

# Orthopedic Appliance Company

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Prosthetics • Orthopedic Bracing • Seating & Mobility

No. 14

## O&P—Who We Are, What We Do

In the whole of American health care are many specialties, ranging from common to esoteric...from well-known to a mystery. But regardless of their size and the awareness they elicit, these unique disciplines are all important to the patients who require their respective form of specialized care and to the decision-makers who make the referrals for that treatment.

The twin rehabilitation fields of orthotics and prosthetics neither constitute a major slice of U.S. health care nor rank high on the typical American's recognition scale; but to people with limb loss, a neurologic deficit, orthopedic abnormality, or one of various other physical disabilities, the knowledge, skill and experience embodied

in these specialties can be nothing short of life-sustaining.

This issue of our newsletter steps back from the details of everyday practice to examine the roots of prosthetic and orthotic rehabilitation, the education and credentials O&P practitioners bring to the care of their patients, and the spectrum of physical challenges they are trained to alleviate, accommodate, and overcome. We hope you find the presentation worthwhile.



## Supporting, Protecting, Relieving, Replacing

Appreciating the role of prosthetists and orthotists begins with an understanding the services we offer. Our core competency is to provide rehabilitation devices that either replace a missing body part (prostheses) or support and protect anatomical structures to facilitate healing, relieve pain or promote safe ambulation (orthoses).



Courtesy Orthomerica Products Inc.

The process begins with a detailed patient history and physical to gain a clear understanding of the patient's condition, physical capabilities and lifestyle goals. This step often involves consultation with the patient's physician and/or surgeon, family members, a social worker, and other rehabilitation practitioners involved in delivering care.

Next come careful anatomical measurements and observations to assist in the design process, typically involving a positive model of the anatomy using casting techniques or CAD/CAM technology. In the design process, practitioners combine the "science" of their training and applicable technology with the "art" of their accumulated experience and personal appreciation for the patient's needs and abilities. When the finished product is delivered, our

role shifts to one of monitoring and upkeep to ensure proper fit and function are maintained.

### Scope of Services

#### Prostheses

Although some prostheses are created for largely cosmetic reasons, the major focus of prosthetic practice is on restoration of function to compensate for the loss or congenital absence of a portion or all of an arm or leg.

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### New Treatment for Foot Drop

Orthopedic Appliance Company is pleased to offer two portable functional electrical stimulation (FES) systems for managing foot drop, the inability to properly lift (dorsiflex) the forefoot during ambulation. Both the Bioness L-300 and Innovative Neurotronics Walk-Aide have proven effective in addressing this challenging condition.

Foot drop is a common outcome of medical conditions affecting the central nervous system, including stroke, M.S., C.P., traumatic brain injury, and incomplete spinal cord injury, among others. Foot drop can result from complete or partial paralysis or general weakness of the dorsiflexor muscles.

Patients with foot drop are seriously challenged when trying to walk. Unable to lift their forefoot normally during swing phase, they typically either drag their forefoot and toes—which can precipitate a fall—or overcompensate with an exaggerated high-stepping pattern known as steppage gait.



Bioness L-300



Courtesy OrthoCare Innovations LLC

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# Standards of Our Profession: Education, Certification, Licensure

The term “professional,” regardless of the field, evokes certain expectations — advanced, specialized education...demonstrated skill...proven experience. Professionals are measured by specific standards that help define their preparation, capabilities and competence for the patients they serve and the health care providers and facilitators with whom they interact.

This condition is every bit as true for orthotics and prosthetics as for other health care professions. In 1993 the American Medical Association recognized orthotics and prosthetics as an allied health profession, culminating a steady evolution of the twin disciplines from medical-related craft to true patient care specialty. Like their counterparts in other allied health professions, O&P practitioners are evaluated against exacting standards of education, clinical experience, professional knowledge and demonstrated competence.

