



Noteworthy



Setting up a Safe O&P Fabrication Area

- Leonard Niles, CEO Leonard Industries

“We all know fabricating orthotic and prosthetic devices of various forms and sizes comes with workplace hazards.”

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Changes in the O&P Program at Spokane Falls Community College

- Ambrose Cavegn, BOCP, CPA, CTPO

“At this time, there are only four colleges in the United States that educate and train students to become orthotic and prosthetic technicians.”

Read the full story on page 6.

Technical and Material Milestones in Orthotics & Prosthetics

- Sheryl Sachs, MS, CPO and Joshua B. Utay, CPO

“The field of orthotics and prosthetics has evolved in countless ways since its inception.”

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Larry Lange Travel Fellowship

- Erin Casey, Board Eligible Prosthetist/Orthotist

“Being awarded the Larry Lange Travel fellowship in 2023 was an honor that enabled me to fulfill long-held professional goals. I used the funds for a service trip to Guatemala to volunteer with the Range of Motion Project (ROMP).”

Read the full story on page 16.

Limb Difference and Limb Loss Awareness Month

- Stacey Brown, CPO Board Eligible and Adrienne Hill, MHA, CPO (L)

“We spend our lives dedicated to helping other people.”

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Setting Up a Safe O&P Fabrication Area

- Leonard Niles, CEO Leonard Industries

About the Author



Leonard Niles, CEO Leonard Industries

Niles began working in the O and P industry at the age of 19 as a technician while in college. After graduation, instead of enrolling in an O and P program, he went to welding school to become certified in all types of welding.

In 2006, Niles founded Leonard Industries to build custom high-quality tools designed specifically for the O and P industry. In the last 18 years, he has been privileged to build dozens of labs and thousands of tools focusing on efficiency and safety.

Leonard Industries is headquartered in sunny De Leon Springs, Florida with a machine and welding shop dedicated to the O and P industry. Niles frequently gives presentations at O&P national meetings about the need for a safety standard in orthotic and prosthetic fabrication.



We all know fabricating orthotic and prosthetic devices of various forms and sizes comes with workplace hazards. This article will examine the specific hazards associated with each process in fabrication, and the modern equipment used to address them at their source. Each piece of equipment will be described with a few common standards.

First, all equipment must come with the ability to test the efficacy of the machine, like having a light-indicating when a filter needs to be changed or drum capacity is full. Second, this change cannot affect the exterior envelope of the building, or no holes cut in the building to vent outside.

Most offices can just open a window, but where does that smell, or dust go? Usually to the smoking area, but they do not care anyway, right? Another important reason is we do not want to affect the HVAC system of the building. If you are running a 900 CFM dust collector that is exhausting outside, you are pulling more air out of the building than a 1-ton AC system can circulate. With these few parameters in place, we will set a quantitative fabrication standard for offices large or small.

“The four principal areas for a fabrication safety standard are fire safety, chemical handling, fume scrubbing, and dust collection.”

Fire safety, being already regulated by the fire inspector upon certification of the office, is mostly taken care of, but a few items specific to our industry can be added. Chemical handling is widely unregulated and undermaintained in most offices, but simple changes can have a drastic effect. Fume scrubbing is almost non-existent in small offices, but with a minor investment the practice of blowing contaminated air outside can be squelched. Dust collection is my personal enemy. I believe it is our biggest problem in composite carbon fiber fabrication.

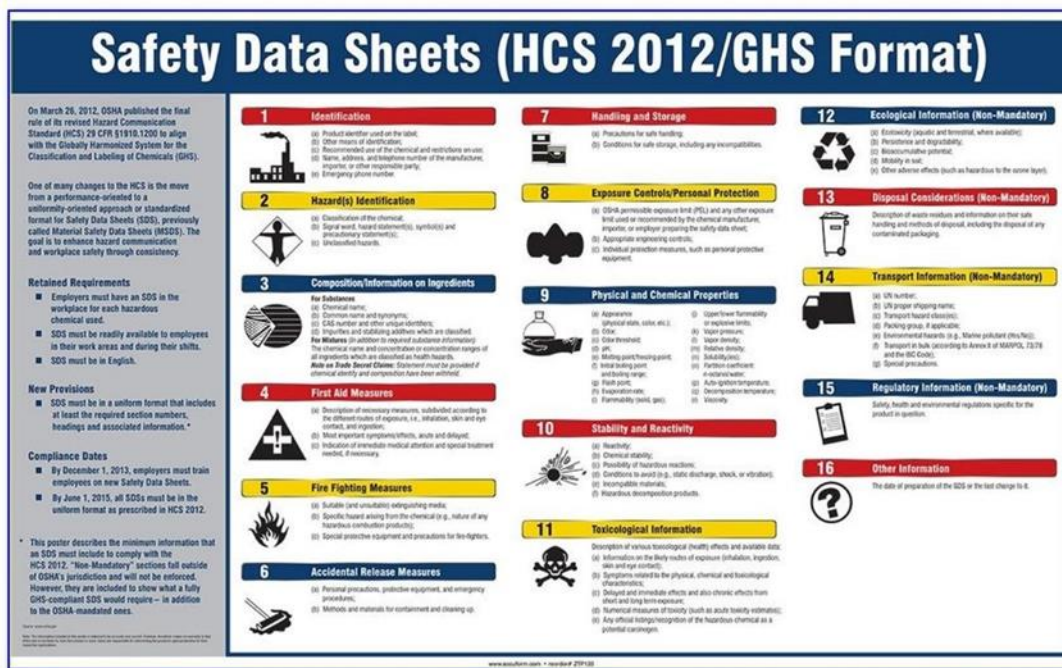
The fire code states that at least one 2A or a larger fire extinguisher for every 3,000 square feet or 100 feet of travel is required. However, most labs are much smaller than 3,000 square feet, and fire extinguishers are needed closer than next door. OSHA regulations state fire extinguishers must be mounted at least 4 inches off the floor, and the handle mounted between 3-5 five feet off the floor. Fire extinguishers must be placed on the outside of any room with a fire risk, like the oven, lamination, and machine rooms. Be certain to have visual signage identifying the extinguishers, first aid area, eye wash stations, and caution HOT oven.

Another important item for both fire safety and chemical handling is installation of a double walled, steel, self-closing chemical cabinet. Chemical cabinets are necessary to keep all volatile chemicals safe when not in use. One drop from a bottle of thinner stored on a table at night can drip on a hot charging battery pack, quickly creating a fire. Specific to our industry, we have both wet and dry chemicals that should be stored separately. The small bag of dry catalyst used for resins can work its way to the bottom of a large chemical cabinet and is in danger of being spilled on. Should this occur, an exothermic reaction within the chemical cabinet can lead to a dangerous chemical fire. To prevent such an event, purchase a second small fire cabinet for storage of your dry chemicals.

