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Inside This Issue

Editor-In-Chief

Ruthie Dearing, MHSA, JD

rdearing@ncope.org

Advancements in 3D Printing for Orthotics and Prosthetics: Methods and Materials

Introduction

The use of 3D printing in orthotics and prosthetics (O&P) has grown exponentially in recent years, revolutionizing patient care and device customization. This technology allows for rapid prototyping, enhanced design flexibility, and cost-effective production of medical devices. By integrating innovative materials and advanced manufacturing methods, clinicians and researchers are improving patient outcomes and expanding the capabilities of assistive devices.

This article explores the key methods and materials employed in 3D printing for orthotics and prosthetics, highlighting their benefits, challenges, and future potential in clinical applications.

Methods of 3D Printing in Orthotics and Prosthetics

1. Fused Deposition Modeling (FDM)

FDM is one of the most widely used 3D printing techniques in O&P due to its affordability and accessibility. The process involves melting thermoplastic filament and extruding it layer by layer to form a three-dimensional object.

Advantages of FDM in O&P

Cost-Effectiveness: FDM printers are relatively inexpensive, making them accessible for clinics and research facilities.

Material Availability: A variety of thermoplastics, including polylactic acid (PLA), Polyethylene terephthalate glycol (PETG). Polypropylene (PP), and thermoplastic polyurethane (TPU), are some of the materials compatible with FDM printing.

Easy Customization: The method allows for personalized orthoses and prostheses quickly tailored to individual patient needs. FDM is particularly helpful in a prototype or diagnostic phase in which the specific shape of the design is workout and trial fit. Because FDM printers are reasonably easy to own and operate, these printers can be commonplace in-house fabrication facilities. When the design's morphology is confirmed, the device can be refabricated utilizing printers which are off-site into definitive devices.

Challenges

Layer Adhesion Issues: FDM parts may have weak interlayer bonding, affecting the durability of printed devices.

Surface Finish: The final product often requires post-processing to achieve a smooth surface.

2. Stereolithography (SLA) and Digital Light Processing (DLP)

SLA and DLP use photopolymerization to create detailed and precise 3D-printed structures. SLA employs a laser to cure liquid resin layer by layer, while DLP uses a digital projector to solidify entire layers at once.

See 3D Printing, page 2

3D Printing, cont'd

Advantages of SLA/DLP in O&P

High Accuracy: Produces smooth, precise components suitable for intricate prosthetic designs and molds.

Wide Range Material Properties: Provides the broadest range of mechanical properties found in the commonly used 3D printing methods.

Challenges

Material Limitations: Resins can be brittle and may require reinforcement for weight-bearing applications.

Post-Processing: Requires washing and UV curing to finalize the printed object.

3. Selective Laser Sintering (SLS)

SLS involves using a high-powered laser to fuse powdered materials into a solid structure. This method is commonly used for producing durable and lightweight prosthetic components.

Advantages of SLS in O&P

Strong, Lightweight Parts: Ideal for prosthetic sockets and high-stress applications.

No Support Structures Needed: The powder itself acts as support, reducing material waste.

Complex Geometries: Enables the fabrication of intricate lattice structures for improved comfort and airflow.

Challenges

High Cost: SLS printers and materials are expensive, limiting accessibility.

Material Selection: Primarily relies on nylon-based polymers, restricting the range of available materials.

4. Multi Jet Fusion (MJF)

(MJF) is an advanced powder-bed fusion technique that uses a combination of fusing and detailing agents to produce high-strength parts with excellent surface quality.

Advantages of MJF in O&P

Durability: Produces parts with strong mechanical properties which are similar to SLS prints.

Efficiency: Faster print times than traditional sintering methods.

Isotropic: MJF prints exhibit near-isotropic mechanical properties, meaning they have consistent strength and durability across all directions, unlike FDM prints, which tend to be weaker along layer lines.

Challenges

Material Costs: Although more efficient, MJF materials remain expensive.

Limited Material Choices: Primarily limited to polyamide-based powders but there have been some recent advances in TPU materials.

5. Direct Metal Laser Sintering (DMLS) and Electron Beam Melting (EBM)

These metal 3D printing methods can be used for fabricating strong, lightweight components, such as prosthetic joints and high-load-bearing structures.

Advantages of DMLS/EBM in O&P

Superior Strength: Enables the production of durable, weight-bearing prostheses.

Custom Metal Components: Allows for patient-specific high strength devices.

