



Noteworthy

Building Community from a Distance

- Léa Richer MSOP, CPO and Nicholas Charon, MSPO, CP

“As aspiring practitioners in the field of Orthotics and Prosthetics (O&P), O&P residents face unique challenges that can best be addressed through collective efforts. ”

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The Power of Representation

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

“When I wanted to enter the profession of prosthetics and orthotics, I remember looking at pictures of students in graduate school programs and not seeing someone who looked like me. ”

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Quickly Implementing Newly Learned Adjustment Hand Skills

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- Sydney Ezell, CPO and Chris Robinson MS, MBA, CPO, ATC, FAAOP (D)

“The development of an orthotic/prosthetic professional requires a combination of knowledge and skills that are developed both in the classroom and real-world patient care settings. ”

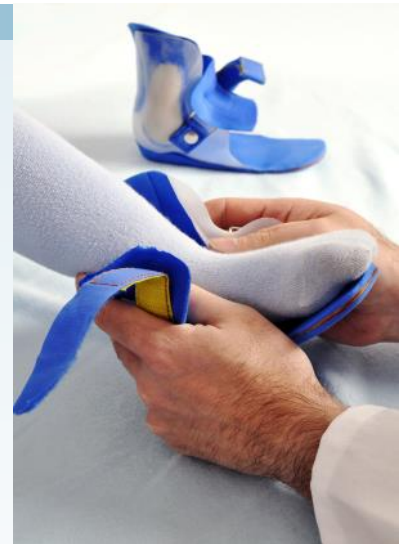
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The Historical Background of O&P Education

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

“The field of orthotics and prosthetics has completely transformed over the past few hundred years ”

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Building Community from a Distance

- Léa Richer, MSOP, CPO and Nicholas Charon, MSPO, CP
- With assistance from Kirsten George, MSPO, CPO and Marion Gibney, MSPO, CPO

As aspiring practitioners in the field of Orthotics and Prosthetics (O&P), O&P residents face unique challenges that can best be addressed through collective efforts.

“Building a strong community among O&P residents is paramount in fostering an environment of collaboration, support, and professional growth. “

By cultivating a sense of camaraderie and mutual understanding, O&P residents can share knowledge, exchange experiences, and develop essential skills that go beyond formal education. This interconnected community provides a platform for residents

About the Author



Léa Richer, MSOP, CPO

Léa graduated from Concordia University St Paul, and the Century College Program in 2020. She completed both residencies at the VA Portland Health Care System in Portland Oregon in 2020-2022. In August 2022, Léa began working at the Edward Hines Jr VA Hospital in Hines, Illinois. At the annual meeting of the AAOP in February 2023, Léa presented results from a national research study focusing on mental health and prosthetics.



to navigate the complexities of patient care, technological advancements, and industry developments together, ultimately shaping them into well-rounded practitioners. Following is a reflection from two former Lead Residents from the Veterans Administration’s (VA) National Residency Program. This article-describes the myriad of benefits that the existence of a strong community among O&P residents provides, and the efforts that the VA residency program has put in place to-foster this sense of community.

The Lead Residents found that building a strong community within any professional setting yields numerous benefits. In the realm of O&P, fostering a sense of community among residents brings about improved patient care outcomes as those providing care collaborate and share information. Connecting O&P residents to each other, and/or to other clinicians (both in and out of O&P), creates a greater opportunity for collective problem-solving, leading to enhanced orthotic and prosthetic interventions. Networking within a community practice opens doors to collaboration, knowledge exchanges, and career growth, enabling future clinicians to broaden their horizons and stay updated with the latest advancements in O&P.

Building a resident community not only impacts patient care, but it also cultivates a sense of belonging, which can reduce feelings of isolation, promote mental well-being, and play a pivotal role in the prevention of burnout.

Support systems foster camaraderie and residents find emotional support within these groups.

Through shared experiences, coping mechanisms, and mutual support, residents are afforded an outlet providing solace, recharge, and resilience. By mitigating burnout and fostering positive resident experiences, residents leave residency prepared with tools and networks to support future careers. These tools and networks influence the greater field of O&P by improving clinician retention and improving the quality of care provided to patients.

Each year, the VA's O&P residency program selects a resident in his or her second year of residency to serve as Lead Resident.

“The Lead Resident’s job is to function as a facilitator between residents and leadership, to answer resident questions, and to lead monthly educational meetings for all VA O&P residents.

Community (continued)

The Lead Resident position was created during the COVID-19 pandemic in 2020 to connect the O&P residents dispersed across the United States, as many are the only O&P resident in a specific hospital. The Lead Resident uses various strategies to foster a sense of community among VA residents, regardless of location. Monthly virtual meetings serve as the primary platform for collaboration and knowledge sharing. Guest speakers from various O&P and related organizations are invited to these meetings, providing an opportunity for residents to engage in focused discussions, exchange insights, and enhance understanding of O&P practices from multiple perspectives. These meetings also serve as a forum to discuss challenges residents experience with fabrication, patient care, work in a hospital and clinical setting, human resources, mentor interactions and relationships, and/or to ask for advice on specific cases. Optional virtual study groups are held once a month and offer residents an opportunity to engage in collaborative learning, sharing knowledge, exchanging insights, and reinforcing their understanding of board exam material. Through active participation in these study groups, residents can clarify doubts, discuss challenging concepts, and gain new insights. The study groups further enhance exam preparation, leading them to professional certification. For many residents, this is also a time to discuss frustrations, fears, and troubles experienced with the exam process.