See Fabrication, page 3

Fabrication (continued)

All hazardous chemicals sold come with an SDS sheet, Safety Data Sheet. Learn these rules! The Safety Data Sheet contains all the information we have forced manufactures to include by law. SDS are laid out in a universal format for easy access in an emergency (Fig 1).



Create an SDS binder listing all the chemicals in your practice, not as many as you think, in alphabetical order. Insert duplicates like “C” for cyanoacrylate and “S” for super glue, so that in an emergency the information about spills, ingestion, disposal, and clean-up can be quickly and easily found. Identifying and knowing the chemicals in your practice will make it easier to mitigate them with equipment, like using activated charcoal to scrub the air when laminating.

Fumes are created in orthotic and prosthetic fabrication when using glues, thinners, and wet laminating techniques. Generally, fumes are dealt with through forced air ducting, blowing the contaminated air outside of the work area. However, this choice is not always an option in rooms without outside walls. And as mentioned previously, this practice can ruin the HVAC system by blowing heated or cooled air outside.

“Thankfully, the VOCs off-gassed during fabrication can easily be removed by activated charcoal.”

The clean air can then be recirculated into the room making it safe to breathe and keeping the HVAC system balanced. To keep up 4 lamination stations safe, we recommend units with at least 20 lbs. of charcoal, a VOC filter light, and an articulating arm to suck up the fumes at the source (Fig 2).

See Fabrication, page 4

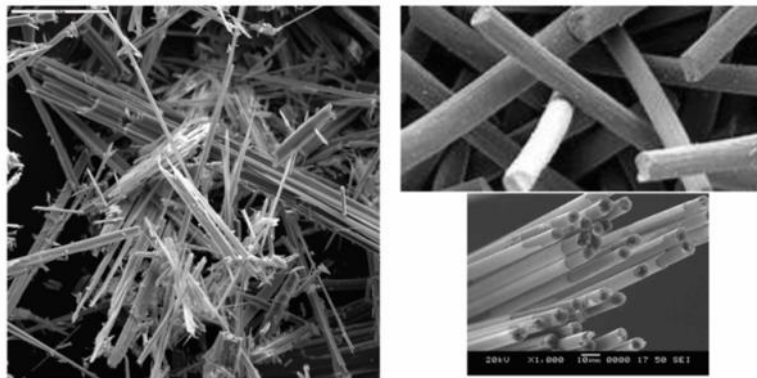
Fabrication (continued)



A high-quality fume scrubber with filter, VOC light, 3 speeds, and an articulating arm will cost \$2,500-\$3,000. VOCs have a strong odor, indicating when the fume scrubber is doing its job.

However, dust is a little bit harder to reveal when it is dangerous. The amount of dust created in fabrication changed dramatically with the use of laminated devices over thermoformable plastics, foams, and wood. Laminated devices are denser, and when ground at high speed, they create smaller chips. Dangerous particles for human lungs are generally between 1-10 microns in size. The 2.5-10-micron sized particles are less dangerous, but long-term exposure has shown carcinogenic properties. Anything smaller than .5-1 micron in size can be digested by lung cells, and any particles larger than 10 microns can physically be coughed out if there are no sharp or irregular shapes. When grinding composites, particles throughout this range will be created. How does carbon fiber compare to a known carcinogen asbestos (Fig3)?

SEM - Asbestos vs Carbon Fiber



See Fabrication, page 5

Fabrication (continued)

As you can see,

“...carbon fiber is not as sharp or brittle as carcinogen asbestos but keeping it out of our lungs is critical.”

Dust collectors with an inflatable canvas bag as the filter have a 30-micron hole; but are not effective against 1–10-micron particles. The good news is that 1 micron and finer dust collectors are not that expensive and are manufactured worldwide for the woodworking industry. A high quality, 900 CFM dust collector, that will serve 3 grinders can be purchased for roughly \$2,000 (Fig4).



Not only do these dust collectors have proper filters they also have disposable collection bags. To empty the dust can, tie up the top of the bag, like a trash bag, and throw it away--you do not have to shake out a large canvas bag. Making maintenance easier will ensure that it happens more often.

With all these equipment changes added to your workplace, PPE or personal protection equipment is still necessary.

“Safe eye, hearing, and lung protections are ultimately your personal responsibility to wear them correctly and diligently.”

Small things, like removing clothes and shoes before hugging your loved ones after work will help keep your home and family safer, too. Demand and create a safer work environment for your practice and your patients. You all deserve it!

Changes in the O&P Technology Program at Spokane Falls Community College

- Ambrose Cavegn, BOCP, CPA, CTPO

About the Author



**Ambrose Cavegn,
BOCP, CPA, CTPO**

Ambrose graduated from Spokane Falls Community College (SFCC) in 2009 with an AAS degree in O&P Technology. Since then, he has worked around the United States at several nationally renowned rehabilitation centers, including The Center for the Intrepid at Brooke Army Medical Center, the Washington DC VA Medical Center, Walter Reed Army Medical Center, and MedStar National Rehabilitation Hospital. Ambrose has been a Certified Technician of Orthotics and Prosthetics since 2010, a Certified Prosthetic Assistant since 2012, and he became a Certified Prosthetist with the BOC in 2016. He has been teaching Prosthetic Technology since 2017 and in 2019 became the Program Director for the O&P Technology Program at SFCC. Ambrose earned his Bachelor of Applied Science Degree in Professional Technical Education and Instructional Design from South Seattle College in 2019.



Preface

At this time, there are only four colleges in the United States that educate and train students to become orthotic and prosthetic technicians. These colleges are in Spokane, Washington, Joliet, Illinois, White Bear Lake, Minnesota, and Versailles, Kentucky. This article is written about and focuses on the technician program located in Spokane, Washington. The exciting changes described below are just the beginning of the reimagining of the O and P technician and paraprofessional training program offered at the Spokane Falls Community College.

Justification for Changes

In the years that I have been a faculty member in the Orthotic and Prosthetic Technology Program at Spokane Falls Community College (SFCC), it has become apparent that there is a genuine need to change the way we train orthotic and prosthetic technicians. This needed change is the result of many factors, but several pressing issues indicated that we (the faculty) could no longer wait to execute these crucial curriculum revisions.

The predominant factor driving this change is that the cost of training technicians in the existing format has become prohibitive, both to the students and to the technical education programs as well. Over the past few years, the cost of enrollment for a two-year program has risen dramatically for students. The lack of availability of housing and the cost of housing have become significant hurdles. As the cost of consumable goods and materials used in the program continues to increase, so do the fees required from each student to cover these costs. As a result of these uncontrollable economic realities, the O&P Technology Program at SFCC is experiencing record low enrollment numbers.