Challenges

Extremely High Costs: Metal 3D printing is among the most expensive methods.

Complex Post-Processing: Parts often require heat treatment and machining for optimal performance.

See 3D Printing, page 3

3D Printing, cont'd

Materials Used in 3D-Printed Orthotics and Prosthetics

The selection of materials in 3D printing significantly impacts the functionality, durability, and comfort of orthotic and prosthetic devices.

1. Thermoplastics

Polylactic Acid (PLA)

Advantages: Affordable, biodegradable, and easy to print.

Limitations: Brittle and unsuitable for weight-bearing applications.

Acrylonitrile Butadiene Styrene (ABS)

Advantages: Stronger and more impact-resistant than PLA.

Limitations: Warping issues and the need for a heated print bed.

Polyethylene Terephthalate Glycol (PETG)

Advantages: Improved flexibility and chemical resistance compared to PLA and ABS.

Limitations: Slightly lower print precision..

Thermoplastic Polyurethane (TPU)

Advantages: High elasticity, ideal for flexible orthoses..

Limitations: Requires specialized print settings for optimal results.

2. Nylon and Composite Polymers

Nylon 12: Excellent strength, flexibility, and wear resistance, commonly used in SLS printing.

Carbon-Fiber-Reinforced Polymers: Offer high strength-to-weight ratios for prosthetic applications.

Glass-Filled Nylons: Improve stiffness for structural components..

3. Resins

Standard Resins: Used for aesthetic and non-load-bearing applications.

Flexible and Tough Resins: Provide improved durability for functional orthoses.

Biocompatible Resins: Safe for medical use, ideal for custom-fit devices.

4. Metals

Titanium Alloys: Lightweight, strong, and biocompatible, commonly used in prosthetic joints..

Stainless Steel: Provides cost-effective durability.

Cobalt-Chrome Alloys: Suitable for high-stress, long-term applications..

Clinical Applications of 3D Printing in O&P

1. Custom Orthotics

3D printing allows for the precise fabrication of insoles, braces, and splints tailored to individual patients. The technology ensures improved fit, comfort, and functional support.

2. Prosthetic Sockets

Custom prosthetic sockets are designed for enhanced comfort and weight distribution, reducing pressure points and improving user mobility.

See 3D Printing, page 4

3D Printing, cont'd

3. Pediatric and Low-Cost Prosthetics

3D printing has enabled the development of affordable prosthetic solutions for children, allowing for frequent size adjustments as they grow.

4. Hybrid and Modular Designs

Combining traditional materials with 3D-printed components allows for more adaptable and functional prostheses.

5. Bionic and Smart Prosthetics

Integration with sensors and electronic components has led to the development of advanced, AI-driven prostheses that enhance user control.

Challenges and Future Directions

Despite its advantages, 3D printing in O&P faces several challenges:.

Material Limitations: Further research is needed to develop stronger, biocompatible materials.

Regulatory Concerns: Ensuring patient safety and device reliability requires stringent validation processes..

Cost Barriers: High-end 3D printing technologies remain expensive for widespread adoption.

Training and Implementation: Clinicians and technicians require specialized training to optimize 3D printing workflows.

Future advancements in materials science, AI-driven design, and hybrid manufacturing techniques will further enhance the capabilities of 3D-printed orthotic and prosthetic devices.

Conclusion

3D printing has revolutionized the orthotics and prosthetics field by making digital designs easier to actualize in the real world. Practitioners have broadened the personalized, cost-effective, and efficient solutions offered to patients. As research and technology continue to evolve, the integration of advanced methods and materials will further enhance the quality, accessibility, and functionality of assistive devices. By overcoming current challenges and embracing innovation, the future of 3D-printed O&P devices holds immense promise in improving mobility and quality of life for individuals worldwide.

AUTHOR

Jeff Erenstone, CPO

As founder of Operation Namaste and owner of Mountain Orthotic and Prosthetic Services, Jeff has devoted years to improving prosthetic care around the world, especially in low-income countries and conflict zones. He is a well-known innovator of digital technology for prosthetic care: especially 3D printing.

Jeff is educated as a Certified Prosthetist and Orthotist and has three offices in Northern New York. He is a member of the Board of Directors for American Orthotic and Prosthetic Association and is the chair of the Digital O&P Committee and Socket Guidance Workgroup.

Jeff believes that the future of O&P care is a combination of traditional techniques and modern digital technology and has devoted his life to assisting with this merger.

