DIRECTIONS

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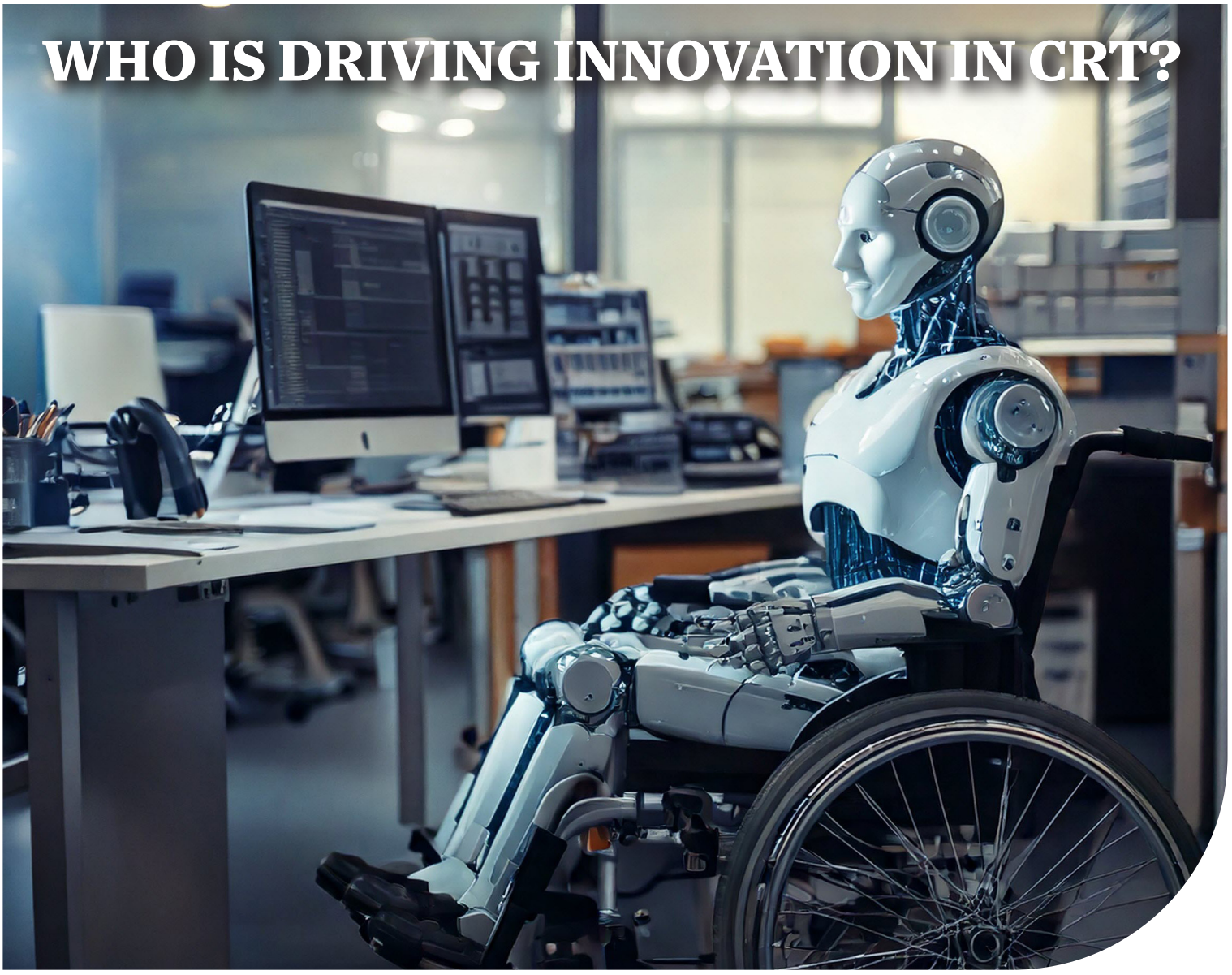
WHO IS DRIVING INNOVATION IN CRT?



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This issue of DIRECTIONS focuses on Innovations in Complex Rehab Tecnology. Make sure to read the column Clinical Perspective/CEU Article on dynamic wheelchair seating. After you read the article, you can receive .1 CEU (1 hour). Also, If you are interested in serving on the iNRRTS board of directors, please contact Andrea Madsen at amadsen@nrrts.org.

Amy Odom, BS

IN EVERY ISSUE

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FROM THE iNRRTS OFFICE

I'm Blessed Every Day

WRITTEN BY: Jason Kelln, ATP, CRTS®

For the first time since 2020, I am flying over Vancouver. The last time I was in Vancouver was a week before COVID-19 restrictions during the 2020 International Seating Symposium.. I'm now flying into Victoria to see a friend.

I thought back to the time in Vancouver, the last ISS. Let's hope there will be a movement to bring it back there as well. I also remembered it because I had lunch with some legends, including Gerry Dickerson, Weesie Walker, Steve Cranna and Mike Longo. We met to discuss NRRTS coming into Canada.

As we touch down, and I'm looking at the simple beauty of this island. I'm also struck by the people in the plane. Everyone has very essential items and what they need to get through a two-hour flight. It is a little like Complex Rehabilitation Technology. The CRT people need is important and vital for them to make it through the day.

They are many neat things happening is the world of iNRRTS and CRT. Seat elevation and the bill to upgrade materials in manual wheelchairs to name a few.

iNRRTS was recently at the ISS in Pittsburgh. Great education offered and a great time to meet Registrants. iNRRTS also hosted a reception and bestowed awards to recipients. It was a great evening.

Education events are fantastic events that allow us to meet and interact with people in the CRT industry. I remember tapping Jean Mikel on the shoulder at ISS and asking if she would come to Saskatchewan and speak for me.

I recently was contacted by someone who was taking the first section of the CRT Supplier Certificate Program. When he asked me about the textbook, I remember saying some absolute legends wrote it. I've even brought some of these legends to Saskatchewan to speak.

He went on to say the first course was pretty easy.

About an hour later, he said wow the second course is good, and he was learning a lot.

This is a tribute to this amazing program. If you have not looked at it, I encourage you to, as we can always learn something.

I was recently in a meeting with someone not in our business but asking us about our company. I commented about putting a client in a headrest the week before, who used 30-year-old jet fighter technology to work.

They were amazed. I was then asked by another person, "Why is that technology still used?" I explained that we tried using something new and cutting-edge with the client, but at the end of the day, the 30-year-old jet technology worked better. Our duty is to explain what is available and do the right thing for our clients. This is a win-win for everyone.

It is a blessing to do this job. Education and continually trying to learn more is the great part of what we do.

I'm going to go back to my flying playlist as we are about to land.

It's a list I have had for a while. Every once and while my kids or wife add a song so I am a bit more up-to-date.

Now, on to ... Jimmy Buffett on the playlist.

CONTACT THE AUTHOR

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Jason Kelln, ATP, CRTS®, is president of iNRRTS and became the first Canadian iNRRTS Registrant in 2018. Kelln is the recipient of the Simon Margolis fellow award. Kelln serves on the Rehabilitation Engineering and Assistive Technology Society of North America's Professional Standards Board and is an owner of PrairieHeart Mobility since 2022.

LIFE ON WHEELS

Live Your Truth

WRITTEN BY: Rosa Walston Latimer

In a world that often overlooks the needs of individuals with disabilities, Michael Cesarino, 39, has become a steadfast advocate for change. Born with spastic cerebral palsy, he has navigated life's challenges with resilience, transforming obstacles into opportunities for activism. His journey is not just personal — it inspires others to champion accessibility in their communities.

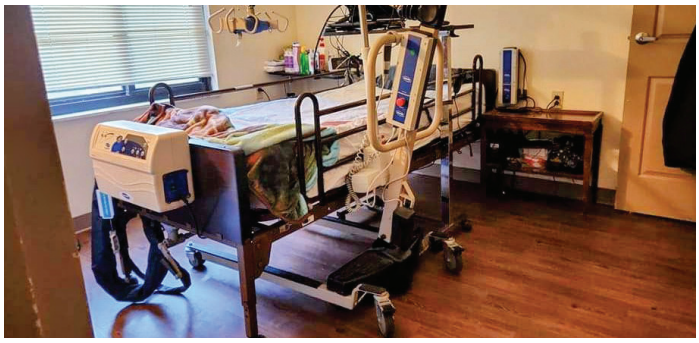
"My life has been a complex journey of learning," Cesarino said. He realized early on those systemic failures affected him and others in his hometown. "Things just didn't work the way they should." That realization sparked his passion for advocacy.

Nearly two decades ago, a pivotal experience set Cesarino on his path. While shoveling snow from his sidewalk, a police officer confronted him, believing the housing authority should handle the issue. Cesarino explained that ice had formed due to a leaking gutter that had gone unrepaired for two years. The officer documented the issue, and by spring, the gutter was fixed, eliminating the hazard. That moment taught Cesarino a key lesson: "You just have to say something. If no one does, nothing changes."

His advocacy efforts expanded as he identified other community shortcomings.

Michael Cesarino with cousins at PNC Park, Pittsburg, Pennsylvania.

Michael Cesarino's customized workstation supports his advocacy work and networking efforts.



Michael Cesarino's bedroom with hospital bed, air pressure relief mattress and powered lift used for transfers.

The town's bus system lacked proper wheelchair-accessible training for drivers. Sidewalks were often in disrepair, posing risks for people using walkers and power chairs — including Cesarino himself. "I flipped my power chair in the park because the sidewalk had a one-inch drop, and I ended up on the ground," he said.