Another major factor supporting the curriculum change is the increasing demand for O and P technicians throughout the country. Experienced technicians are retiring or moving to different industries at high levels, and newer practitioners are not being exposed to fabrication at the same level they once were. The employers that hire our students simply cannot afford to wait two years before hiring an entry level technician. Often times, a practice is forced to hire someone “off the street” who must be trained not only in fabrication skills, but also anatomy and medical terminology. As business expenses increase while profit margins get slimmer, the role of a capable and proficient technician has become more critical. One of our primary goals is to have these formally trained individuals in the workplace as quickly as possible.

When the pandemic occurred, it caused major disruptions to the established O and P technical programs, forcing rapid adaptation. At that time, all course offerings were on campus and in person. We learned quite a bit about alternative educational models that worked well, didn’t work at all, or most importantly, what could be possible if the models were refined and fine-tuned. While at the time this change was a rough and forceful transition, we have now had a couple of years to smooth our processes. As a result, we think that now is a perfect time to permanently implement these changes. In fact, at this time, we do not have a choice if we wish for the SFCC O and P Technology Program to survive.

Proposed Changes

We decided that identifying underlying processes involved in O and P fabrication would be the best place to begin this venture. We reasoned that if we could effectively educate a technician to understand these processes, they should be able to fabricate any device they are asked to create. Working with members of our advisory committee, other O and P technical educators, and program alumni, we identified skillsets that are universal in O and P fabrication.

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Changes (Continued)

Once we had a grasp on these processes and concepts, we went through the list of devices that have traditionally been required to teach. From this list, we identified redundancies and overlaps in the skills demonstrated during fabrication. As a result, we were able to compress the curriculum and shorten the program from a two-year degree program to a one-year certificate program. It is our belief that we can deliver higher quality education and career training in this timeframe while keeping up with industry demand.

“A major factor in shortening the program was our ability to shift much of our didactic curriculum into online modules that students complete independently of class.”

In this way, time in the lab is focused on the development of hand skills and fabrication competencies. With these changes, the SFCC O&P Technology Program will be operating as a hybrid program beginning in 2025.

In the one-year program, students will begin as a cohort during fall quarter. During this term, we focus on foundational content areas including lab safety, O and P terminology, plaster work, plastic identification and processing, metal processing, finishing work, sewing, material technology, componentry, basic alignment and understanding of the gait cycle, functional anatomy as applicable to the understanding of what makes a device work, the roles and scope of practice of different levels of O and P professionals, and professional behavior development. We also present basic device fabrication. The focus in this introductory term is on foundational knowledge and fabrication skills in both orthotics and prosthetics. While there has traditionally been a divide between these two disciplines, we aim to highlight the overlapping skills in the curriculum with specifics in each discipline provided later in the year.

Once a student has completed the introductory coursework, they will move into one of the discipline specific quarters of instruction. These discipline specific courses focus on the biomechanical principals of orthotics or prosthetics, lower extremity orthotic or prosthetic technologies, and upper extremity technologies in either discipline. Fabrication skills continue to be refined, anatomy and biomechanics are explored in a discipline specific manner, and advanced concepts are introduced. We are also adding digital workflow competencies into the curriculum. Students then switch from one discipline to the other discipline during the following quarter.

When a student has completed three quarters of instruction, they will complete two six-credit practicums with each practicum lasting for 198 hours. Students (or practicum site supervisors) have the option of completing both practicums at one site or choosing another site for the second practicum. Since students need a full course load to receive financial aid, the amount of time required for each practicum was increased to meet requirements. It has been very difficult for students to afford to travel outside the Spokane area without access to financial aid. This expanded format also allows a student to be exposed to a broader array of fabrication experiences, if desired. Practicum experiences can be paid or unpaid, depending on what the student negotiates with the host site.

At the conclusion of the one-year program, students will be awarded a certificate and will most likely be eligible to sit for the ABC exam in either, or both, disciplines. Approval from NCOPE for the curriculum and program changes is expected later this year. Much of the content in this new course structure is the same, including a wealth of viable and relevant competencies laid out in the previous curriculum. Some projects that were deemed obsolete, too time consuming, or too material heavy were removed to maintain the compressed timeline.

“In every case where a project was removed, we were certain to map the knowledge and skills demonstrated to another task remaining in the curriculum.”

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Changes (Continued)

These changes result in less repetition, which was not an easy sacrifice, but one that was deemed necessary. Our emphasis in these curriculum changes remains on developing the basic knowledge and requisite hand skills, as well as a sense of professionalism through the development of soft skills, that enhance student employability.

The Future

These exciting changes are just the beginning of the reimagining of the O and P technician and paraprofessional training at Spokane Falls Community College. There are many additional possibilities for program change that we are exploring.

We built the new program to include the possibility of remote training for technicians who live and work outside of Spokane. For example, a person working in a lab anywhere in the country who wishes to become certified, may participate in the program without having to relocate. They can stay employed while improving skills and knowledge. While this model will likely include brief trips to Spokane for skills testing, we are exploring several remote options for testing as well. This option may help solve employability challenges in high cost living areas where we have had difficulties relocating students. If employers are able to recruit from local populations, while allowing SFCC to provide education and training, dramatic changes in the workforce are possible. At SFCC, we have the technical capabilities to make this a reality.

“We enthusiastically wish to have practitioners know of these changes and new options for the training of technicians.”

We are eager to meet potential students or employers who may be interested in discussion about further developing this model.

An ongoing goal is to have our program offer an Associate of Applied Science degree once again. To do so, we are working on adding additional coursework that leads to other certificates, for example, orthotic fitter or pedorthist. There is also much interest at the local, state, and national level about the concept of ‘micro-credentialing’ or ‘stackable certificates,’ a model that may work extremely well for this level of training and education. These changes will be provided in the form of abbreviated training sessions (one quarter in length). These sessions will result in specialty certifications that may be taken as either an individual or employer deems necessary. Students will be awarded college credits and after completing a specific number of the certificates, awarded an AAS degree. Imagine the concept of being able to design your own education (or the education of your technician) to fit your employment (or business) needs. We hope the increased accessibility this model affords will better suit the needs of potential students and the industry.

Spokane Falls Community College recently launched several new Bachelor of Applied Science degrees. The Allied Health Department is exploring the development of a general Allied Health BAS degree. This degree will be designed to satisfy the prerequisites for a Master of Science degree in different Allied Health professions, including Physical Therapy, Occupational Therapy, Audiology, and of course, Orthotics and Prosthetics. While we know that not every technician wishes to or is interested in a career providing clinical care, we do have some students with that goal in mind. We believe a foundation in the fabrication of O and P devices, combined with a strong undergraduate education and experience in the industry, will provide an extremely well-prepared practitioner student.

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Changes (Continued)

“We are interested in this concept and wish to hear from anyone who agrees and wishes to explore possibilities.”