The Highlights and Challenges of Lab Management Operations

In addition to being the lab manager for the past six years, I am also the maintenance and safety manager for Brownfield's Prosthetic & Orthotics practice in Meridian and Nampa, Idaho. I have learned a fair amount on the job through trial and errors which have pushed me to grow. I manage the lab with two technicians who work under my guidance.

Presently, we are an all-female technical team which has changed the dynamic in the lab from what it has been in the past. I was the first female technician to join the Brownfield's O&P practice and have paved the way to shed light on what a female technician can really do. Our facility has five CPOs which keep the lab remarkably busy. To manage the lab efficiently, a variety of organization and multitasking skills are needed and required.

Practicing LEAN processes is what we utilize to stay efficient in every aspect at our facility. The management staff meet weekly to discuss what is or is not working in each of our departments. This exchange of ideas and suggestions has allowed me to grow as a manager, focusing on what/how the future of the technical department will look like and how to implement recommended changes.

Brownfield's was founded in 1949 and over the years has made a significant impact on our community. I am proud to continue the legacy that Brownfield's has built within our community and service area. The O&P field in the Treasure Valley is competitive; and nothing makes me happier than receiving a review from a patient stating that "they prefer Brownfield's staff and fabrication work."

My technical staff is held to a high standard and pushed to pay attention to the intricate details on the devices we make. The quality checks I implemented hold my staff and the practitioners accountable to verify that each newly created device is correct in all facets. Two separate quality check sheets, one for orthotics and one for prosthetics, are in use. These check sheets make the technician evaluate and examine every part of the device from smooth edges, covered rivets, padding thickness, and if Loctite and torques were applied. This process helps to set Brownfield's apart from competitors, allowing us to refine our fabrication and processes to achieve the best possible outcomes for our patients. Our devices do not just pass the check of being "good enough;" every project/device needs to be created with pride to look the absolute best for our patients.

I know that there is always room for improvement, so I am constantly seeking ways to improve our fabrication techniques. One such way is to create lighter yet stronger laminations with materials that will not cause harm while keeping the sockets strong and durable. Materials such as NSP braid over carbon and Super Bond glue that is a little healthier than Barge are two of the changes we have made. Our technical team are constantly challenging each other with questions on why we fabricate a certain way causing us to-learn new techniques or think outside of the box for improvement.

One issue I have been able to work closely on with practitioners is designing our own adjustable sockets using the click medical Revo Dials. Some of these projects have been time-consuming to figure out but have given positive results for the patients. I am enthusiastic about the importance of continuing to learn by trial and error. I believe that keeping an open mindset and being able to learn from your mistakes will make you the best technician you can be.

As a manager, I want my technicians to be passionate about their work and fabrication skills, recognizing that this is a career and not just a job. Involving the technicians in the more difficult projects and having them see patients walk with their new device in our hallway reinforces the connection that we are not just working with plaster and plastic. As all of you know, technicians make a difference in the lives of our patients. Without us, the patient might not be able to walk. I have made an impact on many patients' lives who know me by name and are happy to hear that I continue to work at Brownfield's. Restoring independence and renewing the lives of our patients is why I choose to come to work every day at Brownfield's.

From a management perspective, I continually revisit processes that we have implemented and ask the question "how can we make this function more efficiently?" Sometimes I produce ideas and other times I turn to my team for their insights into what is or is not working. I ask the technicians what a pain point is and how can we improve this process?

See Lab Management, page 6

Lab Management, cont'd

By staying organized with procedures that I question, I can run an efficient lab, even when I am out of the office. We practice doing team huddles to set project goals for the day or week which helps us stay focused on getting projects out in a timely manner. Projects in our facility are organized by the first in first out method unless there is a high priority or hospital call project that comes in.

I have received feedback from my technical staff that they appreciate how empathetic and caring I am about their individual situations. As the manager, I have earned their respect, so they trust me with outcomes/choices for whatever is needed. This behavior applies with other staff members in our clinic that need to talk to a manager who listens and cares about what is happening within the company.

Conversely, you must look at your lab and your staff with a critical lens. If you do not, processes may become erratic and lazy allowing checks and balances to slip through the cracks. As the manager, you must remain subjective about every action or issue that occurs in the lab to make choices that can be critical in the success of the business. I always appreciate learning how other managers have solved staff member issues in the past employing techniques to resolve future problems that might arise.