Determined to improve accessibility, Cesarino reached out to city officials, including the mayor and the code enforcement officer. Progress was slow, but he remained encouraged. "I've experienced some success, but it has been very slow in coming," he said.

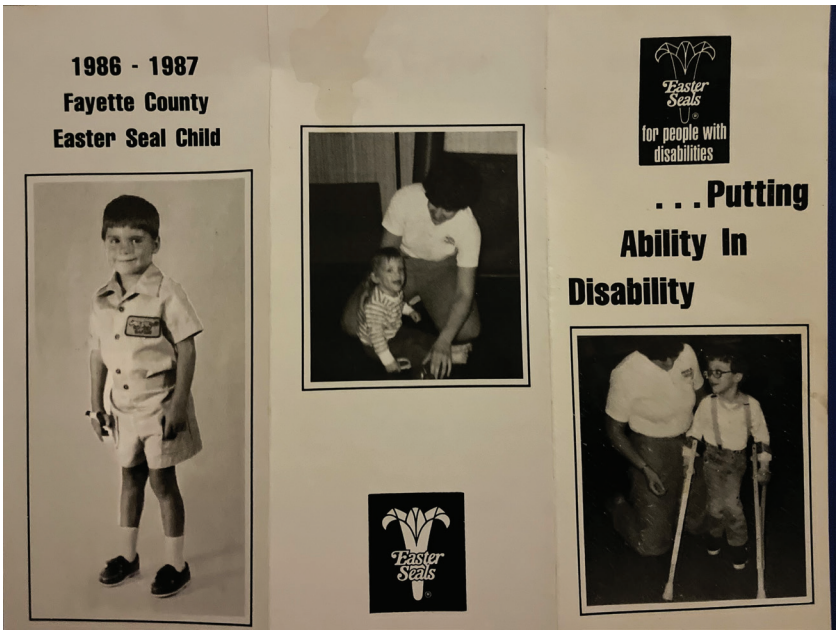
His activism is deeply personal. Growing up in a small mountain town, his family was reluctant to "make a scene" about disability issues. But Cesarino saw the need for change. "I never wanted to make a scene. I just wanted to make a point," he said.

Technology has played a crucial role in his independence and advocacy. Complex wheelchairs have significantly improved his mobility, and innovations like voice recognition and word prediction software have helped him communicate more effectively. "I'm dyslexic, and automatic punctuation is amazing," Cesarino said.

CONTINUED ON PAGE 6

LIFE ON WHEELS | CONTINUED FROM PAGE 5

Michael Cesarino enjoying the fresh air outside his apartment in Uniontown, Pennsylvania.



Michael Cesarino, 6 years old, was designated the 1991 Fayette County, Pennsylvania Easter Seal Child.

He encourages others to use technology to amplify their voices. "Not everyone has the newest devices. But if you have a way to be heard, even in a small way, use it. Start there."

Cesarino stays engaged through social media and virtual platforms like Second Life, which allow users to create avatars and interact in a world without physical limitations. "In Second Life, I can do things I can't in the real world — go to clubs, attend concerts, even build and create. It's not just escape. It's expression."

Beyond local efforts, Cesarino has participated in national advocacy. In 2023, he joined a Virtual Fly-In to Washington, D.C., to lobby for disability rights. He has also served on the Participant Advisory Committee for UPMC Health Plan, helping shape policies that impact people with disabilities.

Despite using a power wheelchair and requiring daily care, Cesarino maintains a strong level of independence. He moved out on his own at 19. "My mom was two hours away. My attendant staff was my only support. That's when I really started learning how to speak up," he said.

Transportation remains a challenge for people with disabilities, but programs like Community Health Choices and the Medical Assistance Transportation Program have helped Cesarino access nonmedical and medical transit. Still, he acknowledges that smaller communities often lack such resources, leading to further marginalization.

Advocacy requires strategic thinking, he said. "Choose your battles. Sometimes, people don't know how to help because they don't understand the needs. Be respectful, and if your request is too big of an ask, try a different approach. Practicality and persistence are essential."

A lover of art and architecture, Cesarino finds inspiration in visionary architect Paolo Soleri, whose unfinished "city within a city" project in Arizona sought to redefine urban living. "Soleri had incredible ideas about how people could live together better. I think he would've been a disability advocate if he were alive today."

Cesarino also enjoys reading, often pairing audiobooks with physical copies to accommodate his dyslexia. Economics fascinates him, as he believes understanding financial systems is key to shaping disability policy. "Decisions get made based on cost," Cesarino said.

His guiding principle remains simple: "Live your truth. Figure out what you need—and use it. If you have a disability, continually seek out and learn how to use technology that best fits your evolving needs. Make your life what you want it to be."

Cesarino's story highlights how one voice can lead to meaningful change, proving that awareness and action can cultivate a more inclusive society for all.

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Michael Cesarino has spent much of his adult life advocating for people with disabilities in Pennsylvania and beyond. He served on the Participant Advisory Committee for UPMC Health Plan for three years and took part in the 2023 Virtual Fly-In to Washington, D.C.

MOMENTS WITH MADSEN

Lifelines, Not Luxuries:
The Critical Role of CRT in Daily Life

WRITTEN BY: Andrea Madsen, ATP

Complex Rehabilitation Technology has made inspiring strides in recent years. These technologies are more than tools — they are lifelines that empower people to live, work, travel and engage fully with their communities. For individuals with chronic or progressive conditions, a properly fitted wheelchair is not simply a mobility device; it is the foundation for health, autonomy and dignity.

Innovation in CRT is advancing rapidly. Designers and engineers are working with clinicians and users to develop solutions that are increasingly responsive, personalized and effective. Today's advancements include smarter power systems, lighter and more durable materials, and user-centered features such as Bluetooth integration and mobile app controls.

But innovation only matters if it reaches the people it is designed to help.

That is where the greatest challenge lies. Despite these breakthroughs, too many individuals still encounter financial, bureaucratic and systemic barriers that prevent access to necessary technology. Without deliberate action, advanced CRT may remain an ideal rather than a reality, leaving real people waiting, struggling or going without.

Developing a cutting-edge power wheelchair or fully customized manual system is no small feat. It requires a multidisciplinary effort combining biomechanics, materials science, clinical insight and data analysis. Each device must be tailored to an individual's body, health condition and lifestyle. These are not mass-produced gadgets; they are specialized medical tools requiring an equally specialized process.

Naturally, this complexity carries cost. CRT serves smaller populations and is subject to strict medical regulations. The involvement of highly trained professionals — including clinicians, supplier professionals and technicians—is essential for assessment, fitting, training and ongoing support. This is not just an investment in equipment; it is an investment in people's lives.

Unfortunately, these costs often create barriers. Public insurance programs may delay, limit or deny CRT coverage, leaving users waiting months or stuck with devices that do not meet their needs. This can result in discomfort, injury, hospitalization and a loss of independence. Globally, the disparity is even more severe, with advanced CRT largely unavailable in many low- and middle-income countries.

Change is necessary.

The gap between technological possibilities and actual accessibility must be closed. CRT should be recognized as a medical necessity, not a luxury. A tilt-and-recline power wheelchair is not a comfort item; it is essential for individuals with limited trunk control or skin vulnerability. A rigid-frame manual chair is not a preference; it is a safeguard against repetitive strain injury and a pathway to independence.

Advocacy is key to unlocking access. Policymakers must understand CRT's value and fund it accordingly. Insurance systems must be responsive, flexible and fair. Skilled clinicians and supplier professionals should receive adequate reimbursement and professional development support. Most importantly, the voices of those who rely on CRT daily must be elevated — they know what works, what is missing and what is needed next.

The path forward will not be easy. But the advancements today are extraordinary, and the community driving them is resilient. Decades of advocacy, ingenuity, and perseverance have built a strong foundation. Now is the time to act—to push for policies that prioritize access, equity and innovation.

Mobility, dignity and full participation should not be privileges for a few. They must be rights for all.

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Andrea Madsen, ATP, is the executive director of iNRRTS, the International Registry of Rehabilitation Technology Suppliers. She has over 20 years' experience providing Complex Rehabilitation Technology to adult and pediatric patients in Southern Minnesota, Western Wisconsin, Northern Iowa and internationally through her work with the Mayo Clinic. She holds a Bachelor of Science in business management and finance, is a credentialed Assistive Technology Professional and has been a Certified Complex Rehabilitation Technology Supplier®. She served for 10 years on the iNRRTS board of directors and as committee chair for the Midwest Association of Medical Equipment Services. She has lectured for the University of Minnesota Rochester, University of Wisconsin La Crosse, the Mayo Clinic College of Medicine and Science and at the International Seating Symposium.

NOTES FROM THE FIELD

It Started with a Simple Question

WRITTEN BY: Rosa Walston Latimer

From a young age, Sarah Uncle knew she wanted a career where she could make a difference, though she wasn't sure what that would look like. Her journey began when she came across a university degree titled Bachelor of Applied Science (Occupational Therapy). The description asked, "Do you want to help people?" That simple question resonated deeply. Today, she brings 20 years of experience to her role as a clinical educator for Independent Living Specialists in Australia.

A career defined by helping others

"I didn't know what to do when I finished school, but I knew I wanted to go to university," Uncle said. Reading that brief course description set the trajectory of her career. At the time, she had no idea what occupational therapy was, but she understood that helping others gave her a sense of fulfillment. That feeling remains a driving force in her work today.

After graduating Uncle worked in a rehabilitation hospital on neurology and orthopedic wards. She then transitioned to private practice, working in pediatrics before shifting to a role as a pharmaceutical sales representative. During that time, she discovered a passion for educating health care professionals and researching the clinical efficacy of medicines and medical devices.