Conclusion

As the current Program Director for the Orthotic and Prosthetic Technology Program at SFCC, I have never been so excited about the possibilities that lie ahead. I am grateful to be in this role, at this time, and in this environment. At the college, we have a local administration open to exploring these opportunities, an advisory committee supportive of these changes and the development of new training models, and a dedicated faculty and staff eager to make this education and training model work successfully.

On a national level, our colleagues in O and P technical education are also innovating program changes. We are working with each other in many ways to improve our offerings collectively. The NCOPE, our Committee on Accreditation for CAAHEP, is supportive of our goals. The Board sees the need for updating the technician standards to be flexible enough to support innovation within the technical education programs. At SFCC, we now have the infrastructure in our lab to allow unprecedented levels of training and collaboration. Everything seems to have aligned perfectly to make these new possibilities a successful reality. I look forward to a bright future for O and P Technician education. Personally, I can hardly wait to see where we end up!

Please do not hesitate to contact us if you have questions or wish to discuss the curriculum changes and keep an eye out for updates and future developments.

Technical and Material Milestones in Orthotics and Prosthetics

- Sheryl Sachs, MS, CPO, and Joshua B. Utay, CPO

Introduction:

The field of orthotics and prosthetics has evolved in countless ways since its inception. In this article, we have narrowed down some of the materials and methods commonly used in O&P over the years by analyzing multiple resources, as well as pulling from our own experiences. At its core, this article is a timeline of advancements fleshed out by narrative, photos of older devices, and maybe even info boxes (diagrams?) of milestones year by year, or era by era. While this article provides an overview, for those interested in additional details, more information can be found: <https://journals.sagepub.com/toc/poia/44/6>.

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About the Author



Sheryl Sachs, MS, CPO

Sheryl Sachs is a dedicated Orthotist-Prosthetist from Maryland. She is a graduate of the University of Maryland where she earned a dual degree in Communication (BA) and Kinesiological Sciences (BS). She attended the P&O Program at the Georgia Institute of Technology, where she earned her Master of Science in Prosthetics and Orthotics (MSPO).

Sheryl's professional path has been intertwined with Dankmeyer Inc., where she completed her residency and now works as a Certified Prosthetist-Orthotist (CPO). Beyond her clinical role, Sheryl is also involved with mentoring and advocacy in the field. She has taken on mentorship roles within the American Academy of Orthotists and Prosthetists' (AAOP) mentoring program and for aspiring professionals completing their residencies. She also serves as a member of the Government Relations Committee of the American Orthotic and Prosthetic Association (AOPA). Sheryl's engagement with the National Commission on Orthotic and Prosthetic Education (NCOPE) is rooted in a genuine desire to guide education and training in the field. Starting as a Regional Residency Liaison (RRL) to presently being a part of the NCOPE Board's Executive Committee, Sheryl's contributions extend beyond her patients/ She is committed to helping the field of O&P to grow and thrive in the ever-changing healthcare environment.



O&P Historical Timeline

Prehistory: Evidence of orthotic and assistive devices can be traced back to prehistoric times, where tree bark was used for spinal orthoses, and records depicting canes and crutches go back millennia.

Ancient Greek/Roman Examples

Prior to the Civil War, few artificial limb companies existed. It was the carnage of the Civil War and subsequent Western conflicts that dramatically increased the need for artificial limbs and the provision for those in need. Thus, limb companies were established, generally by amputees who were dissatisfied with the prostheses that were available to them (per AOPA). During this time, most prostheses and orthoses were made from conventional materials, including wood for prosthetic legs, bent metal, and leather. There were few technological and material advancements until the early 20th century. During that time, we started to see the development of companies that significantly contributed to our field as it is today.

Before World War I, artificial limbs were nearly always made of wood, although they were sometimes wrongly called "cork legs." Wooden legs, in Minnesota and elsewhere, were made by craftsmen, not by medical professionals. Some craftsmen were cabinet makers who brought woodworking experience to the industry. Others were former clockmakers and locksmiths who found that their work with mechanical pieces was helpful in constructing joints" per mnopeia.org.

Early 20th Century

It was in the early part of the 20th century that we started to see the names of O&P companies and our professional organizations that are still familiar to us today. In 1907, the Ohio Willow Wood (OWW) Company was founded by William E. Arbogast, a bilateral amputee, on his family farm in Pickaway County. Just 10 years later, in 1917, The **American Orthotic & Prosthetic Association (AOPA)** was founded in Washington, D.C., as the Artificial Limb Manufacturers and Brace Association (ALMBA). Anticipating that World War I casualties would require orthotic and prosthetic (O&P) treatment, the Council of National Defense and artificial limb and brace manufacturers met to prepare the industry to meet those needs. During that same year, the U.S. government created the Artificial Limb Laboratory (Limb Lab) at Walter Reed General Hospital. The Limb Lab positioned doctors in charge of artificial limbs rather than craftsmen. These physicians attempted to standardize artificial limb construction by using fiber made of pressed sawdust instead of solid wood," per mnopeia.org.

Between 1919 and 1930, the O&P field saw the foundation of Orthopädische Industrie GmbH in the Kreuzberg neighborhood of Berlin by Otto Bock, and the foundation of the Otto K Becker Company in Huntington, West Virginia. In Germany, the introduction of the fabrication of components for prostheses, allowed the company to succeed quickly and reliably treating the numerous victims who had returned home from World War I.

"Shortly after the First World War ended, OWW released the "Sterling Stump Socket," a wool sock worn by the patient prior to donning their wooden socket, leading to one of the earliest standards within the prosthetic industry."

About the Author



Joshua B. Utay, CPO

Joshua Utay is an orthotist-prosthetist who started his career by attending UT Southwestern's P&O Program in Dallas in the late 1990's. His early clinical career consisted of pediatric and adult O&P practice with experience in both institutional and private settings. Josh credits professional mentorship and familial support for his appreciation of the educational processes and the enormous potential education can unlock.

Armed with a master's degree in education, he became a fulltime O&P educator in 2012 as a founding faculty member of the O&P Program at Baylor College of Medicine in Houston. Over the next decade, Josh was inspired by the transformation repeatedly witnessed as students became graduates, graduates became certified, and young professionals became motivational leaders. Further exploration of the learning process led to a Doctor of Education in 2022 with special emphasis on training clinicians and health science experts to become effective educators, as well as capable clinicians.

Josh has a specific interest in exploring and preserving all aspects of the history and culture of our field, as well as stories of the extraordinary people who dedicate their energies to defining it today. He may be reached at jutay@ncope.org



Between the world wars, ALMBA's members began to view themselves as clinicians and professionals caring for patients rather than as craftspeople and blacksmiths hammering on leather and stitching metal. The rehabilitation of people with disabilities was becoming their priority.