In-person networking opportunities further strengthen the community by fostering personal connections and solidarity among residents while reinforcing the network beyond typical virtual interactions. Within the VA's O&P residency program, the main example is the VA Breakout Session, conducted the day before the Annual Meeting & Scientific Symposium of the American Academy of Orthotists and Prosthetists (AAOP) begins.

About the Author



**Nicholas Charon,
MSPO, CP**

Nicholas graduated from the University of Pittsburgh Program in 2021 and completed both residencies at the Edward Hines Jr VA Hospital in 2021-2023. Nicholas began and continues his professional career working at the Danville VA Medical Center in Danville, Illinois.

One of the requirements of a VA residency is to complete a research project on an O&P topic chosen by the resident. The VA Breakout Session, at the AAOP meeting, provides an opportunity for residents to present their research as a presentation or in a poster format. This in-person event provides residents with the opportunity to meet colleagues face-to-face, communicating in a virtual setting. By integrating virtual meetings, study groups, and in-person social opportunities, O&P residents in the VA can cultivate a thriving community that promotes learning, collaboration, and mutual support. Many of the connections built during residency extend far beyond the residency program creating community and friendships among junior clinicians as they begin their post-residency careers.

Building a community among O&P residents from across the nation comes with a unique set of challenges .

Technological difficulties can impede effective communication and collaboration, hindering the establishment of virtual connections and the seamless organization of online meetings. Some of the difficulties that have impeded the last two cohorts of residents were the lack of access to cameras, not being willing to turn on the camera, and the lack of a work environment quiet enough to participate in a meeting.

Scheduling conflicts often arise due to the demanding nature of clinical care responsibilities, accommodating four time zones. Even with beginning-of-the-year surveys, it is difficult to find suitable times for monthly meetings that accommodate the availability of all residents and staff. Moreover, striking a balance between the time allocated to clinical care responsibilities and the commitment required for monthly meetings and/or study groups is challenging. Residents must manage their workload effectively to ensure patient care remains a priority while actively participating in these community-building efforts and activities.

Community (continued)

Once learned, this skill will benefit them in later aspects of their careers. Overcoming these challenges necessitates effective communication, flexibility, and a shared commitment from all residents (and their individual leadership) to create a supportive community. Buying into the concept of community building is not needed from the residents and national leadership; it is essential and needed among local residency mentors and directors.

In 2020, Kirsten George, CPO, was selected to be the first Lead Resident. Kirsten shared that initially the Lead Resident's role was to see how other residents were coping with the pandemic and the changes it forced and/or mandated. There was some thought about bringing uniformity to the program, and Kirsten thought, "I can do that." Though her role was focused on helping the residents, she found the experience to be a year of personal growth for herself as well.

"To help others is to help yourself."

Kirsten reflected on how the year helped her deepen connections with other residents and pass on critical information and experiences from one resident group to the next. Today, as a CPO, she expressed that this experience was instrumental to her success as a clinician in the private sector. She gained new perspective surrounding interdisciplinary care, communicating clearly within care teams, and writing up justifications as a clinician.

As Lead Resident the following year, Léa experienced many of the same reactions as Kirsten. As the second Lead Resident, questions from residents were more detailed and nuanced as cumulative resident knowledge increased. Collaborating with a cohort of second-year residents, whose only work experience occurred during the COVID-19 pandemic, Léa faced both the pressure and the freedom to curate lectures that were engaging, interesting, enticing so that residents would attend and participate. With the ever-changing landscape of the pandemic, traveling for exams became even more stressful. The study group became a place not just to prepare residents for exams, but also to help them navigate pandemic travel restrictions. For Léa, this experience led to the creation of national connections across the VA for both residents and clinical staff while securing friendships with residents, both personally and professionally. This opportunity also allowed Léa to transfer to another VA for employment when her residency was over.

Nick was selected to be Lead Resident in 2022 after completing his first VA O&P residency in 2021. During his time as Lead Resident, he continued to build upon the foundation created by Kirsten and Léa. Nick had limited prior experience in a leadership role such as this and learned lessons on effective decision-making and communication. Nick gained confidence as a leader and found his voice in group discussions. Now, as a new VA clinician, Nick plans to use the skills gained during his Lead Resident tenure by employing these leadership skills in a way that benefits all of the nation's Veterans.

"Residency can be an isolating and stressful experience, regardless of the clinical setting (or pandemic status)."

Establishing community with colleagues living a similar experience is something the VA worked to establish through the O&P residency programs. Former Lead Residents have learned that creating a resident community, regardless of the distance separating residents, has helped each resident become a more engaged clinician. O&P resident communities foster solidarity helping residents develop clinical thinking, improve problem solving, expand resources/knowledge base, and mitigate the stresses associated when entering a career in healthcare.