Andrew and Sarah Uncle (center) and their children (l to r) Archer, Nathaniel, Chloe and Joey.

Her career took another turn following the birth of her third son, who was born with a rare syndrome. Uncle stepped back from full-time employment to care for him. On weekends, she took on a role as a disability support worker, an experience that profoundly shaped her perspective. "That experience was invaluable, both professionally and as a mother of a child with a disability," she said.

Working in group homes, Uncle supported individuals with a range of physical and intellectual disabilities. She quickly learned to see each person beyond their diagnosis. "When you work closely with someone, you know them as a person, not a disability," she said. The experience reinforced her appreciation for the value people with disabilities bring to their communities.

"I am so grateful for what my clients and son have taught me about resilience, joy, perseverance and fun. And about not sweating the small stuff," Uncle said.

Today, as a clinical educator in the assistive technology sector at Independent Living Specialists, she draws on her occupational therapy training, pharmaceutical industry experience and personal connections with the disability community to enrich her work.

Supporting therapists through education

Uncle has worked as a clinical educator at ILS for five years. The Australian company, which has more than 700 staff and 54 retail locations, provides expert guidance in assistive technology across several divisions, including Independent Living Specialists Home and Community, Complex Rehab, Kids and Hospital and Pressure Care.

She initially worked with the Hospital and Pressure Care team, educating professionals on pressure injury prevention, a topic she is deeply passionate about. Her interest in the subject intensified after her son experienced preventable injuries during a hospital stay.

Today, her role extends across all divisions, supporting occupational therapists and physiotherapists through clinical education on various assistive technologies.

Many Australian therapists receive limited training in assistive technology during university, leaving them uncertain about prescribing standard and complex solutions. Uncle aims to bridge that gap, helping practitioners feel confident in their recommendations. She also hosts her company's podcast, "Redefining What's Possible,", which explores real-world applications of assistive technology and fosters ongoing learning.

Advancements and challenges in assistive technology

Uncle has witnessed significant changes during her 20-year career. One of the most impactful was the rollout of Australia's National Disability Insurance Scheme in 2013. While the initiative offers individualized support for people with disabilities, it has introduced challenges, including limited supervision for new occupational therapist graduates hired by private companies.

"This lack of structured mentoring can leave early-career therapists without confidence in their role, especially regarding assistive technology," she said. Uncle's work as an educator helps bridge that gap by building knowledge, skills and confidence.

Another notable change is the credentialing of assistive technology professionals. Historically, Australia has not required formal certification for ATPs, but Independent Living Specialists is leading the way in ensuring its ATPs receive credentialing through iNRRTS. Uncle hopes this marks the beginning of a national standard requiring all ATPs to be formally trained and credentialed.

"This is about achieving the best outcomes for the end user," she said. "Ensuring that the professionals involved in recommending, prescribing, fitting and monitoring equipment are properly trained is essential."

Passion for impactful work

Uncle finds deep fulfillment in her work. She appreciates the positive feedback she receives from therapists who benefit from her training. "That affirmation is energizing," she said. "I provide education, and they reward me with a positive response, saying the information was helpful."

Her dedication extends to supporting therapists with complex individual cases where her expertise may guide the next steps in assistive technology recommendations.

One area of particular interest for Uncle is supported lying for people with mid-to-late-stage dementia. Research has shown the benefits of supported supine lying in providing comfort and preventing the effects of paratonia.

At a recent trial of a sleep system, Uncle and her colleagues worked with a 63-year-old woman with early-onset dementia. When they arrived, she was in bed, unresponsive, with labored breathing. After positioning her using the sleep system, she became alert, smiled and her breathing slowed.

"That was a good day at work," Uncle said. "Seeing the benefits so quickly was especially rewarding."

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Sarah Uncle educating therapists on pressure care considerations for mattress prescription.

Sarah Uncle presenting with her colleague, Lois Brown, at Assistive Technology Suppliers Australia in Sydney, 2024.

Sarah Uncle, Clinical Educator for Independent Living Specialists in Sydney, Australia , presenting on mobility scooter prescription to a group of occupational therapists.

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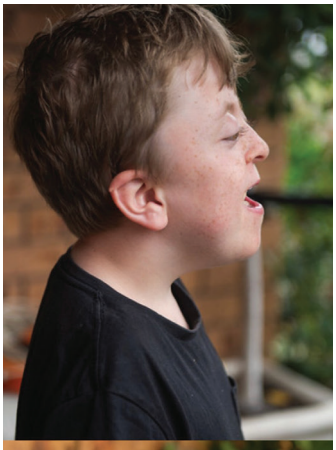
Sarah Uncle and her 11-yer-old son, Nathaniel, her inspiration.



Nathaniel before his latest surgery to move his facial bones (top photo) and after the surgery (bottom photo).

Family, community, and advocacy

Uncle credits her son, Nathaniel, as her greatest influence, both personally and professionally. Born with Apert Syndrome, he has undergone 10 surgeries in his 11 years.

"Every day, he navigates challenges from his physical and intellectual disabilities. He looks different in a world where almost everybody wants to fit in. But he is resilient, joyful, amazing and brave," Uncle said.

Nathaniel has taught her about respecting individuals with disabilities and recognizing their humanity beyond their differences. "We all want to be loved, accepted, seen and valued," she said. "That truth fuels my desire to be person-centered in educating and discussing assistive technology."

Her career has also been shaped by Lois Brown, who propelled her into the role of clinical educator and encouraged her growth in the field. "We are like-minded in wanting the best outcomes for the end users of assistive technology. I had a lot of fun presenting alongside her," Uncle said.

Outside of work, family is Uncle's top priority. She has three sons and a daughter, and their home is often lively and chaotic. When she finds free time, she enjoys painting, cooking, gardening and running, especially on bush tracks in the Australian wilderness.

Advocacy through inclusion

Uncle is deeply involved in the Titans football club, where every player has a disability yet competes in a mainstream league against neurotypical teams.

"It's a beautiful example of inclusivity," she said. "The opposing teams adjust their game to allow the Titans to score and have a chance to kick the ball. They do it willingly, and it's wonderful to watch."

Advice for aspiring occupational therapists

Uncle encourages those entering the field to remember the profound impact of their work. "You've chosen a wonderful career, fulfilling and rarely boring," she said.

She advises new occupational therapists to focus on the difference they can make in clients' lives. "At times, frustrations will arise, but overall, the work is incredibly rewarding," she said.

Her final piece of advice: "Be inspired by the people accessing assistive technology. Show them respect. Speak directly to them, even if you're unsure they will hear or understand you. Make them feel like it's all about them because it is."

CONTACT
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Sarah Uncle, RRTS®, is the clinical educator for Independent Living Specialists in Sydney, Australia. She holds an occupational therapy degree from Sydney University and has extensive experience in the assistive technology industry, with a passion for pressure care. She has been an iNRRTS Registrant since 2023.

TECH CORNER

Smart Integration: Advancing Complex Rehabilitation Technology

WRITTEN BY: Jered Dean

Technology is transforming complex rehabilitation

Smart devices, wearables, robotics and neurofeedback solutions are reshaping assistive technology. These innovations are rapidly entering Complex Rehabilitation Technology from outside the industry, offering new opportunities for independence and improved quality of life.

As these advancements become more sophisticated, affordable and interconnected, CRT must adapt to remain effective. The technicians and assistive technology professionals who embrace these changes will define the future — one where CRT actively enhances human potential through increasingly advanced human-machine partnership.

Roles will change

The integration of artificial intelligence and smart technology is already transforming the roles of ATPs and technicians.

ATPs will shift from focusing primarily on physical equipment selection to becoming technology integration specialists. They will need expertise in configuring connected systems and understanding how different technologies work together. Evaluations will be enhanced by AI while maintaining the human element. ATPs will increasingly bridge the gap between users' existing commercial smart technology and CRT devices.

Technicians will evolve from primarily mechanical repairs to troubleshooting technology, requiring new skills in handling software updates as well as electrical and digital diagnostics. They'll need to better understand the interplay between hardware and software.

This shift brings significant benefits. Work will become more data-driven, using information provided by connected devices to ease troubleshooting, predict maintenance needs, monitor user success and optimize equipment performance. Training initiatives like the ATP Academy and ATP Gateway programs are already preparing professionals for these evolving responsibilities; though, as Bill Noelting recently noted, more progress is needed in this area.

2024 CES Technology Demonstration

With ATP and technician shortages looming as many near retirement, these technological advancements create opportunities to attract and recruit the next generation of professionals.

You have an opportunity

ATPs and technicians can proactively prepare for the not-so-far-off future by

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TECH CORNER | CONTINUED FROM PAGE 11

embracing and seeking out technological interaction in their lives and pursuing educational opportunities.

First, industry professionals should engage with consumer technologies. Most people reading this will be on a computer or smart device. Do you know what the accessibility settings and options on that device are? Why not? Try them out ... I'll wait ...

How much have you engaged with AI? There are free options online. Take a stab at it and figure out what it does well and where it struggles. If you are willing to spend a little money, how many smart home devices do you use at your home? If you haven't tried one, give it a try. Start small, maybe a smart light bulb or outlet somewhere. These steps matter. Little by little seeing how different technologies work, how they are setup, and having to troubleshoot a smart home with multiple devices is practical education.

If you are already digital pro, then congratulations, you probably have the basics of software and app troubleshooting down. I challenge you to go further.