World War II

During World War II, Ohio Willow Wood augmented its manufacturing with government defense contracts to make parts for the Navy's PT Boats and the Army's B-17 Bombers. This was not the first time that OWW diversified its portfolio. During the Great Depression, the company started manufacturing and selling wooden polo mallets and balls. This diversification succeeded in allowing the company to survive, even after a factory fire destroyed the entire plant during that time.

Throughout WWII and the era that followed, O&P practitioners and policy makers realized a need for more O&P research. During these years, membership of the association now known as AOPA expanded and assumed more duties. It also changed its name to the Orthopedic Appliance and Limb Manufacturers Association (OALMA) and established a national office in Washington, D.C., to work more effectively with the federal government. In 1945, the National Research Council (NRC) convened a meeting on the Northwestern University campus. The meeting was held in response to the need for better artificial limbs for war veterans, and 80 physicians, prosthetists, engineers, administrators, and physical therapists were in attendance.

Post-World War II

After the war, the field saw developments in both materials as well as company and professional organizational growth. In 1946, Polyester resins catalyzed by peroxide became commercially available; this product was used to fabricate everyday items, such as in manufacturing of boats and buildings, and became adapted to use in the fabrication of prosthetic sockets. The American Board for Certification was founded in September 1948 as the "American Board for Certification of the Orthotic and Prosthetic Appliance Industry." It was founded by O&P practitioners and AOPA members Chester C. Haddan, CPO, J. Blaine Korrady, Lee J. Fawver, CPO and David E. Stolpe, CPO.

"ABC's primary goal, then as now, is to establish minimum standards for practitioners' education and experience levels and to test clinical knowledge of members entering the profession."

The first certification exam took place in New York City three years later, where 51 individuals attained their certification.

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Milestones (continued)

The 1950s saw Becker Orthopedic develop a complete line of knee, hip, and ankle joints. In 1952, John and Edwin Arbogast of OWW developed a shin-knee unit, the first semi-finished above-knee prosthesis that incorporated interchangeable parts, a milestone in the prosthetic industry. The field started to see the development of education programs across the country, including VA-funded prosthetics education programs at the University of California (Los Angeles) in 1952, and at New York University in 1956. The Northwestern University Prosthetics Research Laboratory (NUPRL) was also established in 1956 by Clinton Compere, MD, chairman of the Northwestern University's Department of Orthopedic Surgery. NUPRL was at times called the Prosthetics Research Center and the Rehabilitation Engineering Research Program; two years later, Hildegard Myers, RN, RPT; Robert Thompson, MD; and Colin McLaurin, ScD, established the Northwestern University Prosthetics-Orthotics Center (NUPOC), the third prosthetics education program to be established in the United States. However, it was not until the 1960s that orthotic education program began. H. Blair Hanger, CP, was recruited and served as the Director of Prosthetics Education at NUPOC until 1977. While education programs were established across the country, 1958 was also the foundation of the first OttoBock foreign subsidiary in Minneapolis by Dr. Max Näder.

1960s: Many technological advancements occurred during the 60s. In 1961, Ohio Willow Wood's SACH foot (Solid Ankle, Cushion Heel) was the first manufactured in the U.S. Ottobock introduced its first myoelectric ULP components to market in 1965 and three years later patented the endoskeletal inverted pyramidal alignment, also known as their modular system. OttoBock was not the only group working on myoelectric control at this time. In 1968, Dudley Childress, PhD and John N. Billock, CPO/L, developed the Northwestern myoelectric system, the first commercial, North American, self-suspended and self-contained myoelectric system with proportional control, allowing the user to control the speed of fingers and rate of change of grip force.

1970s: While focusing on materials and technology, it is important to note that the 1970s saw some significant growth regarding O&P education. The first Education Summit for the field took place in 1970, in Ponte Vedra. The American Academy of Orthotists and Prosthetists (The Academy) was founded in November 1970 to expand the scientific and educational attainments of professional practitioners in the disciplines of orthotics and prosthetics. The leadership of the AOPA and ABC agreed that an organization focused on continuing education was needed.

"In the early 1970s, a guideline for the O&P education coursework essentials, universal orthotic-prosthetic terminology, and new occupational titles and job descriptions were developed "

Shortly thereafter, AOPA established the Business Procedures and Liaison Committee. In 1972, ABC created two committees, the Educational Accreditation Commission (EAC), to develop O&P programs with colleges and universities and the Continuing Education Policy Committee, to establish continuing education requirements for all ABC certified practitioners, phasing these education requirements in over the next decade.

In 1970, Boston Brace was founded by M.E. "Bill" Miller. Five years later, along with Dr. John Hall, the Chief of Clinical Orthopedics at Boston Children's Hospital, Miller designed and patented the Boston Brace System for the non-operative treatment of scoliosis.

1980s: In addition to the growth of O&P schools, academic requirements, and professional organizations, the 80s saw innovative milestones too. 1984 saw the creation of the Carbon Copy II Foot by OWW. Marketed as the "first conventional, lightweight, energy-storing prosthetic foot" incorporating carbon composites, it represented a notable innovation in the industry.

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Milestones (continued)

Following this, in 1986, the Academy of Orthotics and Prosthetics (The Academy) published its inaugural patient-oriented Care & Use Guides, focusing on plastic ankle foot orthoses and below-knee amputee care. The year 1989 saw pivotal developments as The Academy collaborated with the U.S. Department of Veterans Affairs to co-sponsor a consensus conference on emerging CAD/CAM technology.

“This technology has become integral in O&P practice over the last 40 years, by both clinicians and manufacturers. “

This collaboration also facilitated the establishment of new academic and clinical standards, referred to as "essentials," for students enrolled in Orthotics and Prosthetics (O&P) schools. Consequently, this change led to a significant restructuring of O&P education accreditation processes, laying the groundwork for the National Commission on Orthotic and Prosthetic Education (NCOPE) in 1991. Concurrently, the formation of the Amputee Coalition of America (ACA, now known as the Amputee Coalition) emerged, serving as a prominent advocate for prosthetic consumers, particularly in legislative and research realms.

1900s: In 1990, a series of significant developments unfolded within the orthotic and prosthetic landscape. The ABC's Facility Accreditation Program underwent a major overhaul, featuring new standards and the implementation of mandatory onsite surveys, reflecting a commitment to enhanced quality assurance of each facility. At the same time, two national legislative advocacy efforts bore fruit as O&P secured separation from durable medical equipment (DME) for reimbursement purposes, and HR 3839 was passed, with increased funding for O&P schools. Additionally, The Academy assumed a pivotal role as a sponsoring member of the Commission on Accreditation of Rehabilitation Facilities (CARF).