The Power of Representation

- Adrienne Hill, MHA, CPO (L) Clinical Assistant Professor Kennesaw State University Kennesaw, Georgia and Stacey Brown, CPO Board Eligible Hanger Clinic Athens, Georgia

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.



Representation has the power to make you feel seen.

Stacey: When I wanted to enter the profession of prosthetics and orthotics, I remember looking at pictures of students in graduate school programs and not seeing someone who looks like me. I remember shadowing at clinics or going to events surrounding O&P and being the only African American in the room. It felt very isolating and discouraging. I constantly questioned if I belonged. Then I met Adrienne Hill, a brilliant African American woman working in prosthetics and orthotics. Adrienne was the representation that I so desperately needed to see.

Upon meeting Adrienne, she noticed my disability. I was born with my arms being unable to extend all the way. She immediately began giving tips and tricks on how to accommodate myself when working with a patient. In this moment, I not only felt seen as a Black woman, but as a Black woman with a disability.

“If I had a quarter for every time someone told me that they did not notice my arms, I would be rich.”

As an adult, I have never tried to hide my disability, but at the same time, I recognize that people choose what they wish to see. The world sees each person as strong and that is how we are supposed to be. I appreciated Adrienne for creating a safe space, where I could ask for help. A safe space where I could be vulnerable.

Representation has the power to improve patient care.

Adrienne: As a clinician, I have had a major impact on the lives of my patients and their families. African Americans are four times more likely to undergo an amputation (1). These staggering statistics require a healthcare team that prioritizes a patient's best interest. Minority populations have endured medical mistrust, racism, and bias that has impacted overall healthcare.

By being in the exam room, I was able to provide an experience based on cultural competency. I could relate to the struggles that a patient may have around dietary restrictions and access to healthy foods. Patients felt comfortable sharing that they were displeased with the aesthetics of their prosthesis. An example of this is the lack of variety amongst the resin coupled with the misconception that certain skin tones are specific to ethnicities.

“Through my professional encounters, if students are shadowing me or I am teaching them, I am imparting my knowledge based on my experiences as a minority.”

This accounting ranges from identifying redness on darker skin to understanding the morals of African American patients.

Representation has the power to heal.

Stacey: I completed my residency in Elmira, NY, a small town where the percentage of African Americans is 12.1% (2). Living and working there was a cultural shock, especially after living in Atlanta where you see yourself everywhere. During residency, I experienced several traumatic situations regarding my race and gender, but at that time, did not perceive these experiences as traumatic. According to the National Center for PTSD, racial trauma is defined as the emotional impact of stress related to racism, such as stereotypes, microaggressions, or systemic barriers. People can experience racial trauma when it happens to them directly or by seeing it happen to others (3).

See Representation, page 6

Representation (Continued)

After these experiences, I did not feel safe while at work. I felt anxious and was always on edge ready for the next thing to happen. I could have taken a mental health day but a part of me felt like I had to push through and continue. I was grateful to have a community of Black women who had experienced similar actions. These women reassured me that my feelings about the experience were valid and encouraged me to prioritize my safety. Those shared experiences were extremely important, without having to over-explain or educate. Having a supportive community, while I navigated these experiences, gave me permission to heal.

Representation has the power to create a more inclusive environment.

Stacey: Being a minority in a professional space, taught how to repress my voice and creative expression in the name of professionalism. From an early age, we are taught how to code switch. This means that you must work ten times harder, or that your hair needs to look a certain way to be considered for opportunities. Only during my time in graduate school did I find the power in my voice. Creating a space that allows people to safely share ideas and experiences leads to a more inclusive environment. This openness allows for change beyond diversity, equity, and inclusion.

“Inclusive environments provide opportunities for mentorship among the underrepresented while cultivating new opportunities” (4)

About the Author



**Stacey Brown, CPO Board
Eligible Hanger Clinic
Athens, Georgia**

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.



Representation empowers the next generation.

Adrienne: Being the granddaughter of a bilateral transfemoral amputee and the daughter of a unilateral transtibial amputee, Exposed to the field of orthotics and prosthetics early in life. However, the practitioners whom my father and grandfather worked with did not look like me. My grandfather's prosthetist allowed me to shadow him in the lab and it was so fascinating. This one gesture opened my eyes to a career that I have grown to love and cherish. Because of the grace and opportunity that this practitioner showed, I acknowledged the importance of exposure and the importance of creating opportunities for future clinicians and practitioners.

I have had an amazing female array of mentors from my residency. Preceptors to colleagues who have shown how to navigate the healthcare field, when only one was also African American. Over the last 15 years, I have had several students shadow me. It has been an honor to invest in the next generation of clinicians. I am honored to be among one of the first African Americans to pave the path for the clinicians who will follow me. Being one of the first, gives me purpose.

“Mentoring is a relationship, in that, just as much as I am teaching, I am also learning.”