## Credentials

### Education

Today nine accredited programs across the U.S. offer formal O&P education curricula to prepare the prosthetists and orthotists of tomorrow with credentials ranging from bachelor’s degrees to post-baccalaureate certificates, to master’s degrees. The instruction in

# O&P Has Come a Long Way, Baby

The origin of orthotic and prosthetic practice is traceable back to ancient times. The first orthotic craftsmen applied leather, textiles and the metals at their disposal to splint-making and bone-setting. The earliest prosthetists emerged from mankind’s physical and spiritual need for functional and cosmetic wholeness in response to limb loss in battle or an accident or a congenital absence. Evidence exists of prosthetic limbs being applied as far back as 2500 BCE.

Though those early practitioners were surprisingly innovative, their craft was extremely slow to develop through the 19th century CE. They learned their trade on the job and functioned in small independent workshops; there was no organized education, formal research or group collaboration for sharing ideas and experience.

That situation began to change in late-World War I when representatives of the nation’s 10 leading prosthetic firms gathered discuss the state of U.S. prosthetic practice and technology, which was then significantly lagging Europe. That meeting led to the creation of the Artificial Limb Manufacturers and Brace Association, an event now considered to be the turning point for O&P growth and development in this country.

By providing a national forum for developing educational and scientific programs, ethical standards and building better relationships with other health and rehabilitation practitioners, the national organization (since renamed the American Orthotic & Prosthetic Association) shepherded a transformation of practitioners from craftsmen to skilled clinicians provid-



Courtesy Touch Bionics



Courtesy Otto Bock Health Care

these programs places particular emphasis on anatomy and physiology, patient management skills, clinical practices and professionalism, fabrication and fitting techniques.

Upon graduation from an O&P education program, many students seek to further their preparation with a year-long residency at an accredited site to gain clinical training and experience. The National Commission on Orthotic and Prosthetic Education (NCOPE) serves as the accrediting body for residency programs and participates with the Commission on Accreditation of Allied Health Education Programs (CAAHEP) in accrediting O&P education programs.

### Certification

Board certification of practitioners establishes and promotes the highest standards of organizational and clinical performance in O&P service delivery. Since 1948 the American Board for Certification in Orthotics and Prosthetics (Pedorthics was added in 2007) has served

ing direct care to patients. In 1948, the formation of the American Board for Certification in Orthotics and Prosthetics (ABC) set minimum standards for practitioner education and experience and testing their clinical knowledge.

The large number of American casualties in World War II and the polio epidemic of the 1950s greatly increased the need for orthotic and prosthetic care in America and with it the need for formalized education programs and scientific research. An explosion of innovation followed, accompanied by creation of university-based orthotic and prosthetic training programs.

## Foundations

In 1970 the American Academy of Orthotists and Prosthetists was established to further the scientific and educational attainments of O&P practitioners.

Increased demand for O&P services led to improved technology in components, materials and clinical skills beginning in the 1960s. Particularly noteworthy was the introduction of composite materials such as fiberglass and high-temperature thermoplastics in the 1970s.

Accelerated innovation in orthotic and prosthetic design has continued into the 21st century, driven by increased worldwide demand, microprocessor technology and government programs to provide top-quality prostheses and orthoses for military casualties of U.S. campaigns in Iraq and Afghanistan. Though still in their infancy, powered prosthetic limbs and electric orthoses promise to be the “next big thing” in our field; many other exciting concepts are also on the drawing board.

Although its roots are thousands of years old, the practice of orthotics and prosthetics may just now be coming into its own.



Courtesy Becker Oregon



Courtesy Freedom Innovations

as the comprehensive credentialing organization for establishing individual and organizational performance standards for delivery of orthotic, prosthetic and pedorthic care. At present, ABC offers 14 different certifications encompassing orthotists, prosthetists, pedorthists, orthotic fitters, mastectomy fitters, assistants and technicians.