“This move culminated in the historic appointment of an O&P practitioner to the CARF Board of Trustees, amplifying the profession's representation in accrediting bodies. “

Simultaneously, Jim Tierney founded Spinal Technology, a venture poised to make significant contributions to orthotic advancements, as Spinal Technology is still used by clinicians today for patients.

Transitioning into 1992, pivotal changes reshaped the landscape of O&P education and global engagement. The ABC relinquished its oversight of primary O&P education, passing the torch to the newly established National Commission on Orthotic and Prosthetic Education (NCOPE), a pivotal transition that streamlined accreditation processes. The Academy, in collaboration with the ABC and AOPA, orchestrated the World Congress of the International Society for Prosthetics and Orthotics (ISPO) in Chicago, an event of global significance that facilitated cross-cultural dialogue and knowledge dissemination. Additionally, the inaugural legislative conference convened to enlighten members on pertinent O&P legislative concerns and lobbying endeavors, amplifying advocacy efforts on behalf of the profession. The inception of AAOP Professional Membership Societies marked a significant milestone, delineating specialties within the field and fostering professional development.

See Milestones, page 14

Milestones *(continued)*

The year 1995 heralded advancements in certification requirements and professional development opportunities. The ABC mandated the NCOPE residencies for orthotist and/or prosthetist certification, elevating standards for professional practice. The Academy unveiled Certificate Programs for Professional Development and introduced the prestigious Fellow of The Academy designation (FAAOP), underscoring a commitment to ongoing education and recognition of excellence. In 1996, technological innovation and digital presence took center stage. The Academy launched its website, ushering in a new era of digital engagement and knowledge dissemination. OWW introduced Alpha Liners, a groundbreaking fabric-covered, prefabricated gel interface system, setting new benchmarks for comfort and functionality in prosthetic design. Alpha liners have since expanded, allowing for choices of different gels, profiles/thicknesses, outer cover materials, as well as custom liner options. 1997 witnessed the availability of Ottobock C-Legs in European markets, signaling advancements in prosthetic technology. Subsequently, in 1998, The Academy celebrated a significant milestone with the induction of its inaugural class of Academy Fellows, a cohort of esteemed professionals recognized for their contributions to the field.

The year 1999 marked a pivotal moment in accreditation history as

“... the NCOPE transitioned into an incorporated accreditation agency, asserting its independence from sister O&P organizations, a move aimed at fortifying accreditation processes and standards.”

Furthermore, Ottobock C-Legs made their debut in the US market, extending groundbreaking prosthetic advancements to American consumers. These milestones collectively underscored a period of dynamic evolution and innovation within the orthotic and prosthetic profession, shaping its trajectory into the future.

2000s: Just like years prior, 2002 marked notable innovations and advocacy efforts for the field. OWW introduced the groundbreaking T-Ring Shape Capture Tool, with the OMEGA Tracer CAD system, enabling the swift capture of three-dimensional contours in mere fractions of a second through scanning technology. Additionally, the Consensus Conference on the Treatment of Idiopathic Scoliosis convened, fostering collaborative discussions and advancements in scoliosis management. Also in 2002, Georgia Institute of Technology's master's level O&P program was established, laying the groundwork for elevated academic standards within the profession. Recognizing the need for continued education beyond the classroom, in 2005, The Academy introduced the Paul E. Leimkuehler Online Learning Center. This dynamic educational platform, funded by generous donations, facilitated continuous professional development for practitioners. The debut of The Academy TODAY magazine enriched communication and knowledge sharing within the O&P community. Also important to note, in 2005, Ossur had its official global launch of its Rheo knee, further expanding the options for microprocessor knees on the market.

2010s to today: Osseointegration, 3D printing, scanning become widespread. Significant advancements in the field have occurred within the last 15 years, both from a professional and technological standpoint. In 2011, Ottobock introduced the Genium MPK, a breakthrough in prosthetic technology that revolutionized mobility and functionality for amputees, taking the C-leg “one step further.” Fast forward to September 2015, The Academy unveiled a new evidence note titled “Differences in Myoelectric and Body-powered Upper-limb Prostheses;” contributing to informed decision-making in clinical practice. Also, with the support of the ABC, the NCOPE revised the orthotic and prosthetic education standards. This transition in 2015 increased the required minimum education level for the profession to a master’s degree in both Orthotics and Prosthetics.

In 2017, Boston Brace launched the Boston Brace 3D[®], featuring an enhanced brace design crafted using CAD/CAM technology, exemplifying a marriage between traditional orthotic principles and cutting-edge manufacturing techniques.

See Milestones, page 15

Milestones (continued)

The following year, Ottobock introduced the C-Brace, further expanding the repertoire of advanced orthotic solutions available to individuals with mobility impairments. Meanwhile, the ABC streamlined its practitioner written exam, consolidating coverage for both orthotics and prosthetics, reflecting a commitment to comprehensive professional standards.

The onset of the global pandemic in 2020 presented unprecedented challenges for the O&P field, catalyzing a rapid shift towards virtual learning and telemedicine solutions. Professional organizations and educational institutions adapted swiftly, with The Academy hosting its inaugural virtual Annual Meeting, Experience AAOP 2021, exemplifying resilience and adaptability in the face of adversity. In 2021, the ABC launched the *WhatisPOP* Career Awareness Initiative, aimed at raising awareness and promoting career opportunities within the orthotic and prosthetic profession. Meanwhile, on September 30, 2022, the Orthotic and Prosthetic Education and Research Foundation (OPERF) merged with the Center for Orthotic and Prosthetic Learning (COPL) to form The Orthotic and Prosthetic Foundation for Education and Research (The Foundation). This merger heralded a new era of collaboration and resource consolidation, poised to expand access to awards, scholarships, fellowships, and prizes, fostering excellence and innovation within the field.

Reflecting on this journey of progress and innovation, it is evident that the orthotic and prosthetic profession has undergone transformative growth, driven by technological advancements and a commitment to evidence-based practice. As we look towards the future, we anticipate further evolution and change, fueled by the ongoing pursuit of excellence and the relentless quest to enhance the lives of individuals with limb differences.

The following online resources were helpful in assembling the content for this article.

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[ABC](#)

[ABC Article of History](#)

[AOPA](#)

[Becker](#)

[Boston](#)

[ISPO](#)

[Minnesota Artificial Limb Co.](#)

[NCOPE](#)

[NIH/NLM Resources](#)

[NUPOC](#)

[O&P Virtual Library](#)

[Ottobock](#)

[OWW](#)

[Plastics Historical Society](#)

[PMT](#)

[Spinal Tech](#)

[UT Southwestern O&P Program](#)

[UW O&P](#)

[Veteran's Resources](#)

About the Author



**Erin Casey,
Board Eligible
Prosthetist/Orthotist**

Erin Casey, MS is a board eligible orthotist/prosthetist originally from New Jersey. She currently works as a board eligible clinician at the Paley Institute in West Palm Beach, FL and is a 2023 graduate of the Baylor College of Medicine Orthotics and Prosthetics Program and. Over 18 months, she completed residency rotations in Florida, Virginia, New Jersey/Pennsylvania, and Texas. Erin graduated from the University of Pittsburgh in 2020 with a Bachelor of Science degree in Rehabilitation Science and a certificate in Assistive Technology. At the 2024 Academy annual meeting, she gave a poster presentation of her master's thesis research in patient education in Orthotics and Prosthetics and hopes to continue research in this area in the future.