By educating future clinicians, I am decidedly grateful to serve as a representative for students beginning their journey into the profession of Orthotics and Prosthetics.

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Quickly Implementing Newly Learned Adjustment Hand Skills

- Spencer Leckrone, CPO

As the field transitioned from requiring certificates to master's degrees, more newcomers pursued higher education immediately after receiving undergraduate degrees. As someone who spent undergraduate studying engineering prior to transitioning into graduate school, I had zero infield exposure. I realized quickly that I needed to learn hand skills I had never performed in my life. My first experiences gluing, heating/cooling plastics, and skiving was in graduate school. However, I did not start to hone my skills until a real-world patient was counting on me for treatment.

About the Author



Spencer Leckrone, CPO

Spencer became interested in medicine at an early age wanting to be a pediatrician. But, he was also interested in Legos and building learning how machines worked and devices fit together... especially the human body.

While Spencer was introduced to engineering during high school and was fascinated with prosthetic limbs and devices, he did not become aware of the field of orthotics and prosthetics until late in his undergraduate studies. Spencer graduated from The Ohio State University with a bachelor's degree in Biomedical Engineering in 2016. He received a master's degree in 2018 from the Northwestern University of Prosthetics-Orthotics Center.

Spencer is employed at the Shirley Ryan Ability Lab in the Chicago/Glenview areas and focuses his interests and abilities on pediatric gait.



“It took multiple mistakes and failures to master the essential hand skills that are crucial to be an effective practitioner.”

To begin, mentors repeatedly told me, “Less glue is more” and “two or three thin layers is better than one thick layer.” When I first started out, I was too concerned with making sure every square millimeter of the piece of foam or plastic was visibly covered with glue. Knowing that someone was waiting on me was an additional stressor, so often I would not wait for the glue to-become completely dry. Prior to feeling like I had enough coverage, I found myself dipping my brush into glue repeatedly, trying to rush the drying process instead of being patient. This action resulted in pads slipping and coming off with patient use. Having a patient come-back to the office because I used too much glue was embarrassing. But alas, these failures are the best fuel by which to learn.

I soon developed a strategy. First, when gluing a small area like an arch pad in an AFO or a transtibial wing, I dipped the brush into the glue and wiped off one side of the brush completely on the inside of the jar. The reverse side of the brush has all the glue needed for use on that pad. To ensure that not too much glue gets collected on the pad, I use the glue-less side of my brush for strokes. The glue on the other side will lightly go onto the surface, allowing me to control how much glue I am putting on the area. If no glue comes out, I will dap the glue-covered side into a bare area, applying only as much glue as needed. Gauging how much glue to apply to the glue-holding side of the brush came with time, and at times, I will not use all the glue on the brush.

Because foam is porous and has high friction, glue does not spread as easily on it. Thus, foam requires more glue when compared to plastic or carbon fiber. To dry the glue, I use a heat gun on cool or simply wave the pad in the air to speed up the process. I know the glue is completely dry when there is a sparkle and zero signs of wetness. I have learned that it is better to wait a few minutes until the glue is completely dry, rather than rushing to put a wet pad on a wet orthosis/prosthesis and having to start over because the pad slipped.

“Less is more and patience is the key.”

When it comes to heating and flaring plastic, more is more, yet patience is still key. Once again, it took mistakes early on to develop effective strategies for heating and flaring plastics.

See Implementing, page 8

Implementing (continued)

When in residency, I recall being apprehensive about heating an AFO or test socket too much because I was afraid of melting the orthosis/ prosthesis. This resulted in multiple trips to patient rooms without changing dimensions. It also resulted in feelings of frustration, with myself and among my patients, which is not good behavior when trying to build confidence. There was a period in residency when I heated material too much to avoid running in and out of patient rooms without effecting the dimensions of the orthosis/prosthesis. This action resulted in sloppy, warped trim lines, and burnt test sockets. I found that, similar to gluing, it takes the right amount of heat and time to get a material in a sweet spot for an effective adjustment.

A thicker material, like a 1/2" Vivak test socket, is going to require higher heat and more time to move than a 1/8" co-poly UCBL. I discovered that heating the side opposite to the side I want to push had positive results. For example,

“Heating the outside of an AFO when pushing out a malleolus resulted in cleaner adjustments. “

Though heating both sides requires less time, it often results in warping of the inner plastic which then requires buffing and grinding and wastes the time saved.

Strategies I developed when heating and flaring materials involved learning how to read plastics and gauge elasticity during the process. There are visual changes that occur when heating plastics. Plastic begins to shine as it becomes malleable, which is when a test of elasticity, with hands, anvil, or side of a table is warranted. It is important to heat not only the area that needs to be pushed out, but also the surrounding material so that the desired area can move more freely, and the adjustment is easier. When plastic is heated, the molecules are energized and moveable. The opposite is true when plastic is cooled. Heating a material and pushing it slightly passed its desired dimension, cooling it with an air hose or with breath, is the most effective way ensure a positive change in dimension. When the material is completely cooled, the shine will disappear. Plastic that is too hot can be cooled prior/during manipulation but a material that is not heated enough will not move.