ABC certification is well-recognized and highly respected in our field. To earn it, orthotists and prosthetists must meet well-defined educational and experience requirements and pass a rigorous written examination, written simulation, and two-day clinical exam. Once certified, practitioners must work diligently to update and enhance their knowledge and skill to maintain their credential. Certification is renewable every five years once candidates demonstrate they have reached required continuing education thresholds established to ensure practitioners stay on top of advances in technology and current patient management standards.

### Facility Accreditation

ABC’s facility accreditation program evaluates O&P practices against exacting standards relating to governance, administration, staff qualifications, patient care, quality assessment, facility management and safety. ABC is recognized as an approved accrediting organization for suppliers of orthotic and prosthetic services and durable medical equipment by the Centers for Medicare and Medicaid Services. Full facility accreditation is good for three years.

An alternative pathway for individual certification and facility accreditation is offered by the Board of Certification/Accreditation, International (BOC), which was established as a second credentialing body in 1984.

### Licensure

Despite the existence of national O&P certification and accreditation programs, various underqualified providers continue to deliver substandard orthotic and prosthetic care with resulting negative consequences for unsuspecting patients. To combat this practice, 14 states now require licensure for orthotists and prosthetists, and others have legislation under consideration.

As a profession we believe licensure requirements are in the best interests of our field, that prosthetic and orthotic care should be delivered by practitioners who have fulfilled requirements for certification and that state licensure laws should embody similar requirements.

Current licensure states include Alabama, Arkansas, Florida, Georgia, Illinois, Kentucky, Mississippi, New Jersey, Ohio, Oklahoma, Rhode Island, Tennessee, Texas and Washington.



# Let’s Talk Terms

Like our counterparts in other medical specialties, we who practice prosthetics and orthotics use a somewhat specialized vocabulary pertaining to the work we do. The terms are not difficult but tend to be confusing to some folks.

Take *prosthetic*... It will come as a surprise to more than a few people who use it frequently that this word is not a noun! It is correctly used only as an adjective, as in *prosthetic rehabilitation*. The proper term for what in past times was generally called an “artificial limb” is a *prosthesis* (pl. *prostheses*)...not a “prosthetic.” Similarly, an *orthotic* device (popularly termed a “brace” in past times) is correctly termed an *orthosis* (pl. *orthoses*).

## Terminology

Adding further confusion to the discussion are the words *prosthetics* and *orthotics*, which **are** nouns, as they refer to the science and practice of providing prostheses and orthoses. (Prosthetics are **not** more than one replacement limb, nor are orthotics two or more orthopedic braces.)



TLSO — Example of a spinal orthosis. Courtesy Boston Brace Inc.

And finally, the individuals who provide prostheses and orthoses: An *orthotist* is a practitioner who measures, designs, fabricates, fits and services orthoses to support or correct disabilities; likewise, a *prosthetist* is a practitioner who measures, designs, fabricates, fits and services prostheses for replacement of a missing limb or appendage (hand, fingers, toes) due to congenital or acquired limb loss.

Now, further muddying the water are different uses of these terms by other specialties. For example, while the technically correct term for a molded shoe insert is a foot orthosis, that particular product is often called an “orthotic” by some podiatrists and sellers of prefabricated inserts. Moreover, providers of various devices that do not have an impact on the musculoskeletal functions of the body — artificial eyes or appliances for the eyes, dental plates, and largely cosmetic ears and noses for example — like to call these items “prostheses.” So it can be confusing.

A few other terms pertinent to our specialties:

**O&P (or P&O)** — Widely used abbreviation for orthotics and prosthetics.

**Pedorthist** — An individual trained in the manufacturing, fitting and modification of foot appliances and footwear for the purposes of alleviating painful or debilitating conditions of the lower limb.

**Rehabilitation team** — A group of allied health care professionals that frequently includes physician, surgeon, orthotist/prosthetist, physical and/or occupational therapist, social worker and counselor assembled to help a debilitated individual regain a functional life.

**Residual limb** — The portion of an arm or leg remaining after amputation...sometimes referred to as a stump or residuum.