Expand your expertise to include troubleshooting and digital device repair. I highly recommend iFixit (www.ifixit.com) and their device tear downs and step-by-step guides for repairing common electronic devices. Even better, I bet you can find an old broken device somewhere in your house (or at a garage sale) that has an iFixit guide. A good device tear-down or repair is a great way to spend a rainy day.

The point is, expand your expertise beyond traditional mechanical skills to include software troubleshooting and digital diagnostics. And advocate for inclusion of more advanced topics in official continuous education programs like the courses offered by RESNA and U.S. Rehab.

Collaboration will shape CRT's future

Rapid external technological innovation is reshaping mobility and independence. AI is changing expectations about how people interact with technology, and major technology companies are investing in accessibility solutions.

Apple has announced eye-gaze and brain-computer interface integrations; Google has enhanced its TalkBack solution; and Microsoft is extending its Seeing AI technology to Android — all pointing to a future where accessibility is even more built into consumer devices. The future of the CRT industry rests on how much it is willing to collaborate with the outside companies investing in the technology that will fuel the accessible future..

The industry must embrace connected systems compatible with modern standards — devices that not only assist with activities of daily living but also prevent accidents, monitor health, predict maintenance needs and communicate with care teams. Open standards and collaboration should be seen as opportunities rather than threats.

At the 2024 Consumer Electronics Show in Las Vegas, Nevada, LUCI, Lenovo, Deep Brain AI and others showcased integration possibilities for a young woman with ALS, including autonomous wheelchair navigation, a more efficient eye-gaze communication system and an emotive AI avatar — all built on commercial technologies. This level of integration required common protocols and collaborative approaches. The limitation in CRT isn't the technology itself, it's the industry's willingness to embrace it. You can help lead your organizations to that change.

CRT's future depends on developing integrated technology solutions so that, as Michelle Lange put it, each person's technology "lives up to the potential of the person in the wheelchair."

Are we ready for the next era?

The lives of CRT users are being transformed through smart device integration and emerging technologies. These advancements improve access and enhance independence for individuals with complex conditions.

Smart wheelchairs, wearable sensors, neurofeedback solutions and intelligent environments offer unprecedented opportunities for mobility, communication and personal autonomy.

The challenge now is to be ready for this revolution. The industry must take collaborative approaches, use data-driven decision-making and expand training opportunities for ATPs and technicians. The future is coming and it will be defined by those willing to embrace it.

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Jered Dean is co-founder and chief technology officer of LUCI Mobility, which he established in 2017 with his brother, Barry Dean, to develop smart wheelchair technology. His mission began with a personal connection — creating safer mobility solutions for his niece, Katherine, who has cerebral palsy. Dean serves on ISO and RESNA standards committees.

Prior to LUCI, he worked at Syncroness in product development and served as director of the Capstone Design program at Colorado School of Mines, where he earned his engineering degrees. At LUCI, he leads a team of engineers in Denver, developing innovative technologies. Under his leadership, LUCI has received recognition from Time, Popular Science, Fast Company and CES. The company's technology enables independent power mobility for users across more than 40 U.S. states and Canada.

CLINICAL PERSPECTIVE

Dynamic Wheelchair Seating:

CEU ARTICLE REVIEW

Innovative Design, Clinical Applications and a Paradigm Shift

WRITTEN BY: Michelle L. Lange, OTR/L, ATP/SMS, and Becky Breaux, PhD, OTR/L, ATP

Introduction

While dynamic seating has been available for a long time, it remains underutilized. Seating and wheeled mobility team members have learned quite a bit over the years about its benefits and application. Clinical experience and research show that dynamic seating has far more clinical benefits than simply preventing equipment breakage. The purpose of this article is to present a dynamic seating definition and history, describe innovative changes to design and explain clinical applications of this intervention. A summary of research supporting both the need and application of dynamic seating is included and current funding challenges will be addressed. Finally, the future of this intervention will be proposed, including a paradigm shift in its application, whereby we recognize that everyone has a right to move, including those who need aggressive postural support to maintain their position.

Dynamic seating – a definition

Most wheelchairs and seating systems are static. If the client moves, they will move in relation to the seating support surfaces, which may result in a loss of their body position and posture. Dynamic seating moves with the client in response to the force they exert.

Definitions and terminology are important so that team members know exactly what assistive technology or intervention is being recommended or used. Some literature uses the term "dynamic" or "dynamic seating" to refer to other types of interventions. The International Dynamic Seating Workgroup met several times in 2018 and agreed upon a formal definition of dynamic seating. This definition was later used in the RESNA Position Paper on the Application of Dynamic Seating.

Dynamic seating is movement which occurs within the seating system and/or wheelchair frame in response to intentional or unintentional force generated by the client. Dynamic components absorb force. When client force ceases, the stored energy is returned through the dynamic component, which in turn assists the client back to a starting position (Lange, et al., 2021, p. 3).

Dynamic seating is not the same as **suspension**. Suspension includes components like shock absorbers and springs, located on the lower part of the frame or near the wheels, that act to dampen vibration and other forces that occur when the wheelchair is moving. Suspension is available on some manual and power wheelchairs, sometimes as an aftermarket addition. This is an important intervention with numerous clinical benefits, however, it differs from dynamic seating.

Common categories of dynamic seating include:

- Dynamic backs that open the seat-to-back angle in response to client hip extension.
- Dynamic footrests that move in response to lower extremity forces. The footrests may

FIGURE 1 | A manual wheelchair with dynamic back, dynamic footrests, and dynamic head support hardware.

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lengthen or telescope in a downward direction and increase the thigh to lower leg angle as the individual's knees extend. The footplates may also move to accommodate active ankle plantar flexion or rotate outward to accommodate foot rotation.

- Dynamic head support hardware that moves in response to neck extension and rotation. This movement may be bidirectional (forward and rearward), rotational or multidirectional.
- A combination of dynamic seating interventions can be used to allow movement at multiple joints (see Figure 1).

A key feature of dynamic seating is **resistance**. Resistance is provided by elastomers, springs and/or hydraulics.

These components provide a degree of resistance while the client moves (providing more stable, controlled movement), store energy and then use that stored energy to return the client to their starting point.

Resistance can be increased or decreased to meet an individual's needs. Individualizing the level of resistance for each person is important so that they can activate the dynamic component, based on their strength and muscle tone, and then return to the starting position.

These dynamic components are **separate from the seating system**. For example, dynamic back hardware attaches between the seat rails and the back canes. It is not integrated into the seat cushion or back support. Dynamic footrests typically replace the current footrest hangers, although secondary supports (i.e., ankle straps) are typically required. Dynamic head support hardware replaces the head support mounting hardware, although head pads are still required.

Dynamic seating – a history

Dynamic seating options are much more readily available today compared to several years ago. Many years before commercially available options were available, some service providers fabricated homemade solutions. Various designs were proposed and patented over the years. Some early designs were intended for a stationary chair (rather than a wheelchair) but incorporated dynamic features that responded to client forces and movement. Other designs were specific to wheelchairs — either providing a rocking movement or changing the seated angles in response to client movement. In **1910**, the first patent was approved for a wheelchair that moved in response to client force/movement (Charles Francis Walker, 961,389). This design used springs to provide a rocking movement (see Figure 2).

The first widely available wheelchair-based dynamic system, to the best of our knowledge, was the EndoFlex by Pin Dot, which was manufactured

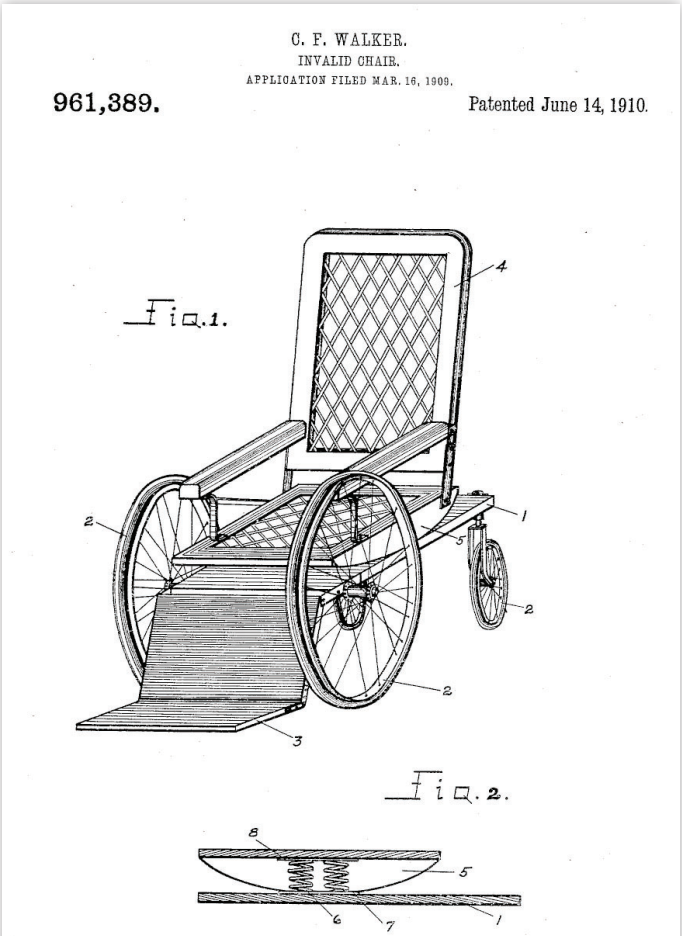

FIGURE 2 | Figure from a 1910 patent for a wheelchair that moved in response to client force/movement.

in **1989**. This dynamic back provided extension of the upper portion of the back support at the lumbar area to allow the client to "lean back, stretch or shift weight. It's even easier to propel your wheelchair" (Pin Dot catalog, p. 37). The feature could be locked out restricting dynamic movement temporarily. The height of the entire back support could be changed to achieve the optimal height for this dynamic movement.