Lastly, as CPOs, we provide physical devices to people to help them achieve their goals. The patients wear what we provide, and it is our duty to ensure that the devices are comfortable. But we never truly know how a particular test socket or AFO feels for the patient. When patients require padding for offloading and comfort, we do our best to gauge how firm/soft a material ought to be, and which shape is best. One of the only custom devices we may use ourselves are custom FOs.

“My advice to new clinicians is to use FOs to experiment on yourself. “

Take various materials and thicknesses and skive shapes and use them as arch pads. In residency, I recall using ¼" arch pads on patients for maximum control. Only after I made myself an arch pad of this thickness did I realize it was too much for the average pes planus patient. Experimenting on myself helped me learn how much of an edge to skive. When the goal is to provide comfort, it is helpful for new clinicians to physically evaluate and feel which materials and shapes are actually comfortable.

As clinicians responsible for the wellbeing of our patients, it is our duty to carefully develop strategies to help those (patients) counting on us. Effective hand skills are the cornerstone of great clinicians. Use residency to experiment with methods for gluing, heating, and skiving that work for you. Embrace a mindset that you are never finished learning and be open to trying new processes and techniques. Your career will be long, and effective hand skills will ensure that it is fulfilling

About the Author



Sydney Ezell, CPO

Sydney is a Certified Prosthetist Orthotist at Prescott's Bionic in San Antonio, Texas. She attended the University of Wyoming earning a Bachelor's of Science degree in Kinesiology and Health Promotion with a minor in African American and Diaspora Studies. Sydney earned her Master's in Orthotics and Prosthetics degree from Eastern Michigan University. Following completion of her studies, Sydney completed both her prosthetic and orthotic residencies at the University of Wisconsin Hospital and Clinics. She currently serves on two NCOPE committees: one as a Regional Residency Liaison and the other as a member of the DEI Committee. Sydney also volunteers with the ABC as an Ambassador and for standard setting for certification exams. In her free time, Sydney enjoys exploring new places around Texas with family and friends.



Failing Forward: Learning in Real-World Clinical Settings

- Sydney Ezell, CPO and Chris Robinson, MS, MBA, CPO, ATC, FAAOP(D)

The development of an orthotic/prosthetic professional requires a combination of knowledge and skills that are developed both in the classroom and real-world patient care settings. While all orthotic and prosthetic master's programs provide students with foundational knowledge and the ability to develop clinical skills in a controlled environment, there are many lessons that are best learned in a real-world patient care setting. To not only grow as a clinician, but succeed long-term, novice clinicians need to develop a sound understanding of the individual needs of each patient, be willing to experiment with treatment options when "textbook" solutions do not exist, be persistent about achieving the goals agreed upon with the patient and remember to make the most of every learning opportunity.

At the conclusion of an orthotic and prosthetic education program, students will have completed all of the courses, passed numerous quizzes, and even developed foundational clinical skills working with patients with conditions such as limb loss or stroke. Often fittings in orthotic & prosthetic schools occur in a controlled environment with each fitting intended to teach a specific orthosis, socket design, or component application. A concept often best learned during residency is that while you will benefit from the lessons taught during school, it is essential to recognize that each patient is unique, and the care provided is not intended to simply convey a specific clinically relevant concept. Furthermore, the unique needs of each patient will often require deviation from a "tried and true recipe" taught in school to provide the patient with his/her desired outcome.

During the initial phase of the residency, young clinicians soon realize that not every patient with a specific pathology or presentation can be treated in the same way.

"Personalized care concepts are essential to the provision of the best possible care."

However, the knowledge needed to develop a personalized treatment plan cannot be evaluated using a multiple-choice question or by fitting a defined prosthesis/orthosis regardless of the model demonstrators' personal preferences and goals. Even with the added experience of offering personalized care to numerous patients during the residency, there will be circumstances where there is no clear "best" treatment plan. Thus, forcing the clinician to leverage the scientific method and experiment with different treatment options until the patient and clinician agree with the care plan.

A real-world example of how deviating from the traditional approach taught during school is not going to achieve the best treatment goal occurred while working with a unique prosthetic alignment. A patient who had been battling MS for some time required a wheelchair for mobility. Due to complications, the patient was recommended to undergo an amputation about which she was reluctant. The resident and clinical mentor saw the patient for pre-amputation counseling. After six months, the patient came to terms and elected to undergo an amputation based on the suggestions of the prosthetic clinician and the physician care team members. This procedure would provide the best opportunity to regain some level of mobility without the use of a wheelchair. Prior to having the amputation, the patient's foot, knee, and hip were severely internally rotated. The resident set up the patient's check socket in the "tried and true" bench alignment learned during school.