When you must talk with a staff member about an issue or problem, it is best to remain unemotional and levelheaded. This is a key aspect of lab management that I have been working on the most to improve. I have reflected on the changes we have implemented in the past year and my outlook for the lab in the years to come. This action and behavior show that I perceive my lab management role seriously and is appreciated by upper management at Brownfield's. My goal is to continue to grow to become a better and stronger manager over time.

I hope that you, as a technician or a lab manager, find your passion and purpose in the work that you do in the orthotic and prosthetic field and challenge yourself to keep learning and growing every day.

AUTHOR

Shawna Ross, CTPO

Shawna Ross, CTPO is the lab manager at Brownfield's Prosthetics & Orthotics practice in Meridian, Idaho. She graduated from the Spokane Falls Community College O&P Technology Program in 2017 and became fully certified in both orthotics and prosthetics within 6 months of being hired at Brownfield's P&O.

Shawna was hired to be the second in command to help run the lab and has been with the practice for 8 years. In 2019, Shawna was promoted to lab manager and quickly accepted her new position and took it with stride. She works with an outstanding team of managers at Brownfields who are always supportive and ready to help when needed.

Outside of work, Shawna is a bit of a nerd, playing a lot of tabletop games and enjoying painting mini figures that are integrated into the games. Her absolute favorite activity outside of work is riding her Indian Scout Bobber motorcycle. She muses that it may seem strange to create prosthetic devices for those who have lost a limb in motorcycle accidents, but states that the motorcycle ride brings a very free feeling that she loves. "Life is all about perspective and it is too short to not enjoy the things you love because of the "what ifs" in this world."

Shawna is the proud mother of a 6-year-old and has now been a gestational surrogate twice for the same family. She notes that being pregnant in the lab setting really opened her eyes to question the chemicals and materials that are used. This began a quest to determine how to make the lab safer for herself and the other staff members ensuring that everyone in the lab is working in the healthiest environment possible.

The Role of Hand Skills in a Technologically Evolving Field

Introduction

As a young clinician, I have often found myself on the receiving end of comments from mentors about the apparent erosion of traditional hand skills—skills once considered foundational in prosthetics and orthotics. These remarks, shared throughout my time in the MSPO program, into residency, and now in clinical practice, often come with a dose of skepticism. Some mentors express concern that clinicians today overly rely on digital tools, and that this reliance has come at the expense of understanding the nuances and complexities inherent in older, more manual methods of fabrication.

To a degree, these critiques are understandable. There are certainly examples of newer fabrication methods, particularly from central fabrication facilities, which fall short of clinical expectations. In those cases, the clinician's dissatisfaction is justified. However, too often, these criticisms are based on narrow experiences or generalized assumptions that overlook a deeper and more significant issue: the profession's struggle to effectively integrate new technologies into clinical workflows without losing the essence of hands-on expertise and critical thinking.

The Growing Divide Between Technology and Clinical Practice

The field of prosthetics and orthotics is evolving rapidly. Innovative technologies, digital workflows, and centralized services have transformed how devices are designed and delivered. But amid this transformation, not enough attention has been paid to the *integration* of these tools in a way that supports—not replaces—clinical expertise.

This has led to an ongoing debate about the importance of hand skills versus the utility of new technologies. Traditionally, hand skills were considered essential to good clinical practice. They allowed a practitioner to provide timely care, make in-clinic modifications, and respond directly to a patient's changing condition. In many ways, they represented a clinician's autonomy and mastery of their craft.

Today, however, the widespread use of central fabrication and satellite offices—often with limited on-site fabrication capabilities—has reshaped that narrative. Clinicians increasingly find themselves removed from the physical creation of devices, instead acting as facilitators who prescribe and coordinate care rather than directly shaping the product.

Two Distinct Skill Sets: Hands-On Modification vs. Conceptual Design

In many conversations about declining hand skills, two distinct competencies are often blurred together, weakening the value of both. The first is a clinician's *ability to modify, repair, and adjust* prosthetic and orthotic devices—skills that are often categorized as manual or technical. The second is the *ability to conceptualize and communicate* a device's design effectively to those who will fabricate it.

Both are crucial to good patient care, but they serve different purposes:

- **Hand Skills:** These lower order skills include actions like skiving pads, adjusting trimlines, riveting straps, or re-aligning components. They are essential for quick turnarounds, emergency fixes, and ensuring optimal fit during final fittings.
- **Design and Communication Skills:** These higher order skills involve imagining a solution based on clinical evaluation, developing **a** design that meets patient goals, and clearly articulating that design to technicians or fabrication teams, whether through CAD files, measurements, or modified casts.