By **2001**, several commercial options entered the market and provided a rocking movement. The Freedom Designs Spectrum wheelchair offered an option utilizing a free-floating ring to attach the back support to the back canes to allow limited back support movement in response to client force and movement. Miller's Adaptive Technologies had two different dynamic footrest options and later added dynamic backs and dynamic head support hardware to their product line. In **2006**, Degage (which eventually was renamed Seating Dynamics) began offering a dynamic back and later added dynamic footrests, as well as dynamic head support hardware. In **2008**, the

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FIGURE 3 | The pivot point of the dynamic footrests (knee elevation feature) is close to the natural pivot point of the knee.

Kids Up Kids Rock wheelchair with integrated dynamic seating was introduced.

Dynamic seating - design

Over time, dynamic seating design has progressed in several areas. While some dynamic seating components are only compatible with the same manufacturer's products, other components are compatible with multiple manual and power wheelchair bases, increasing access to more clients. Nearly all options in the United States are modular, rather than integrated with the wheelchair frame, allowing dynamic seating components to be retrofitted to existing wheelchairs or added to a new wheelchair. More dynamic seating components now "lock-out," preventing movement in certain situations such as during transportation. Resistance strategies have improved to provide more choices in the field and less guesswork during the ordering process.

Finally, the importance of pivot points has changed product design in recent years. It is critical that the pivot point of the dynamic component (such as a dynamic footrest), is as close as possible to the natural pivot point on the client's body (such as the knee) (see Figure 3). This allows a ready and efficient response to client movement and force, reduces shear forces and helps maintain client position.

Dynamic seating – clinical applications

Many of the dynamic seating options that are now available were initially designed and used to prevent equipment breakage. Over time, seating and mobility team members also realized that clients were sometimes injuring themselves while moving in their wheelchair due to the intentional or unintentional forces they applied, which could include large and forceful movements.

For many years, wheelchair seating professionals used dynamic seating with a wide variety of clients. This work was instrumental for informing practice. As a result, these professionals observed a wide range of clinical benefits, much of which is supported by research:

1. **To protect the wheelchair user from injury**, including injury from excessive and unrelieved force through joints, contact of the head against the head support pad exceeding concussive forces, and contact of their bodies with broken seating or wheelchair equipment (Lange, 2021).

2. **To increase sitting tolerance and compliance.** Movement can decrease pain and discomfort, prolonging the time a client will tolerate a seated position (Ridilla, et al., 2024; Lyons, et al., 2017; Frank & DeSouza, 2017; Frank et al., 2012; Incoronato, 2007).

3. **To reduce active extension.** By absorbing and diffusing client force, active extension often is reduced in duration and intensity (Cimolin, et al., 2009; Lange, 2021). Imagine sitting behind a client on a mat table as that client begins to extend their hips. If the examiner supports the client's body and leans back 10 to 20 degrees as the client extends, that force will be diffused, and the client can readily be returned to upright sitting.

4. **To reduce energy consumption**. Some clients with forceful extension and/or large and forceful movements spend a great deal of their day appearing to "fight" their seating system – to the point that they appear to be standing in their wheelchair. This takes a tremendous amount of energy and caloric expenditure (Wang & Raunser, 2023). By diffusing forces

through movement, the client can conserve that energy for functional tasks and avoid burning excessive calories.

5. **To maintain client posture within the seating system** (McNamara & Casey, 2007). When a client extends at the hips in a static seating system, this force is not diffused and so results in movement of the client in relation to the support surfaces. For example, as the client extends their hips and pushes their trunk against the back of the seating system, their pelvis migrates forward into a posterior pelvic tilt because there is nowhere else for the pelvis to go. Most likely, the client is unable to correct the position of their pelvis independently and will need repositioning by others.

6. **To decrease shear forces and pressure.** When a client moves in relation to the seating system, shear forces occur as these two surfaces (body and seating) slide across each other (Chen, et al., 2018; Hahn, 2009; Cimolin, et al., 2009). Pressure can be quite high at bony prominences where areas of the client's body exert the most force against a static seating system, such as the scapulae.

7. **To increase vestibular and proprioceptive stimulation** (Chen, et al., 2018). People need to move, and many clients using wheelchair seating seek sensory input, such as vestibular stimulation, through movement and proprioceptive stimulation from pushing against a resistive surface.

8. **To increase alertness through movement** (Chen, 2018; Phillips, 2017). Most people are more alert when moving, and this can be particularly true for some clients using wheelchair seating. For example, people who have a brain injury may be subaroused and movement can increase overall alertness.

9. **To decrease agitation through movement** (Chen, 2018; Phillips, 2017; Pfeiffer, et al., 2008). Agitation can be decreased through body movement. This is common in clients with sensory processing disorders, brain injuries or dementias.

10. **To decrease fatigue through movement.** (Tanoue, et al., 2016). Just as movement can increase cognitive alertness, fatigue is also improved through movement. Imagine how tiring a long flight is when physical movement is restricted.

11. **To increase function** (Chen, 2018; Phillips, 2017; Adlam, 2015; Dalton, 2014; Cimolin, et al., 2009; Incoronato, 2007). Movement against resistance can improve joint stability (through isometric muscle contraction) and support a body position that increases functional abilities like operating a power wheelchair joystick.

12. **To increase strength and postural control** (Chen, 2018; Phillips, 2017, Adlam, et al., 2014; Hahn, 2009; Cimolin, et al., 2009; Incoronato, 2007). Movement against resistance can increase muscle strength, primarily through isometric muscle contractions (McBurney, et al., 2003; Fowler, et al., 2001). Increased strength, particularly in the trunk, can increase trunk and head control.

13. **To facilitate active range of motion.** Dynamic seating components accommodate movement within a limited range at the hips, knees, ankles and neck (Adlam, et al., 2014; Cimolin, et al., 2009; Hahn, et al., 2009; Incoronato, 2007).

14. **To protect wheelchair and seating hardware from breakage or loss of component alignment** (Incoronato, 2007; Lange, 2021). Even clients who do not weigh very much are capable of breaking wheelchair components secondary to intermittent or sustained force. Individuals can exert 200% to 600% of their body weight against a static surface because of the high forces they generate from their increased muscle tone (Samaneein et al., 2013).

There are many other benefits that have been observed in clients using dynamic seating, as well. These include improvements in digestion (Incoronato, 2007), vocalization (Adlam, et al., 2014), circulation (Myers, et al., 2021) and social engagement (Adlam, et al., 2015).

Dynamic Seating – research

The following table summarizes research studies related to clinical phenomena observed in people with cerebral palsy using wheelchair seating and mobility and the impact of dynamic seating on each of these phenomena. Many of these concerns are observed in clients with other diagnoses, as well.

The first column lists common clinical phenomena, the second column summarizes research that supports the presence of each clinical phenomenon, and the third column summarizes research related to dynamic seating and its impact on each clinical phenomenon.

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CLINICAL PHENOMENON	RESEARCH THAT SUPPORTS THIS IS AN ISSUE IN CP	RESEARCH ABOUT DS AND THIS ISSUE
Extension / Spasticity	1. Spasticity increases with resistance, such as client forces exerted against a non-yielding surface (Bar-On, et al., 2018). 2. Clients with increased extension were able to exert up to 200% of their body weight against the back support and up to 600% of their body weight against the foot supports during extension (Samaneein, et al., 2013).	1. Dynamic Seating decreased extensor thrust (Cimolin, et al., 2009). 2. Dynamic Seating decreased extension patterns (Lange, 2021).
Dystonia	1. Dystonia can lead to pain and discomfort and impact function (Penner, et al., 2013).	1. Hypothesis proposed that the use of whole-body dynamic seating can improve comfort, activity, participation, and quality of life in young children with dystonic cerebral palsy (Gimeno and Adlam, 2020). This requires more research. 2. Reduced large upper extremity movement and increased smoothness of movement observed in research participants who had the diagnoses of cerebral palsy and dystonia (Cimolin, et al., 2009).
Pain	1. 57 of 133 (43%) of children and adolescents with CP reported having pain in the past 12 months, 17 (30%) reported chronic pain. Participants at GMFC levels IV-V reported more frequent and higher pain intensity. 23% of participants with pain did not receive any treatment. Pain often restricted participation. 2. Four out of six teens with cerebral palsy (GMFCS V) reported pain (Ridilla, et al., 2024). 3. One study of children with cerebral palsy found that nearly 55% of participants reported pain (Penner, et al, 2013) and another study found that 75% of children with cerebral palsy were in pain (Novak, et al., 2012). 4. Comfort is a high priority for families (Gimeno, et al., 2013). 5. Extension forces can lead to pain and, as a result, decrease sitting tolerance (Cimolin, et al., 2009; Incoronato, 2007). 6. Of people with CP, 75% experience chronic pain (CPARF.org). 7. Adults with CP are more likely to experience joint pain compared to non-disabled adults (43.6% vs. 28.0%) (Peterson, et al., 2015). 8. Children with dystonia report pain as a common concern (De Knegt, et al., 2013; Gimeno, et al., 2013; Penner, et al., 2013). 9. Pain may lead to decreased function and mobility (Haak, et al., 2009). 10. One study concluded that over half of the participants who had spastic CP reported problematic pain. The participants were individuals with CP GMFCS levels IV and V who used power wheelchairs (Frank, et al., 2017).	1. The Ridilla, et al. study (2024) indicated an increase in self-relief of pressure after prolonged seating in a response to increased pain. 2. Frank, et al. (2012) found that most power wheelchair users in their study experienced pain and that one strategy that reduced pain was changing position. 3. Movement has been shown to decrease pain in wheelchair users (Lyons, et al., 2017; Frank & DeSouza, 2017). 4. Incoronato (2007) found a reduction in pain with use of a specific dynamic seating system in a retrospective study.
Arthritis	1. Adults with CP are more likely to experience arthritis compared to non-disabled adults (31.4% vs. 17.4%, Peterson, et al., 2015) (Whitney, et al., 2018). 2. Arthritis may lead to decreased function and mobility (Haak, et al., 2009).	These studies could form the basis for future research to determine if dynamic seating could diffuse extensor forces to specifically lessen forces occurring in the joints.
Injury (from extensor forces, often from forceful contact with equipment or with damaged equipment)	1. The forces from extension on the client's body can lead to injury (Hong, 2006, Lange, 2021).	1. Further injuries were prevented in a client using dynamic seating who had a history of injuries secondary to extreme extension forces (Lange, 2021).