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About the Author



Chris Robinson, MS, MBA, CPO, ATC, FAAOP(D)
Chris serves as the full-time clinical resource director for the National Commission on Orthotic & Prosthetic Education (NCOPE), providing oversight on projects and initiatives to O&P academic and residency programs throughout the United States. Chris is an experienced educator, clinician, and researcher holding a part-time faculty appointment at Northwestern University. In this position, Chris contributes to the orthotist/prosthetist program in addition to resident physician, physician assistant, and physical therapy education programs. His professional interests include the integration of clinically relevant outcome measures, orthotic management of upper motor neuron conditions, informatics, and clinical mentor training. Chris has served as an author for multiple textbooks, peer-reviewed articles, and educational resources. Chris resides in the Western suburbs of Chicago with his wife and two children.



“When the patient stood, the alignment looked horribly inappropriate with the prosthetic foot nowhere near a normal toe-out.”

After numerous alignment changes (some of which made the alignment worse), the prosthetic team achieved a dynamic alignment that was fabricated specifically for this patient. Since the final alignment was atypical of what a dynamic alignment would resemble, the technicians responsible for transferring the test socket to a definitive socket made multiple calls about the alignment to ensure that it was correct. Upon receipt of the finished socket, even the prosthetists were astonished that such an atypical alignment was needed to achieve the most effective gait pattern. The appearance of the finished prosthesis was a stark contrast to the typical definitive sockets being delivered but it was essential to achieve the best possible function for this individual patient. A positive clinical outcome was only possible by being willing to experiment aided by the persistence of both the patient and the care team members.

Persistence is essential. While the resident can achieve effective clinical outcomes by recognizing each patient’s individual needs, there will likely be times where the outcome is anything but positive, despite the best intentions of the clinical team. It is important that the resident recognizes that failure is an important learning opportunity even when it requires the care team to develop a completely new plan. Odds are that your patients appreciate your honesty and sincere desire to achieve a better outcome by taking a completely new approach versus acceptance of the initial sub-optimal outcome.

Clinicians need to recognize that an ineffective prosthesis or orthosis will often sit and collect dust in the patient’s closet, which is never a desirable outcome. Patients should be encouraged to return to the clinic as soon as they have issues with the device, which may occur even with the best possible fitting. The knowledge a developing clinician recognizes when a prosthesis/orthosis does not work as intended and the needed subsequent adjustments or replacements are not a reflection on them, but an aspect of care that even seasoned clinicians must accept.

Working through challenges and celebrating positive outcomes are both essential behaviors in making the most of an orthotic/prosthetic residency experience.”

While the duration of an orthotic/prosthetic residency may seem like “a long time” when a resident registers to start with the NCOPE, many residents find that the time simply flies by. The often-busy nature of orthotic and prosthetic patient care can sometimes make it difficult to think “outside the box” when a patient’s unique needs warrant it. While a mindset of lifelong learning is something we hope all orthotic and prosthetic professionals strive for, remember that orthotic and prosthetic residency is the second half of a practitioner’s education and learning. Opportunities for increased learning will be present in countless places, including failures.

The evolution of evidence/technology and numerous care options available to our patients demands that each member of the clinical team constantly learn and develop patient care knowledge and skills. This is sometimes best done by simply trying something different..... “outside the box.” Although the hectic pace of residency can be stressful, the resident that elects to “fail forward” is taking advantage of the many learning opportunities presented. Residents have even been known to have fun, which often happens if the resident recognizes that valuable learning opportunities can occur in many ways, even when an alleged failure transpires.

The Historical Background of O&P Education

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

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.



The field of orthotics and prosthetics has completely transformed over the past few hundred years. "The first orthotists-prosthetists were craftsmen: artisans who plied their trades as armorers, blacksmiths, carpenters, cabinetmakers, cobblers, harness makers, locksmiths, and the like," as called upon (Holmes et al. 1991, p. 2). The earliest records of artisans referring to themselves as full-time orthotists-prosthetists were associated with monastery-run hospitals of medieval Europe, the earliest in Bologna, established in 1113 CE (Holmes et al., 1991). Over seven centuries would pass before such a profession was known and established in the U.S.

By the mid-19th century, many successes were emerging in surgical techniques as antiseptic and aseptic protocols led to greater survivability of surgical procedures. As a result, the American Civil War produced many more amputees than were previously known to survive combat (Fliegel & Fuehr, 1966). Before the Civil War in the United States, orthotists and prosthetists trained in an apprenticeship alongside physicians to assist in applying splints and fitting artificial limbs to the wounded (Holmes et al., 1991). However, after the war, orthopedic surgeons shifted their focus toward surgery, rather than bracing. This change in practice prompted "brace makers" to establish "brace shops" in or near hospitals to continue to provide services supporting the patients under the care of surgeons.

"During this time, artificial limb facilities were separate from the brace shops."

Those needing prosthetic services, such as Union and Confederate veterans with amputation who were unable to return to previous work, often went to work for an existing "limb" provider or opened their own facility to fabricate and sell improved versions of prosthetic limbs to the public.

Post- Civil-War Reconstruction-era and the decades that followed witnessed literal armies of amputees demanding that prosthetic limbs be more comfortable, functional, durable, and lifelike. Advances made in that time enabled fledgling career prosthetists to hone the craft of making fully-custom prosthetic limbs from an array of raw materials, including wood, leather, cork, rubber, and wool, using any novel approaches that could apply from their own craft or innovation. As late as the 1940s, orthotists and prosthetists were self-trained, rising to proficiency through personal persistence and the expectations of referring physicians and/or patients (Holmes et al., 1991).