<https://www.linkedin.com/in/erin-casey143>



Larry Lange Travel Fellowship

- Erin Casey, Board Eligible Prosthetist/Orthotist

Being awarded the Larry Lange Travel fellowship in 2023 was an honor that enabled me to fulfill long-held professional goals. I used the funds for a service trip to Guatemala to volunteer with the Range of Motion Project (ROMP). The award also funded my participation at the 2024 Meeting of the American Academy of Orthotists and Prosthetists to present my master's thesis research.

As an undergraduate student, I had a goal to study abroad and serve others under a different healthcare system. Part of the requirements needed to graduate was completing courses on culturally competent care and I was eager to apply what I learned to clinical practice. My initial plan was to study abroad in Ireland for comparative healthcare studies with my Rehabilitation Science cohort in May 2020. Those hopes were dashed by the start of the COVID-19 pandemic. During graduate school, a second opportunity to complete a residency rotation in Germany ended up falling through as well. I began to fear that I would never have the opportunity to learn by working in another country, but I continued to believe my determination would pay off. During my residency rotations,

“...I identified opportunities where I could give back by providing support to different causes.”

The Range of Motion Project (ROMP) was a prominent program I had known about for years, and it became my final opportunity to participate in a learning experience abroad before full time employment. The Larry Lange Travel Fellowship enabled me to achieve this dream of using my skill set and contributing to a cause helping others.

This February, I spent 10 days in Guatemala with the incredible ROMP staff and volunteers from Mary Free Bed Rehab Hospital, and volunteers from Colorado, Wisconsin, Michigan, and South Africa. We had such a great team, and I was able to make so many personal and professional connections! Personally, I fit and delivered two transfemoral prostheses and one transtibial prosthesis with the help of the ROMP and Mary Free Bed clinicians. Among our volunteers, we made a total of 25 legs for Guatemalan patients who previously lacked access to care.

The first patient I saw traveled several hours to our clinic via chicken bus (old school buses painted and embellished to transport passengers and anything they bring with them, including live animals). After receiving his prosthesis, my first patient said, “May God bless you many times over.”

“This thank you statement was so touching after such a rewarding experience, reaffirming that our work has such an impact.”

On two patient cases, I worked with Laura, a representative from Ottobock, who is a transfemoral amputee herself. While Laura is familiar with using a prosthesis, she had never observed the fabrication process from start to finish.

See Fellowship, page 17

Fellowship (Continued)

While I cast and evaluated the patient, Laura and Katy, a CPO with Mary Free Bed, led the fabrication to deliver a leg for a first-time user. It was amazing to collaborate with the two of them on this project. Laura commented: "ROMP was one of the most fulfilling experiences I have ever had. I met such talented practitioners and lab technicians who are so dedicated to helping patients however they can. Seeing the immediate impact we had on patients was amazing and emotional. We were able to serve the most deserving and gracious patients. It is obvious what an impact this program will have on their lives. Truly life changing!"

There was a special experience that we were able to share with one patient who was so grateful for his new leg. He was the funniest patient we had all week, constantly joking and saluting our PT when she told him to stand upright "like a soldier." During gait training, he would exclaim "¡Recto!" every other step to remember to stand up straight and look ahead. He was an absolute delight to work with and was so grateful to finally receive a prosthetic leg after being an amputee for three years. It was incredible working with the ROMP staff and clinicians while experiencing the beautiful country of Guatemala.

The ROMP staff and clinicians were so knowledgeable and welcoming. Over the course of 10 days, the ROMP staff shared parts of their culture, sharing different dishes native to Guatemala; teaching an impromptu Spanish slang lesson with a game of *lotería*; and initiating a frenzied clinic-wide chase throwing *cascarones* (hollowed eggshells filled with confetti) at each other. It was great working with this entire team! A special shout-out to Jonathan Naber for translating my lengthy clinic notes, and to Mama Ken who made sure we were taken care of and that our hotel room's hot water got fixed! At the end of the week, we toured Guatemala City and Antigua visiting museums and cultural sites, which made the experience even more enriching. It was an unforgettable experience that, without the generosity of the scholarship donors, would not have been possible.

The remainder of the funding was used to present my master's thesis research in Chicago at the 2024 Academy Meeting. Although I have given poster presentations previously, this was my first time presenting in front of practicing healthcare professionals. It was nerve-racking yet exciting to share knowledge on a topic about which I am so passionate. The project was entitled "Patient Education in Healthcare: Exploring Strategies for Effective Comprehension, Recall, and Compliance."

While practitioners can create different devices for patients, the devices are only effective if our patients are aware of how to use and care for them properly.

"It was a great feeling presenting the culmination of 18 months of work and having so many people interested in the results of the project."

Next, my research mentor and I hope to have the research published in the *Journal of Prosthetics and Orthotics* while continuing future studies in patient education. Another goal of mine is to continue to complete research in orthotic and prosthetic patient education methodology. Continuing research into orthotics and prosthetic patient education may have broad implications for the field. I am excited to see what future research reveals.

I want to thank my research mentor, Jeremy Sherman MS, CPO, LPO, for his support and guidance throughout my research project as well as Ashley Mullen, PhD, MSAT, CPO for writing letters of recommendation for this award. Neither of these experiences would have been possible without the Larry Lange Fellowship. Thank you again to the NCOPE and the selection committee!

Quotes heard from some of our patients:

"I can finally get back to life!"

"My wife doesn't have to cook and do everything anymore."

"This is the best day of my life!"

"I am crying tears of happiness and not sadness, finally."

Limb Difference and Limb Loss Awareness Month

- Stacey Brown, CPO and Adrienne Hill, MHA, CPO(L)

About the Author



Stacey Brown, CPO

Stacey Brown is an Atlanta native who is currently a board-eligible CPO working in Athens, Georgia. Stacey received her Master's in Prosthetics and Orthotics from Northwestern University in Chicago, Illinois. Stacey is an active member of the Collaborative on Inclusive Action and Engagement Committee for the AAOP. She also serves on the NCOPE Diversity, Equity, and Inclusion Committee, and the Member Services committee for the AOPA.

Stacey's primary goal is to promote diversity within the O&P profession through student outreach where she aspires to generate change through advocacy.