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CLINICAL PHENOMENON	RESEARCH THAT SUPPORTS THIS IS AN ISSUE IN CP	RESEARCH ABOUT DS AND THIS ISSUE
Shear forces (from client moving in relation to seating support surfaces)	1. Cimolin et al. (2009) used quantitative movement analysis to compare movement during extensor thrust using a dynamic back support and using a rigid back support and found increased vertical trunk movement (shear) during extension with the rigid back support.	1. Cimolin et al. (2009) used quantitative movement analysis to compare movement during extensor thrust using a dynamic back support and using a rigid back support and found decreased vertical trunk movement (shear) during extension with the dynamic back support. 2. Dynamic Seating allows movement while maintaining contact with the support surfaces, providing stability, and reducing shear forces (Hahn, 2009; Cimolin, et al, 2009; Chen, et al., 2018).
Equipment Breakage (secondary to strong sustained and/or intermittent client forces)	1. The forces from extension on a static wheelchair seat and frame can be so strong as to cause damage to equipment (Hong, 2006). 2. Breakage frequently occurs at the foot supports, leg support hangers, back support mounting hardware, and head support hardware (Hahn, 2009). 3. Continuous rocking, as well as forceful rocking, can lead to damage of the wheelchair seating system and frame (Incoronato, 2007).	1. Dynamic seating is designed to absorb extreme forces, which in turn, protects the wheelchair seating and frame from wear and tear and even breakage (Incoronato, 2007). 2. A single subject using dynamic seating experienced no further equipment breakage once receiving this intervention, despite a long history of equipment breakage (Lange, 2021).
Lack of movement (secondary to degree of postural support required within a seating system)	1. Many people using wheelchair seating and mobility cannot move their bodies significantly in relation to the seating system. This may be due to motor limitations or the postural supports themselves (Strobl, et al., 2013).	1. Movement can calm (reduce agitation), arouse (increase alertness), strengthen muscles, enhance visual control, and provide comfort, as well as improve voluntary functional movements (Chen, 2018; Phillips, 2017) by varying our position. 2. Maladaptive behaviors may be reduced in response to movement (Pfeiffer, et al., 2008). 3. Rollo, et al. (2017) reviewed 5 studies and found that classroom based dynamic seating improved attention. 4. Self-directed movement increases brain derived neurotrophic factor (BDNF) which enhances brain recovery at the structural and chemical level and encourages dendrite and axon development (Phillips, et al., 2017). Dynamic Seating may, through self-directed movement of the dynamic components, impact brain recovery, development, and function.
Decreased postural control, stability and function	1. Motor development plateaus for children with CP as early as 3 years of age with one out of three children unable to gain adequate trunk control for stable, independent sitting (Beckung, et al., 2007; Rosenbaum, et al., 2002). The estimated limit of development decreased as severity of impairment increased (Rosenbaum, et al., 2002).	1. Dynamic Seating allows movement while maintaining contact with the support surfaces, providing stability, and reducing shear forces (Chen, et al., 2018; Hahn, 2009; Cimolin, et al, 2009). 2. Adlam, et al. (2014) found increased head control and increased symmetry in posture using a dynamic seating system. 3.Incoronato (2007) noted improved posture in their study. 4. McNamara & Casey (2007) found improved overall positioning, including reduced sacral sitting (related to seat inclination). 5. Adlam (2015) found increased function with use of a dynamic seat in one study and in another (2014) one subject was able to access a switch when using dynamic seating. 6. Incoronato (2007) found improvement of motor control of the upper extremities, trunk, and head. 7. Dalton, (2014) found increased head and arm control with a simulated dynamic foot support. 8. Cimolin, et al. (2009) noted increased smoothness of movement. 9. Movement can increase vestibular and proprioceptive stimulation which can improve stability (Chen, et al., 2018). 10. Movement against resistance has been demonstrated to increase strength in people with increased muscle tone (McBurney, et al., 2003) without an increase in spasticity (Fowler, et al., 2001).

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CLINICAL PHENOMENON	RESEARCH THAT SUPPORTS THIS IS AN ISSUE IN CP	RESEARCH ABOUT DS AND THIS ISSUE
Range of motion losses (often secondary to prolonged time in a position, such as sitting in a wheelchair)	1. Range of motion may decrease secondary to a prolonged seated position (Strobl, et al., 2013).	1. Dynamic seating improves digestion (Incoronato, 2007).
Decreased vocalization	1. Speech Problems affect more than half of children with CP (based in Sweden, Nordberg, et al., 2013).	1. Dynamic seating improves vocalization (Adlam, et al., 2014).
Decreased circulation, often secondary to prolonged sitting	1. Patrangenaru (2006) noted that static seating can lead to circulation-related issues.	1. Increasing movement improves circulation and has health benefits (Myers, et al., 2021).
Decreased social engagement and participation	1. Children with CP have less participation and enjoyment of social and recreational activities compared to typically developing children (Chiarello, et al, 2014).	1. Adlam, et al. (2015) found increased social engagement with dynamic seating intervention.

Funding Challenges

The Centers for Medicare and Medicaid Services approved Healthcare Common Procedure Coding System Level II code E2398 "Wheelchair accessory, dynamic positioning hardware for back," effective Jan. 1, 2020. A Preliminary Medicare Payment Determination was made in May 2022, comparing the E2398 code for a dynamic back to the E1015 code for a "Shock Absorber for Manual Wheelchair." One way CMS determines a fee schedule is by conducting a"cross walk" that compares an item like the dynamic back to another coded item that already has a fee schedule. The payment determination for the code is then based upon the cost of the item that already has a fee schedule. As a result, the proposed reimbursement rate for the dynamic back was between $152.55 to $183.02, far below the cost to manufacture it. Despite significant advocacy efforts to change the fee schedule to a more reasonable reimbursement rate, the new payment schedule went into effect April 1, 2024. Industry leaders must continue to advocate for change, to ensure that those who require this intervention can still receive it.

A paradigm shift: Movement for all

Many people using wheelchair seating can independently move within their seating system and then return to an optimal position. This provides variety in their body position, which is important for functional tasks as well as for moving joints and muscles. Our brains are wired to move. Movement within an office chair or a wheelchair seating system provides many benefits like increasing alertness (Chen, 2018; Phillips, 2017), reducing discomfort (Ridilla, et al., 2024) and accommodating different body positions for specific tasks (Adlam, 2015; Adlam, 2014). For someone in a wheelchair seating system, pressure may also be relieved and/or redistributed (Ridilla, 2024).

Some people using wheelchair seating can move within their seating system, yet they are not able to independently return to an optimal position. This is typically because their movement causes them to push off a non-yielding surface, such as the back support during hip extension. This movement can cause their pelvis to move forward and into posterior pelvic tilt. As another example, individuals may push against their footplates with active knee extension, causing their pelvis to elevate off the cushion and then return to the seating surface in a poor posture. This person may lack the ability to reposition their bodies into optimal alignment after movement without assistance from a caregiver.

In these situations, movement can be provided through dynamic seating without the resultant loss of position. For example, when a client pushes against the back support during hip extension, a dynamic back moves in response, diffusing force and reducing leverage so that the client's body stays in alignment with their seating supports until they return to their starting position. If the client is pushing against the footplates, dynamic footrests move in response to this force. As the dynamic footrests move, they diffuse the client's forces and reduce leverage so they can extend their legs without loss of pelvic position.

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FIGURE 4 | This young lady has almost no ability to move within her static seating system, with the exception of her arms and neck.

Importantly, dynamic seating can provide movement, even within a very aggressive and restrictive seating system. Some clients may not be able to move their hips in relation to their seating system secondary to restrictive seating; however, a dynamic back allows hip extension without loss of position. A client may not be able to move their feet off the footplates secondary to seating interventions such as shoe holders with strapping, however the client can extend their knees and ankles using dynamic footrests (see Figure 4).

Movement as a human right

Is a person's right to move being neglected when we provide aggressive seating interventions to maintain posture, yet those supports prevent the individual from moving?

Instead of providing postural support or providing movement, can postural support and movement be provided? Just as mobility is considered a human right (Sabet et al., 2022), we argue that movement is as well. Service members can, and should, provide movement for individuals within a wheelchair seating system so they can experience the health and functional benefits that movement offers. While many people using wheelchair seating can move within their seating

system and reposition their bodies independently, others cannot. They may be restricted from moving by their seating supports, and/or unable to reposition their bodies after they move. Dynamic seating is an important solution to this "either-or" dilemma because it helps clients maintain their position while also accommodating their movements.

