Heart, is in effect immediately and is a result of the Veterans Millennium Health Care and Benefits Act, which amended the law to place veterans awarded the Purple Heart in enrollment priority group 3, and to exempt those veterans from co-payment requirements associated with the provision of hospital care and outpatient medical services. Veterans awarded the Purple Heart may submit appropriate documentation, i.e., DD-214, service records, orders of award, certificate, etc., for inclusion into the veteran's consolidated health record.

The eligibility criteria for providing prosthetic services is therefore revised to provide prosthetics, sensory aids, and other prosthetic services/benefits to those veterans who submit appropriate documentation and are medically indicated for such services. The VA will revise their current automated system to allow VA staff to verify this information electronically; however, until that time, VA staff will maintain manual logs. Veterans are encouraged to bring

their DD-214, or other documentation to their local VA medical center to ensure their eligibility status is changed.

Current Issues:

National Footwear Center (NFC) Transition Plan: Effective October 1, 2000, National Footwear Center activities will be officially decentralized to field facilities. Custom Orthopedic shoes, depth inlay shoes, healing shoes, and other similar footwear, previously ordered through the NFC, will be the responsibility of the medical center prosthetic activity/orthotic laboratory providing care for such veteran. Orders can be placed with contractors utilized by the NFC; however, local and National contract initiatives are being looked at. Please be assured the footwear needs of veterans will be taken care of during this transition. There will be no interruption of services to the veteran. Please contact your nearest VA Medical Center, Prosthetic and Sensory Aids Service, if you have any questions. ❖

Please send us your articles, success stories, comments or suggestions for future issues in the VA Presents. E-mail: Robert.Baum@Mail.VA.Gov. Address: PSAS SHG (113), 810 Vermont Ave., NW, Washington, DC 20420. Phone (202) 273-8515. Fax: (202) 273-9110.

AComputer-based Simulation Tool for Assessing & Communicating the Design of Upper Limb Prostheses

Continued from page 2

software. Our ongoing need, as a research laboratory requiring high-end computational capability, kept us abreast of developments in desktop computers and workstations.

By 1999, we believed it possible to develop a second generation PADSS that would address many of the deficiencies of the first PADSS program. This resolution was brought about by the commercial availability of a sophisticated human modeling software package that could be run on a desktop computer.

Transom Jack, the human modeling program that forms the backbone of the second generation PADSS, was developed at the University of Pennsylvania and commercialized (with further development) by EAI (Ann Arbor, MI). This program models virtual humans from a database of standard anthropometric data, including physiological strength and joint range measurements. The models can be animated and analyzed in 3-D while performing specified tasks or movements. Significantly, the Jack software runs on a PC computer with WindowsNT, a system that is likely to be more accessible to prosthetics facilities than a UNIX-based computer workstation.

We are in the early stages of implementing the PADSS using the Jack software. Procedures are being developed to incorporate prosthetic components on the Jack figures, to automatically display the range of space that can be reached with the simulated prosthesis, and to show all of the areas on the body that can reached by the prosthetic prehensor. We will then progress to modeling of harnesses and cable-actuated prostheses and to incorporating strength and joint range data as constraints on the reach of the simulated human.

The overall goal of the PADSS project is to develop a tool that can serve the prosthetist in evaluating alternative prosthetic arm designs and that can be used to facilitate communication between the prosthetist and client during the decision-making phase of a clinical fitting. We also envision application of the PADSS program as a teaching aid in the training of prosthetists and as a research tool in evaluating hypothetical component designs. ❖

Acknowledgments: This project is supported by the National Institute on Disability and Rehabilitation Research, Department of Education. The prototype PADSS was implemented by Michael Redding, as part of his Master of Science degree, completed in 1991. The second generation PADSS is being implemented by Pinata Hungspreugs, in fulfillment of her Master of Science degree.

If you would like to be kept informed of developments on the PADSS project, you may contact the Project Director, Craig Heckathorne
(c-heckathorne @ northwestern . edu).

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Heckathorne, C.W., Redding, M.J., Childress, D.S., and Uellendahl, J., Visualizing Spatial and Positioning Characteristics of Upper-Limb Prostheses", Proceedings of the Seventh World Congress of the International Society for Prosthetics and Orthotics, pg. 385, 1992.

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- ❒ Pediatric Prosthetics
- ❒ Prosthetic Feet
- ❒ Prosthetics & Orthotics: General
- ❒ Upper Limb Prosthetics & Orthotics

Other Sources for Prosthetic & Orthotic Information:

Consumer Information:
National Limb Loss Information Center
900 East Hill Avenue - Suite 285
Knoxville, TN 37915
Toll Free: (888)AMP-KNOW

Prosthetic-Orthotic Education:
National Association of Prosthetic & Orthotic Education
1650 King Street - Suite 500
Alexandria, VA 22314
e-mail: opncope@aol.com

General Information about Prosthetics & Orthotics:
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