Historically, clinicians needed both skill sets. In small clinics where clinicians doubled as technicians, design intent and technical execution were tightly aligned. But as the field scaled and demands increased, this synergy began to dissolve.

See Hand Skills, page 8

Hand Skills, cont'd

The Shift: From Craftspeople to Facilitators

In previous decades, clinicians were more intimately involved in fabrication. Many learned to create devices from start to finish—casting, modifying, fabricating, fitting, and adjusting. This meant that design choices were directly influenced by hands-on understanding of materials, mechanics, and patient feedback. Communication between clinicians and technicians was not just encouraged; it was built into the very structure of the clinical environment.

Today, due to increasing caseloads, shrinking reimbursement rates, documentation burdens, and expanding administrative roles, clinicians are being pushed away from technical work. The professional landscape now encourages specialization and efficiency, often at the expense of tactile engagement. In many settings, the clinician's role has been reduced to evaluating patients, ordering devices, and conducting final fittings—delegating everything else to central fabrication.

This shift has undeniably improved scalability and, in some cases, consistency. But it has also introduced a dangerous disconnect between the person who envisions the device and the person who constructs it.

The Risks of Disconnection

As clinicians become further removed from fabrication, we begin to see breakdowns in communication. A digital scan or CAD file may carry basic geometric information, but it lacks the nuance that a skilled technician might infer from a clinician's in-person explanation or hands-on sketch. Design elements may be misunderstood, or fabrication constraints may not be communicated until it is too late.

In the absence of a shared language between clinician and technician, errors occur: devices arrive misaligned, poorly fitted, or lacking key features. When this happens, the root cause is often attributed to the clinician's lack of hand skills, but in truth, the problem is more complex. It stems from an evolving system that has not yet developed adequate methods to bridge the gap between traditional fabrication knowledge and new digital processes.

This is not just an issue of lost skills; it is an issue of lost collaboration.

The Value of Retaining Hand Skills

Despite the rise of digital tools, hand skills remain critical. The ability to quickly modify or repair a device in the clinic is a valuable tool—especially when patients cannot afford to wait for shipping and refabrication. A misplaced trimline, a broken strap, or a misaligned component can all be addressed on the spot—if the clinician has the necessary skills.

Hand skills also serve as an invaluable educational foundation. A clinician who understands how a device is fabricated—who has experienced socket lamination or attached a stirrup for a conventional AFO—will be better equipped to design those devices effectively. They can better anticipate fabrication limitations and know how their design decisions will translate into physical outcomes.

Even if these clinicians do not fabricate regularly, their fluency in the "language of making" improves their collaboration with technicians and leads to better-fitting, more functional devices.

Technology as a Tool—Not a Replacement

Digital tools are not the enemy of hand skills. In fact, they offer enormous potential when used alongside a strong foundation in clinical judgment and technical understanding. Tools like CAD/CAM, 3D scanning, and digital alignment systems can reduce variability and streamline workflows—but only when integrated thoughtfully.

The problem arises when these tools are treated as turnkey solutions that remove clinicians from the design process. Technology should enhance our ability to provide care, not deskill the clinician. The solution lies in developing robust systems for communication, training clinicians in both digital and manual competencies, and preserving a shared language between clinical and technical teams.

See Hand Skills, page 9

Hand Skills, cont'd

The Need for Defined Terminology and Training

Another critical gap in the field is the lack of shared definitions. Terms like "modification" and "design" are often used interchangeably, causing confusion. In reality, these are distinct activities requiring different skills and responsibilities. Without agreed-upon terminology and standardized training across clinical and technical domains, miscommunication is inevitable.

Educational programs must evolve to reflect this reality. Future clinicians should not only learn traditional fabrication techniques, but also develop skills in digital design, communication, and collaborative problem-solving. It is not about choosing one over the other, it is about creating a hybrid model that supports the full spectrum of modern clinical practice.

Conclusion

Hand skills are far from obsolete; they are an essential component of effective, responsive, and high-quality patient care. While the profession must continue to embrace digital tools and centralized fabrication, it must do so in a way that respects and retains the foundational competencies that have long defined our field.

Rather than viewing hand skills and new technology as opposing forces, we should strive to create a model of practice where they coexist. Clinicians who understand fabrication—whether through direct practice or close collaboration—will always have an edge in designing better devices and achieving better outcomes for their patients.