Transfemoral prosthesis. Courtesy Otto Bock Health Care

# O&P Care Offers Patients a Second Chance

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Upper-extremity prostheses range from partial or complete finger replacements to systems addressing complete arm loss at or above the shoulder. Most common are transradial (below-elbow) limbs typically consisting of a socket, which fits over the remaining (or “residual”) human anatomy, and a hand or hook-type terminal device, sometimes with a functioning wrist component. Transhumeral (above-elbow) systems generally add a functioning elbow.

Traditional upper-limb systems are mechanically controlled and powered by cables actuated by residual limb motion. A newer option, myoelectric control, provides powered actuation of prosthetic hand, and possibly wrist and elbow components, using electrical signals generated in the patient’s residual limb.



Courtesy Otto Bock Health Care

Lower-extremity prostheses compensate for limb loss ranging from a single toe to an entire leg at the hip or even higher. Transtibial (below-knee) systems incorporating a socket, prosthetic foot and connecting pylon are by far the most common, followed by transfemoral (above-knee) systems, partial foot prostheses, and replacement limbs for disarticulations through the ankle, knee or hip joints. The degree of difficulty increases the higher the level of limb loss.

For most of history, the primary functional role of lower-limb prostheses has been to provide weight bearing for standing and ambulation: The wearer provided all power through residual limb musculature. Now, the future of lower-extremity prosthetics may just be coming into sight with the development of the first electrically powered knee, ankle and foot components, which in time could revolutionize prosthetic science.

## Portable FES Units Now Available at OAC

(Continued from page 1)

Both the L-300 and the Walk-Aide surmount dorsiflexor weakness/paralysis by stimulating the peroneal nerve at the appropriate point in the gait cycle to lift the forefoot, assuring ground clearance and providing for a normal heel-to-toe rollover. Many patients afflicted with foot drop are able to replace their ankle foot orthosis or other type of mechanical brace with one of these small unobtrusive portable FES units, which can be worn out of sight under clothing.



L-300 components

The **Walk-Aide** consists of a battery-operated electrical stimulator, two electrodes and electrode leads packaged into a small case, held in position by a cuff on the affected leg just below the knee. A physician’s prescription is required.

The **L-300** consists of three distinct elements “connected” by wireless communication: (1) A leg cuff containing the stimulator component attaches to the affected leg just below the knee; (2) a gait sensor attached to the wearer’s shoe continuously tells the system where the leg is in the gait cycle and enables it to adjust for uneven terrain, ramps and stairs, and (3) a hand-held remote control enables

### Orthoses

Orthotic devices are fabricated for all parts of the lower and upper extremities and the spinal and cervical regions. Orthoses are generally named and classified by the area of the body to which they are applied. For example, a TLSO is a spinal orthosis encompassing the thoracic, lumbar and sacroiliac regions of the trunk. Likewise, a KAFO extends from the knee downward to include the ankle and foot.

Orthotic devices can be as minimal as a pair of foot orthoses for plantar fasciitis or as involved as a cervical-spinal orthosis to protect and promote healing for a major spinal injury. Some are used for a limited time following an injury, others may be applicable throughout an individual’s lifetime for managing symptoms of diseases such as M.S., cerebral palsy and polio.

The list of different orthosis designs currently in use is exhaustive with a significant portion being dedicated to pediatric applications.



Courtesy Fillauer Inc.

### Note to Our Readers

Mention of specific products in our newsletter neither constitutes endorsement nor implies that we will recommend selection of those particular products for use with any particular patient or application. We offer this information to enhance professional and individual understanding of the orthotic and prosthetic disciplines and the experience and capabilities of our practice.

We gratefully acknowledge the assistance of the following resources used in compiling this issue:

Becker Oregon • Boston Brace Inc. • Freedom Innovations  
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OrthoCare Innovations LLC • Otto Bock Health Care



Walk-Aide

the wearer to adjust the level of stimulation and turn the unit on and off.

For more information about this exciting new approach to foot drop management, we invite you to call our office: 828-254-6305.