Prior to the mid-20th century, informal apprenticeships guided newcomers into this line of work through hands-on learning.

"Entry-level technicians first learned how to fabricate and maintain custom devices for individual users in the workshop."

The technicians could then advance to the assistant level, where they learned to design and fit such devices under supervision. Many technicians eventually learned how to practice independently.

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About the Author



JOSHUA 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 full time 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

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Following World War II, the U.S. and its Western allies funded “massive amounts of research and development in O&P” for the first time (Conn, 2007, p. 13). This resulted in widespread innovation, advancement, and global dissemination of techniques and materials and marked the beginning of the modern era of O&P. Experts who documented their best protocols could disseminate their works more widely than ever through publications and multi-national conferences.

“One of the single greatest advancements to reach local prosthetists was the arrival of prefabricated prosthetic feet by the late 1940s,

available in standard shoe sizes from manufacturers’ catalogs (J. B. Holmes, personal communication, October 1998). It became possible to keep prosthetic feet in stock so that a replacement foot could be fitted with the simple removal and reapplication of a single ankle bolt affixing the foot to the prosthesis.

In 1945, the National Academy of Sciences National Research Council launched a cooperative research and development program at the request of the military and in response to the polio epidemic. In addition to the increased demand for orthotic services as a result of the polio epidemic, persons with amputation who were veterans of the Second World War were vigorously protesting the quality of prostheses they were provided (Peizer, 1958, and Hovorka, Shurr & Bozik, 2002). The findings from these research and development programs influenced P&O education with the introduction of new componentry for the devices (e.g., hydraulic prosthetic knee unit), and a clearer understanding of mechanical principles and biomechanical concepts needed to design orthoses and prostheses (Committee on Artificial Limbs, 1947). To address this need, researchers partnered with prosthetists to fit experimental, transfemoral suction sockets while studying socket configuration, fitting, and alignment. The findings led to a new understanding of the fundamental principles and new methods of fitting and suspension for transfemoral prostheses. Fitting and control principles of upper-limb prostheses were also developed and improved because of these collaborations (e.g., fair-lead and myoelectric control principles) (Peizer, 1958, and Childress, 1985).

The administrator of Veterans Affairs was encouraged to make the findings and techniques of the proposed program widely available to benefit all disabled persons, not just those receiving care within the VA System (Wilson, 1970). This led to the start of formal O&P education. Approximately 40 “suction-socket schools” were presented by the University of California and held in cities all over the country between 1948 and 1952 to share the knowledge and techniques acquired as a result of the research (Furman, 1962). In addition to these offerings, the Veterans Administration (VA) financially supported the organizing of the Prosthetics Education Program at the University of California at Los Angeles (UCLA). Once an individual attended all of the foundational courses for either orthotic or prosthetic practices, a certificate was awarded by the program in that single discipline.

The learner was then eligible to sit for exams proctored by the American Board for Certification in Orthotics and Prosthetics (or ABC), established in 1948.

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“The first certifying exam series was held in 1951 in New York City (Conn, 2007).”

On that occasion, 51 clinicians became certified, doubling the number of those certified in the U.S. at the time.

The earliest published education standards for entry into the P&O profession were the Apprenticeship Standards for Prosthetists and Orthotists approved by the Federal Bureau of Apprenticeship in 1952. These standards, or Schedule of Work Processes, included both academic courses and on-the-job training (Hanger, 1953). The Advisory Committee on Educational Standards, a subcommittee of ABC, selected the academic courses (Hanger, 1953). Members of the Orthopedic Appliance and Limb Manufacturers Association (OALMA), known today as the American Orthotic & Prosthetic Association (AOPA), defined the requirements for on-the-job training. Clinics were encouraged to train apprentices, recommending that one half to two thirds of existing clinical facilities should host an apprentice. It was portrayed as, “a necessary cost of doing business to train apprentices, just as necessary as paying rent” (Hanger, 1953).

Beginning in 1953, the clinicians and researchers at UCLA established interdisciplinary short courses on upper-limb prosthetic control and fitting principles. These short courses proved so successful that the VA sponsored the establishment of a similar education program at New York University (NYU) in 1956.

Subsequently, the Vocational Rehabilitation Administration funded another prosthetics program at Northwestern University in 1959 (Wilson, 1970). The short courses held at these institutions led to the continuous translation of research findings into the practice setting. In addition, as researchers and educators gained a deeper understanding of mechanical principles, new components and techniques emerged, leading to the development of additional courses at all three schools (Wilson, 1970). It is important to note the funding sources of these endeavors, as funding became a challenge in later years.

“In the 1960s, orthotic research and orthotic short courses were typically separate from prosthetic research and education (Furman, 1962).”