The future of prosthetics and orthotics will be shaped not just by the tools we use, but by how well we integrate them into our workflows, our education, and our shared language. If we can preserve the best of our hands-on traditions while embracing the possibilities of innovation, the field will not only survive—it will thrive.

AUTHORS

Phillip Call, MBA,CPO and Alex Wright, MSPO,CPO,NREMT-B

Phillip Call, a certified orthotist/prosthetist, serves as the Market Director at the ForMotion Clinic in Virginia, formerly known as Virginia Prosthetics & Orthotics. He earned his bachelor's degree in management and later his Master of Business Administration (MBA) from Virginia Tech, along with a Master of Science in Orthotics and Prosthetics from the University of Pittsburgh.

As a Certified Prosthetist Orthotist through the American Board for Certification, Phillip is committed to leading his team in providing innovative, patient-centered care that empowers individuals to regain mobility and enhance their quality of life.

Alex Wright is a certified prosthetist and orthotist with a master's degree in Prosthetics and Orthotics received from the University of Hartford and completed residency with Bionic Prosthetics and Orthotics in Owensboro Kentucky. He has extensive clinical experience in lower limb prosthetics and pediatric orthotics and has been involved in the design and fabrication of prosthetic devices for a U.S. paralympic team member.

Prior to joining the prosthetic orthotic field, Alex worked in emergency medical services and hospital-based acute care systems and is a member of the National Registry of Emergency Medical Technicians. This role has provided a strong foundation in interdisciplinary communications, acute and transitional patient management, and patient rapport.

With a focus on the implementation of effective communication and shared education in both the clinical and technical aspects of his work, his professional interests include optimizing clinical processes, advancing prosthetic and orthotic technology integration, and improving long-term patient outcomes.

In addition to patient-care responsibilities, Alex continues to work to improve documentation processes with the implementation of AI technologies and streamlined workflows between clinicians and technicians to improve fabrication timelines, device quality, and patient outcomes.

AOPA

2026 O&P Compensation, Benefits, & Operations Survey

DID YOU KNOW...?

- The O&P Survey is the longest running and most **comprehensive profile of peer performance,** spanning over ten years!
- Equitable payer contracts and reasonable reimbursements were top **concerns** in 2025, with **95%** of respondents indicating some or great concern.
- **59%** of respondents were audited by Medicare in 2024.

The 2026 O&P Compensation, Benefits, & Operations Survey promises to provide the most timely and comprehensive profile of peer performance reports available. This survey will result in comprehensive benchmarking tools, the data, and insights you need to understand not only where your business stands today, but how the O&P profession is evolving over time.

The 2026 survey will be conducted primarily online, which will allow different sections of the survey to easily be assigned to the appropriate personnel within your organization (e.g., sending the Staffing section to the HR/Benefits officer). The survey will be administered by Kai Analytics.

You may register for the survey now using the links below.

Landing page: https://aopa.kaianalytics.com/2026-op-professions-survey

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THANK YOU FOR YOUR SUPPORT

The O&P Assistant Education Pathway: A Potential Career Ladder

As the first graduate from the Oakland University (OU) Orthotic and Prosthetic Assistant (OPA) program, Julie Czech has developed several great insights into this pathway and is delighted to discuss these findings.

Julie wanted to be an assistant when the program was instituted in 2020 because a family member had a transfemoral amputation due to osteosarcoma in 2018. This interest was previously validated by a career test she took in middle school that matched her skills and personality to a career as a prosthetist/orthotist. She shared what was a harsh reality check when she started the OPA program. "I was 18, and I had no clue about what I was doing. I had no hand skills, no confidence, and no peers in the program. Yet I knew the OU program offered a chance to be involved in the field I was very interested in and provided a framework to achieve the dream I had in mind," she shared.

Unless you have a personal connection to the field of O&P, very few people know about this specific field of study. This lack of knowledge can be attributed to the fact that the O&P field is much smaller and less well known when compared to other healthcare professions, such as physicians, nurse practitioners, physician assistants, physical and/or occupational therapists. Even those working in the healthcare field have varying degrees of awareness about the knowledge base and hand skills required for different roles in the orthotic/prosthetic field, including the technician, assistant, and clinician. As an entering student in the OPA program, Julie was somewhat unaware of the various roles involved in patient interactions in O&P. The ability to enter a niche field through an easily accessible pathway is invaluable to introducing new professionals, which is exactly what the OU OPA program does.