Summary

Although dynamic seating first became commercially available in 1989, a variety of options did not emerge until the early 2000s. Initially designed to prevent equipment breakage, dynamic seating has a wide variety of clinical applications. Client and caregiver experiences, expert clinical consensus and research support these benefits and innovative clinical applications. Product design has changed over the years to provide more efficient responses to client forces and minimize loss of client position in relation to the support surfaces during movement.

In a continued innovation of thought, seating and wheeled mobility team members must consider provision of movement within a seating system as a human right. This is particularly true for clients with the inability to change their position without a loss of alignment with their seating support surfaces.

REFERENCES

Adlam, T., Johnson, E., Wisbeach, A. and Orpwood, R. (2015). Look at me! A functional approach to dynamic seating for children with dystonia. Developmental Medicine & Child Neurology. Vol 57, pg 27. https://onlinelibrary.wiley.com/doi/pdfdirect/10.1111/dmcn.12780_2

Adlam T (Designability), Orpwood R (University of B), Wisbeach A (Great OSH), Alger H (Great OSH), Johnson E (Great OSH). (2014). Whole Body Dynamic Seating for Children with Extensor Spasms. In: Cooper D, Story M, editors. 30th International Seating Symposium. Vancouver: Interprofessional Continuing Education, University of British Columbia. pp. 182–185. http://seatingsymposium.com/images/pdf/2014Syllabus.pdf

Bar-On, L., Desloovere, K., & Harlaar, J. (2018). Spasticity Assessment in Cerebral Palsy. In Cerebral Palsy (pp. 1-16). Springer. https://link.springer.com/reference-workentry/10.1007/978-3-319-74558-9_40.

Beckung, E., Carlsson, G., Carlsdotter, S., & Uvebrant, P. (2007). The natural history of gross motor development in children with cerebral palsy aged 1 to 15 years. Developmental Medicine & Child Neurology, 49(10), 751-756. https://doi.org/10.1111/j.1469-8749.2007.00751.x.

Bischoff, L. A., Tscherter, A., Hunziker, S., Grunt, S., Graf, N. T., Künzle, C. T., & Broser, P. J. (2024). Pain in Children and Adolescents with Cerebral Palsy: A Cross-sectional Survey Study. Neuropediatrics. https://doi.org/10.1055/a-2474-6503.

Cerebral Palsy Alliance Research Foundation. Cparf.org. https://cparf.org/what-is-cerebral-palsy/how-does-cerebral-palsy-affect-people/.

Chen, X., Liu, F., Yan, Z., Cheng, S., Liu, X., Li, H., & Li, Z. (2018). Therapeutic effects of sensory input training on motor function rehabilitation after stroke. Medicine,97(48). doi:10.1097/md.0000000000013387.

Chiarello, L. A., Palisano, R. J., McCoy, S. W., Bartlett, D. J., Wood, A., Chang, H. J., ... & Avery, L. (2014). Child engagement in daily life: a measure of participation for young children with cerebral palsy. Disability and rehabilitation, 36(21), 1804-1816. https://doi.org/10.3109/09638288.2014.882417.

Cimolin, V., Piccinini, L., Avellis, M., Cazzaniga, A., Turconi, A. C., Crivellini, M., & Galli, M. (2009). 3D-Quantitative evaluation of a rigid seating system and dynamic seating system using 3D movement analysis in individuals with dystonic tetraparesis. Disability and Rehabilitation: Assistive Technology, 4(6), 422-428. https://doi.org/10.3109/17483100903254553.

Dalton (2014). An Evaluation of a Simulated Dynamic Foot Support. International Seating Symposium, Vancouver, BC. Proceedings, pgs. 64-67. http://seatingsymposium.com/images/pdf/2014Syllabus.pdf.

De Knegt, N. C., Pieper, M. J., Lobbezoo, F., Schuengel, C., Evenhuis, H. M., Passchier, J. & Scherder, E. J. (2013). Behavioral pain indicators in people with intellectual disabilities: a systematic review. The Journal of Pain, 14, 885-896. https://doi.org/10.1016/j.jpain.2013.04.016.

Frank, A. & De Souza, L. (2017) Problematic clinical features of children and adults with cerebral palsy who use electric powered indoor/outdoor wheelchairs: A cross-sectional study, Assistive Technology, 29:2, 68-75. DOI: 10.1080/10400435.2016.1201873.

Frank, A. O., De Souza, L. H., Frank, J. L., & Neophytou, C. (2012). The pain experiences of powered wheelchair users. Disability and Rehabilitation, 34(9), 770-778. Doi: 10.3109/09638288.2011.619620.

Gimeno, H., & Adlam, T. (2020, March). Protocol: Using Single-Case Experimental Design to Evaluate Whole-Body Dynamic Seating on Activity, Participation, and Quality of Life in Dystonic Cerebral Palsy. In Healthcare (Vol. 8, No. 1, p. 11). Multidisciplinary Digital Publishing Institute. https://www.mdpi.com/2227-9032/8/1/11.

Gimeno, H., Gordon, A., Tustin, K., & Lin, J. P. (2013). Functional priorities in daily life for children and young people with dystonic movement disorders and their families. European journal of Paediatric Neurology, 17(2), 161-168. https://www.sciencedirect.com/science/article/abs/pii/S1090379812001821, https://www.ejpn-journal.com/article/S1090-3798(12)00182-1/fulltext

Haak, P., Lenski, M., Hidecker, M. J. C., Li, M., & Paneth, N. (2009). Cerebral palsy and aging. Developmental Medicine and Child Neurology, 51(Suppl 4), 16–23. Doi:10.1111/j.1469-8749.2009.03428.x.

Hahn, M. E., Simkins, S. L., Gardner, J. K., & Kaushik, G. (2009). A dynamic seating system for children with cerebral palsy. Journal of Musculoskeletal Research, 12(01), 21-30. https://www.worldscientific.com/doi/abs/10.1142/S0218957709002158.

Hong, S. W., Patrangenaru, V., Singhose, W., & Sprigle, S. (2006). Identification of human-generated forces on wheelchairs during total-body extensor thrusts. Clinical Biomechanics, 21(8), 790-798. https://www.sciencedirect.com/science/article/pii/S0268003306000751.

Incoronato, P.: Dynamic seating for children and adults with multiple disabilities. Orthopedic technology. 2/2007, 92-97. https://www.tib.eu/de/suchen/id/tema%3ATEMA20070300132/Dynamische-Sitzversorgung-f%C3%BCr-Kinder-und-Erwachsene/.

Lange, M. L. (2021). Clinical changes as a result of dynamic seating in a young adult with cerebral palsy. Disability and Rehabilitation: Assistive Technology, 1-6. DOI: 10.1080/17483107.2021.1984593.

Lange, M. L., Crane, B., Diamond, F. J., Eason, S., Pedersen, J. P., & Peek, G. (2021). RESNA position on the application of dynamic seating. Assistive Technology. https://doi.org/10.1080/10400435.2021.1979383

Lyons, Jones, Swallow, Colin Chandler. (2017) An Exploration of Comfort and Discomfort Amongst Children and Young People with Intellectual Disabilities Who Depend on Postural Management Equipment. Journal of Applied Research in Intellectual Disabilities 30:4, pages 727-742. http://eprints.whiterose.ac.uk/105176/3/Accepted%20Lyons%20et%20al.pdf.

McBurney, H., Taylor, N. F., Dodd, K. J., & Graham, H. K. (2003). A qualitative analysis of the benefits of strength training for young people with cerebral palsy. Developmental medicine and child neurology, 45(10), 658-663. https://www.cambridge.org/core/journals/developmental-medicine-and-child-neurology/article/abs/qualitative-analysis-of-the-benefits-of-strength-training-for-young-people-with-cerebral-palsy/5AAF0821D5FF045234A5F247816ADD34.

McNamara, L., & Casey, J. (2007). Seat inclinations affect the function of children with cerebral palsy: a review of the effect of different seat inclines. Disability and Rehabilitation: Assistive Technology, 2(6), 309-318. https://www.tandfonline.com/doi/abs/10.1080/17483100701661314.

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CLINICAL PERSPECTIVE | CONTINUED FROM PAGE 23

Myers, J., Kokkinos, P., Arena, R., & LaMonte, M. J. (2021). The impact of moving more, physical activity, and cardiorespiratory fitness: Why we should strive to measure and improve fitness. Progress in cardiovascular diseases, 64, 77-82. https://doi.org/10.1016/j.pcad.2020.11.003.

Nordberg, A., Miniscalco, C., Lohmander, A., & Himmelmann, K. (2013). Speech problems affect more than one in two children with cerebral palsy: Swedish population-based study. Acta paediatrica, 102(2), 161-166. https://doi.org/10.1111/apa.12076.

Novak, I., Hines, M., Goldsmith, S., & Barclay, R. (2012). Clinical prognostic messages from a systematic review on cerebral palsy. Pediatrics, 130(5), e1285–e1312. doi:10.1542/peds.2012-0924.

Patrangenaru: Development of a dynamic seating system for high-tone extensor thrust. Thesis. 05/2006. Georgia Institute of Technology. https://smartech.gatech.edu/handle/1853/10438.

Penner, M., Xie, W. Y., Binepal, N., Switzer, L., & Fehlings, D. (2013). Characteristics of pain in children and youth with cerebral palsy. Pediatrics, 132(2), e407–e413. doi:10.1542/peds.2013-0224.

Peterson, M. D., Ryan, J. M., Hurvitz, E. A., & Mahmoudi, E. (2015). Chronic conditions in adults with cerebral palsy. Jama, 314(21), 2303-2305. doi:10.1001/jama.2015.11025.