However, educators recognized that many of the mechanical principles learned between 1945 and 1958 applied to both orthotics and prosthetics practices (Kay & Peizer, 1958). Although instructors at UCLA and NYU envisioned the development of a 4-year course leading to a Bachelor of Science degree in both prosthetics and orthotics, the minimum education requirement to take the American Board for Certification (ABC) practitioner examination remained at a high school degree plus apprenticeship, as it had been since its inception in 1948. This was the standard until 1973 when ABC raised the minimum requirement to an associate degree (ABC, 2022, and Storrs, et al., 1965).

The 1960s also was witness to a host of technological developments, including shock-absorbing foam-rubber used to line orthotic devices under the leather to improve comfort and durability, as well as prosthetic feet that would operate more smoothly than their predecessors. Hydraulic cylinders from the aerospace and automobile industries were successfully adapted to modulate prosthetic knee motion for a more fluid and lifelike gait. Lucille Becker, who took over Becker Orthopedic in 1960 following the death of her husband Otto, designed and marketed the paradigm-shifting “double-action ankle joints” and drop-locks for orthotic knee joints. The first battery-powered prosthetic elbow, dubbed the “Boston Elbow,” was developed in a lab at the Massachusetts Institute of Technology (MIT) in the early 1960s (Conn, 2007). Iterations of these innovations, and many more from this period, remain commercially available today.

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These were some of the many examples that inspired orthotists and prosthetists to value greater intellectual heft and recognition for the profession and its members. The leadership of the ABC and AOPA “agreed that there was a need for an organization focused on continuing education” (Academy History – oandp.org, The Formative Years paragraph). The American Academy of Orthotists and Prosthetists (AAOP, or the Academy) “was founded in November 1970 to expand the scientific and educational attainments of professional practitioners in the disciplines of orthotics and prosthetics” (Academy History – oandp.org, The Formative Years paragraph).

By the mid-1970s, the short courses had been combined into single, semester-long programs specializing in either orthotic or prosthetic practices. The educational standard of training required to sit for ABC exams had been raised to an associate degree obtained either before, after, or as part of O&P training, and documented engagement as a technician and/or O&P assistant was a prerequisite to enroll. Still, the trade remained undeniably blue-collar, with its emphasis on machining components and sculpting materials for custom patient interfaces.

“In 1986, after a decade-long transition period, the minimum standard to sit for ABC exams was elevated to a bachelor’s degree.”

Several educational programs offered training in both orthotics and prosthetics as part of a Bachelor of Science in O&P, while other schools continued the semester-long, single-discipline training with a bachelor's degree now required to enroll. Both programs resulted in a certificate commensurate with the orthotic, prosthetic, or dual curriculum. Graduates were then required to log 1,900 hours per discipline under appropriate supervision to qualify for the ABC exam in the related discipline(s).

As evidence influencing the application of clinical techniques grew, the depth of knowledge and experience reflected in the certification exams necessitated greater preparation than was found at the baccalaureate level. A post-graduate curriculum with additional structure superimposed atop the first year of employment following graduation replaced the previous 1,900-hour requirement and was hereafter referred to as a clinical residency. When enough training sites became available in the mid-1990s, completion of a residency became a requirement for all graduates.

In 2002, Georgia Institute of Technology (Atlanta, GA) enrolled the first cohort in a first-of-its-kind, entry-level master’s degree program focused on O&P and included a significant research requirement. In 2005, leaders from the National Commission on Orthotic and Prosthetic Education (NCOPE), AAOP, and elsewhere across the profession convened an educational summit to examine “entry-level degree requirements and educational philosophy” (NCOPE, 2006, p. 3). Broad consensus determined a master’s degree was “deemed necessary for the delivery of quality patient care due to the dynamic base of knowledge and rapidly emerging processes and technologies in the O&P field” (NCOPE, 2006, p. 3). The following year, NCOPE assembled a strategic planning meeting to pave the way for all entry-level practitioner programs to transition to the master’s level. The last cohort to receive a single-discipline certificate with a bachelor's degree did so in 2011, thereby completing the transition to graduate-level, dual-discipline training for every trainee entering O&P.

Concurrently, larger practices were granted authority to host a dual residency whereby a resident could complete clinical training in both disciplines across 18 months instead of two, 12-month, focused experiences. Most master’s-level graduates apply for their residency upon graduation, much like applying for a job, and some well-known host sites become competitive among rising graduates.

“The incorporation of the 18-month dual residency into the master’s-degree curriculum was completed when the first cohort at Baylor College of Medicine’s Orthotics and Prosthetics Program graduated in December 2015.”

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For the first time, a single program could oversee clinical training and shepherd students from classroom to exam preparation immediately following graduation without an intervening period (i.e., clinical residency training independent of didactic schooling) where the Program was not directly responsible to the student or the accreditation agency. This training arrangement more closely resembles that of other healthcare professions which have long incorporated clinical training into the degree, such as physicians, physical and occupational therapists, physician assistants, pharmacists, and nurse practitioners.

Today, there are 14 O&P masters programs across the country, and hundreds of residency programs at various institutions and private practices. As healthcare in the country continues to evolve, O&P education will also evolve to ensure that the orthotics and prosthetic needs across the country are met.

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