As she progressed through the OPA program, Julie gained an abundance of knowledge using classroom materials and equipment, as well as working directly with patient models. The OU OPA program requires scientific and health classes Intro to Psych, Nutrition, Physics, Chemistry, Biomechanics, A & P and Medical Terminology, which allow students to develop the clinical and analytical skills that are used when observing and working with patient models in O&P specific courses. These concepts build the foundation of common O&P pathologies, their progression, and common interventions, which are then expanded upon in the specific O&P coursework. The technical skills needed for appropriate interventions are integrated into the program, requiring use of commonly used O&P lab machines, and field specific tools. In multiple classes, fabrication, coupled with the fitting of different devices for patient models, is practiced.

The OPA program has mandatory classes including Clinical Assessments as well as Patient and Practice Management. Understanding and utilizing appropriate clinical assessments and tools creates the groundwork for clinical settings. The structured coursework also allows acquisition for professional documentation skills. Julie shares that having access to specific hands-on equipment and use of patient models increased her confidence. Julie stated that she was able to transfer these acquired skills into employment as a medical assistant at a local urgent care with Becker Orthopedic as a technician. It was during this period of time when Julie decided she wanted to pursue a master's degree and become a clinician in this field.

Although Julie planned to continue her education to become a clinician, she took the ABC exams after graduating from the OU OPA program and became a Certified Prosthetic-Orthotic Assistant (CPOA). Some students in the program chose immediate employment as an O&P Assistant after successfully completing the ABC exams. Julie felt the desire to do more and possessed the foundation to be successful in the master's program. She shared "What I discovered was that my education in the OPA pathway, interactions with patients, and experience as a technician developed an extremely sound basis for success in the Northwestern University Prosthetics and Orthotics master's program."

The assistant program at OU is not the pathway every individual will be able to pursue, but Julie stated the knowledge and skills she learned were absolutely crucial for her successes in the master's program. An alternative pathway for those desiring to become an O&P Assistant without attending an OPA program permits students to take science courses (Anatomy, Physiology, Medical Terminology, Physics) at local accredited colleges while acquiring 900 - 1800 hours of supervised patient care prior to testing for ABC certification as an Assistant. The O&P technician, who has already developed the technical skills needed and wishes to move into the assistant's role, has a greater opportunity to be successful if their employer provides opportunities for learning and growth. While Julie shares that "The structure of the OPA program provided me with very specific skills and knowledge to be successful in the field," this can be a challenge for an individual who does not receive an OPA education to acquire the broad base of exposures that will benefit the employee as well as the employer. However, if employers provide structure, support, and tangible learning, the outcomes are mutually beneficial.

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See Ladder, see page 12

Ladder, cont'd

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Julie adds "As far as my role, both as a certified assistant and in my residency program post-master's degree, I can see great value of an assistant in a clinical setting. I have spoken with other professionals in the field who have little knowledge of what the assistant role entails and how they can be successfully utilized in every practice."

The O&P profession should support the progression of skills for dedicated and talented individuals no matter what level of training is achieved. A technician who shows interest in becoming an assistant should ideally be given access and support to obtain the required education. An assistant who shows interest in becoming a clinician should have access and support for the same. The employer benefits from developing these individuals and, as a result, retains a quality professional staff as well as developing a well-trained and diverse business.

The O&P field is very intertwined, and the individual professions are dependent upon the other. The assistant acts as a care extender for patient access, expanding company exposures and can definitively impact on clinician burnout. The technician has mastered the hand skills to efficiently and professionally fabricate the orthoses and prostheses that the clinician has requested for the patient's needs and improves turnaround time, improving patient outcomes and increased company profits. The primary goal of all these professions is assisting patients to achieve the highest level of mobility, quality of life and maximal ADLs. Therefore recognizing, valuing, and developing all O&P roles (technician, assistant, clinician, fitter, and pedorthist) is crucial for success of the orthotic/prosthetic profession and businesses in this field.

AUTHORS

Julie Czech, resident at Bionic P&O and Tamara Treanore, CO

Julie Czech is currently a resident at Bionic P&O in Owensboro, Kentucky. She graduated from Northwestern University's Masters in Prosthetics and Orthotics program in March 2025. A Michigan native, she previously graduated in April 2023 from Oakland University with a Bachelors in Exercise Science with a specialization in Orthotic and Prosthetic Assistant Studies. During her time at Oakland University, Julie worked as an Orthotic Technician at Becker Orthopedic.