We spend our lives dedicated to helping other people. For many of us, our drive to help others is what makes us get up in the morning. As a person with a congenital limb difference, I did not know that the cost of helping others would also include my body. Back pain, shoulder pain, elbow pain, "Oh my, oh my." There are days when I push my body past the point of exhaustion, just to be able to say that I have accomplished providing the care that was needed for my patients.

I grew up in a household where I was not allowed to acknowledge or accept a disability or a need for support caused by my disability. Getting accommodation meant that you were weak. This environment created a fear of being labeled as someone with a weakness. I did not receive any accommodation in school until I was a junior in high school. This lack of accommodation led to internalized ableism. Internalized ableism is when a disabled person discriminates against herself and other disabled people by holding the view that disability is something to be ashamed of, or to hide, or to refuse accessibility or support. I continue to struggle with this feeling, on a subconscious level, because I believe that my body is inconvenient and not okay when compared to others.

Realizing that I was deserving of accommodation was step one. Accommodation for disabled people refers to any modification or adjustment that enables a person with a disability to access a job, a work environment, or a service. I had no idea of the number of barriers to be faced to receive an accommodation with the first barrier being the lack of accommodation in many, many places. Do not get me started on describing the amount of paperwork required. The initial process of receiving accommodation can be both daunting and discouraging. Other barriers can be that the workplace is not physically accessible or suited to physical change. Accommodation may create a fear of prejudice and discrimination leading to a lack of disclosure among employees with disabilities.

According to data from the UK Great Big Workplace Adjustment Survey (2023), 78% of disabled employees had to figure out the accommodation process on their own rather than have their managers initiate the process. As a graduate student applying for residency, I was overwhelmed by the interview process. I thought that as a black woman with a disability, the odds of acceptance into a residency program were against me. As soon as I disclosed my disability, the next follow-up question was "So what things did you try or do?" I perceived that there was a responsibility, as the person with the disability, to figure out my accommodation. I was frustrated because, as a healthcare provider, I focus my career on empowering patients, but then wonder why employers do not seem to be empowering employees.

The first time I experienced ableism in Orthotics and Prosthetics was while I was job shadowing. I had a clinician tell me "Maybe you shouldn't go into this profession because your arms cannot extend." As I progressed through the residency and now as a board eligible CPO, I have been questioned for needing help during hospital calls. When asking for help, at times, I have been ignored or told "Oh that is easy to do" like I could not understand or complete the procedure.

See Awareness, page 19

Awareness (Continued)

About the Author



Adrienne Hill, MHA, CPO (L)

Adrienne Hill is a great proponent for the future of Orthotics & Prosthetics.

Adrienne earned her master's degree in health administration at the George Washington University School of Public Health; and received a B.S. in Physics and Mathematics at Spelman College. Adrienne became certified in 2007 as a Prosthetist Orthotist after completing post-baccalaureate courses at Newington Certificate Program through the University of Connecticut. Adrienne is a veteran clinician most recently serving as the Area Clinic Manager at Hanger Clinic in Atlanta Georgia. She is now teaching and shaping the minds of the next generation of O&P

professionals as a Clinical Assistant Professor at Kennesaw State University. During her 15-year career tenure, she has had the opportunity to experience different aspects of Prosthetics and Orthotics through clinical care, patient advocacy, and mentorship. Adrienne has been promoting this field for the last 10 years through community and educational outreach, and Hanger's diversity and inclusion affinity group, PAUSE (People Aligned United to Serve Everyone), and her social media initiative P.O.P.P.E.D. (Promoting Orthotics and Prosthetics Positively Every Day).

P.O.P.P.E.D was born from an idea to inform and educate people who have never heard of the prosthetics and orthotics field. For the last 5 years, she has been educating K-12 students both in and outside of the classroom. Through social media, P.O.P.P.E.D has made the profession more accessible to students, professionals, and the others within the community as she met with students, professionals, and the community where they are.



According to the US Bureau of Labor and Statistics, 7.9% of persons with a disability are employed within the healthcare field in 2023. Even though we are small in number, we are still here. Yet, for many of us, there has been a lack of acknowledgment of our existence as well as our need for accommodation.

As we celebrate those who are a part of the amazing Limb Difference and Limb Loss Community, we must celebrate them for more than their strength. For a while, I attributed my worth as equal to or based upon my ability to suffer. My ability to suffer is what made me worthy to a company and what made me worthy to society. We must create inclusive environments for all of our employees within Orthotics and Prosthetics. As I have become a more mature person, I have learned how to listen to my body. I have learned that it is okay to take off a day from work. On some days, I feel like my body cannot meet the expectations of this profession. Instead of accommodating my body to the demands of my work, maybe my work needs to accommodate to the needs of my body.

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Calling all Students and Residents— Gain National Recognition and Advance Your Career

Enter to win one of two prestigious awards— the Student Resident Poster Award honors two meritorious scientific papers submitted for presentation as a poster at the AOPA National Assembly.

The American Orthotic and Prosthetic Association (AOPA) invites Students and Residents to present orthotic and/or prosthetic research findings or a case study via a poster presentation at the [2024 National Assembly to be held September 12-15 in Charlotte.](#)

Poster presentations should be a graphical display in a poster format using photographs, diagrams, flowcharts and graphs and any sample educational materials. Your confirmation will include a link to templates and tools to help you create and ship your poster.

1. The Otto and Lucille Becker Award will be presented for the best orthotic abstract submitted for a poster presentation.
2. The Edwin and Kathryn Arbogast Award will be presented for the best prosthetic abstract submitted for a poster presentation.

Winners receive a cash prize of \$500, plus hotel and airfare to the 2024 National Assembly. The submission deadline is July 15, 2024. For further information, contact (571) 431-0860 or Assembly@AOPAnet.org.

Submit at <https://bit.ly/4bma3bH>

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The University of Washington's Department of Rehabilitation Medicine, Division of Prosthetics & Orthotics, invites faculty candidates to apply for a full- or part-time faculty for the following positions, based in Seattle, Washington:

Assistant Professor WOT

Assistant Professor, without tenure due to source of funding (which is typical of ranked faculty appointments within the department). The base salary range for this position will be \$8,694 – \$10,228 per month (\$104,328 – \$122,736 annually), commensurate with experience and qualifications, or as mandated by a U.S. Department of Labor prevailing wage determination. Anticipated start date is Summer 2024, but other dates may be considered. View details and apply at www.apply.interfolio.com/120659

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The UW Department of Rehabilitation Medicine is committed to continually building an inclusive culture; has a strong commitment to diversity, equity, and inclusion; and believes that diversity fosters excellence. Seattle is one of the most scenic and livable cities in the United States.

For questions about these positions, please contact Dr Stefania Fatone (Program Director): sfaton@uw.edu or 260-685-7918

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