Julie has been pursuing an interest in O&P since 2017 when her cousin was diagnosed with osteosarcoma and received a right transfemoral amputation. Seeing her cousin experience the highs of accomplishing new tasks while surmounting the struggles that also existed inspired Julie's personal goal to make a difference in patients' lives. Her goal is to be a knowledgeable and trusted partner with every patient, supporting their achievements as well as the challenges they experience.

Julie is passionate in giving her time, skills, and effort to those in need. She has volunteered with the Range of Motion Project (ROMP) in Quito Ecuador, helping fabricate and provide prostheses to patients who would not have received care if not for ROMP. She has also served on multiple mission trips in the states and internationally, where she served communities, teaching, providing religious support, and giving resources such as clean drinking water.

In her free time, Julie enjoys biking, reading, completing puzzles, competing in recreational sports, participating in Bible studies, keeping her puppy entertained, and learning to ride a unicycle.

Tamara Treanore, CO is a certified orthotist, graduating from Northwestern University Prosthetics-Orthotics Center in 1992. For many years, she practiced as a general clinician with a strong focus on TBI, the post-polio patient population and stroke patients. Her work with these patient populations prompted a greater interest in the challenges these patients faced with orthoses applications and initiated Tamara's interest in the technical side of the orthotics/prosthetics industry.

Tamara worked at Baker College Orthotist Prosthetist Technician Program for seven years, updating curriculum while increasing the students understanding of patient needs and orthoses design. When Baker College Orthotist Prosthetist Technician Program closed in 2018, she accepted a position at Oakland University in Rochester, Michigan to develop the Orthotist Prosthetist Assistant program curriculum and labs. Tamara is the acting program director and advocates extensively for the role of assistants in O & P as well as all other care extenders aligned with patient care outcomes and clinician support.

Tamara volunteers on the NCOPE Academic Accreditation Services Committee for the updating and revision of the Technician Standards, Clinician Standards, and Assistant Standards. She is also a reviewer on the Self Study Review Committee. Tamara has presented at MOPA on the roles of care extenders in O & P as well as on clinician burnout/solutions. She also acts as an ambassador promoting a career in orthotics and prosthetics at local high schools, career fairs, STEM, and similar gatherings.

In her spare time, Tamara does lapidary, woodworking, rock hunting, Tang Soo Do karate and whatever else appeals to her creativity.

O&P Educators Network (OPEN)

The Orthotics and Prosthetics Educators Network (OPEN) is a professional community designed to support and connect educators across O&P programs. One of OPEN's core functions has been sharing timely, relevant resources from professional organizations such as NCOPE, ABC, AAOP, AOPA, and others. By circulating updates on policy changes, education and residency standards, and educational tools, OPEN helps educators stay aligned with the broader direction of the O&P field. This regular exchange of information helps reduce the burden on individual instructors to track updates independently.

Meetings are typically held 2-3 times per year both in-person and virtual, providing a dedicated space for educators to discuss challenges, identify common obstacles, and collaborate on solutions. Whether navigating curriculum changes, accreditation expectations, or clinical education concerns, the network serves as a forum where educators can learn from each other's experiences. OPEN also offers educators the opportunity to present a collective voice on issues affecting both academia and the profession as a whole.

As we move into a new year, the first goal for OPEN will be to connect both new and experienced educators through informal mentorship, resource guidance, and shared best practices to help early-career educators gain the confidence and tools they need to succeed in academic roles.

The second goal is to improve OPEN's support for O&P Assistant and Technician programs by appointing a representative from one of these programs as Co-Chair, ensuring their unique needs and perspectives are accurately represented. This added leadership representation will improve communication and collaboration across program types and reinforce OPEN's commitment to supporting the full educational pathway within the O&P profession. Through these initiatives, OPEN will continue to strengthen our community of educators, improve collaboration across programs, and increase engagement with the shared goal of improving education for the students we serve.

AUTHOR

Julie McCulley Quinlan, MPO, MS, CPO, ATC, FAAOP serves as the Associate Director for Drexel University's Orthotics and Prosthetic program. She has a Master of Prosthetics and Orthotics degree from Northwestern University and a Master of Athletic Training degree from Ohio University. Julie is also engaged in many volunteer activities, demonstrating her commitment to advancing the field and supporting adaptive individuals

See Leimkuehler Ad, page 14

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