Pfeiffer, B., Henry, A., Miller, S., & Witherell, S. (2008). Effectiveness of Disc 'O'Sit cushions on attention to task in second-grade students with attention difficulties. American Journal of Occupational Therapy, 62(3), 274-281. doi:10.5014/ajot.62.3.274.

Phillips, C. (2017). Brain-Derived Neurotrophic Factor, Depression, and Physical Activity: Making the Neuroplastic Connection. Neural Plasticity, 1-17. doi:10.1155/2017/7260130.

Ridilla S., Wang H., Sylvester, L. & Arnold, S. (2024) Pain and self-pressure relief in adolescents with cerebral palsy, Assistive Techology, DOI: 10.1080/10400435.2024.2305972.

Rollo, S., Smith, S., & Prapavessis, H. (2017). Do you want your students to pay more attention in class? Try Dynamic Seating! Journal of Ergonomics. https://www.longdom.org/open-access/do-you-want-your-students-to-pay-moreattention-in-class-try-dynamic-seating-2165-7556-1000217.pdf

Rosenbaum, P. L., Walter, S. D., Hanna, S. E., Palisano, R. J., Russell, D. J., Raina, P., ... & Galuppi, B. E. (2002). Prognosis for gross motor function in cerebral palsy: creation of motor development curves. Jama, 288(11), 1357-1363. doi:10.1001/jama.288.11.1357.

Sabet, A., Feldner, H., Tucker, J. Logan, S., Galloway, J. C., (2022). ON TIME mobility: Advocating for Mobility Equity. 22Pediatric Physical Therapy 34 546-560. doi: 10.1097/PEP.0000000000000939.

Samaneein, K., Greene, P., Lees, K., and Riches, P. (2013). Comparison of Imparted Forces between Rigid and Dynamic Seating Systems during Activities of Daily Living by Children with Cerebral Palsy. Congress of the International Society of Biomechanics, Brazil. https://isbweb.org/images/conferences/isb-congresses/2013/oral/cb-cp-stroke-spasticity.03.pdf.

Strobl, W. M. (2013). Seating. Journal of children's orthopaedics, 7(5), 395-399. https://doi.org/10.1007/s11832-013-0513-8.

Sullivan, P.B., Andrew, M.J. (2018). Gastrointestinal Problems in Children with Cerebral Palsy. In: Panteliadis, C. (eds) Cerebral Palsy. Springer, Cham. https://doi.org/10.1007/978-3-319-67858-0_30

Tanoue, H., Mitsuhashi, T., Sako, S., & Inaba, R. (2021). An exploratory study on the impact of static and dynamic sitting postures on lumbar and pelvic mobility during visual display terminal work. Journal of Physical Therapy Science, 33(5), 406-412. https://doi.org/10.1589/jpts.33.406.

Wang, Z., & Raunser, S. (2023). Structural biochemistry of muscle contraction. Annual Review of Biochemistry, 92(1), 411-433. https://doi.org/10.3389/fneur.2021.620852.

Whitney, D. G., Hurvitz, E. A., Ryan, J. M., Devlin, M. J., Caird, M. S., French, Z. P., ... & Peterson, M. D. (2018). Noncommunicable disease and multimorbidity in young adults with cerebral palsy. Clinical epidemiology, 10, 511. https://dx.doi.org/10.2147%2FCLEP.S159405.

Please refer to a prior Rehab Case Study on the application of dynamic seating with a young child. Visit https://issuu.com/nrrts/docs/directions_2024v4_issu/s/55399374

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RESNA

RESNA Update: Position Papers, Recertification, Career Center

WRITTEN BY: Andrea Van Hook, RESNA Executive Director

New RESNA position papers

RESNA has published two new position papers:

- **RESNA Position on Assistive Technology for Lying Care Posture Management –** Postural support in the lying orientation is a key element of 24-hour posture care management, which aims to improve quality of life and prevent secondary complications. This paper educates and advocates for the appropriate use of lying posture care management by outlining the need for such intervention and providing definitions, current evidence and best practices.
- **RESNA Position on the Application of Tilt, Recline and Elevating Leg Rests for Wheelchairs: Literature Update 2023 –** An update of the original 2015 position paper, this document reviews current literature on seat functions available on both power and manual wheelchairs, including tilt, recline and elevating and articulating leg rests. It details the applications and contraindications for each seat function.

RESNA position papers are available free of charge to advance science and improve access to assistive technologies for people with disabilities and older adults. The development of these papers follows a rigorous process that includes a comprehensive review of scientific literature, documented best practices and expert and public review.

Position papers are designed to inform clinicians, suppliers, payors, policymakers and consumers about available research and evidence supporting specific technologies. While they provide valuable insights, they are not a substitute for clinical advice.

Visit the RESNA website, click on "Resources" and scroll down to "Position Papers and Service Provision Guidelines" for more information.

Recertification made simple

Ensure your RESNA recertification process runs smoothly by following these steps:

- Submit your renewal form online and upload CEU certificates **at least** three to five weeks before your expiration date to avoid delays.
- Keep your RESNA account information up to date. Email notifications will be sent to the address on file.
- You may submit recertification up to three months before your expiration date.
- Use the online form; do **not** mail your recertification documents.
- If you have trouble uploading certificates, submit at least one and click "Submit." Then, combine the remaining certificates using Adobe's free online PDF combiner and email them to **certification@resna.org** with your name and confirmation of form submission.
- Once RESNA receives your paperwork, an invoice will be posted to your account within three days. Renewal processing will begin once the invoice is paid.

Processing takes approximately three to five weeks. You can check your recertification status using the "Find an ATP" tool on the RESNA website.

Certificates are emailed on Fridays. If you do not receive your certificate, check your spam folder before contacting the office.

RESNA job board & career center

Looking for a great employee or new job?

Visit RESNA's job board and career center for postings from across the U.S. Go to "Resources" and scroll down to "Career Center" to explore opportunities.

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Andrea Van Hook is executive director of RESNA. She has more than 20 years of experience in nonprofit association management and lives and works in Washington, D.C.

CLINICAL EDITORIAL

Technology for Unmet Needs - Why It's Increasingly Difficult to Get Innovative Technology to Those Who Need It

WRITTEN BY: Rita J. Stanley

Manufacturers of medical devices in the U.S. market are aware of the myriad of regulatory policies that must be followed, especially those enforced by the Food and Drug Administration. This article will not address the FDA regulatory processes except to mention that following the policies closely and consistently is crucial. The Center for Medicare and Medicaid Services processes and resulting decisions have increasingly limited access to innovative technologies for the people who need them. This isn't the agency's intent, but it can be the unintended consequence of its processes. The influence of Medicare decisions is far-reaching. Many third-party payers routinely follow Medicare coding and coverage policies. And most, including Medicaid, routinely use the Medicare fee schedule as the base from which to discount.

Background

There are four necessary steps for a medical device to successfully be reimbursed by third party payers (not including the Veterans Affairs).

1. Medicare Benefit Category Assignment — A Healthcare Common Procedure Coding System code can be assigned without a benefit category, however, Medicare will not reimburse for an item without it.
2. Assignment of a Level II HCPCS code.
3. Adequate reimbursement.
4. Published coverage policy, or one that is well understood and consistently adhered to.

Benefit category assignment

Anyone may submit a request for Durable Medical Equipment, Prosthetic Devices, Prosthetics, Orthotics and Supplies benefit category determination. This can be done in one of two ways: as part of a HCPCS Level II code addition or revision or as part of a request for a National Coverage Determination. The process should be chosen carefully and advice from experts could prove invaluable. The timeline varies between the two processes, as does the level of scientific evidence required for each, as NCDs are made through an evidence-based process.

Assignment to a HCPCS code

Durable medical equipment is billed to Medicare through HCPCS.. It was established in 1978 to provide a standardized coding system. However, the use of these codes was voluntary beyond Medicare, and Medicaid and commercial payers had the ability to create unique codes to meet the needs of their enrollees and their program's operating needs.

With the implementation of the Health Insurance Portability and Accountability Act of 1996, use of the HCPCS for transactions involving health care information became mandatory for all payers, not just Medicare. Then, in October of 2003, the Secretary of Health and Human Service delegated authority under the HIPAA legislation to CMS to maintain and distribute HCPCS Level II codes and establishing uniform national definitions.[1]

Medicare fee schedule development

When a new HCPCS code is approved, a payment modifier and in most situations, a Medicare fee schedule will be established.

Continuity of Pricing — This is applied when Medicaid has paid for the item in the past under an existing HCPCS code. While manufacturers could seek a new HCPCS code for an item with features that exceed existing code requirements, a motivator could be to obtain reimbursement that covers the additional features and their associated cost. However, the continuity of pricing would prevent the assignment of a higher fee schedule.

Comparability — This method is used when the technology for which the new code was created is determined to be comparable to those in an existing code based on physical, mechanical and electrical components,

function and intended use, and additional attributes and features. Based on CMS policy, there is no prioritization among these categories, and the analysis may be completed based on the item, subcomponents of the item or a combination of items. It is important to note that a new item does not have to be comparable within each category to be considered comparable.

Gap-Fill Process — This method is used when neither of the above are applicable. This involves the use of verifiable reimbursement amounts paid for the item by commercial (non-Medicare) payers. There is a complex formula that CMS has utilized for years that involves deflating and inflating the prices and determining the adjusted median paid amount. Without losing readers in the process details, the ultimate fee schedule amount is routinely 30% lower than the median price.

The Medicare influence on access

Medicare has always influenced how other payers view technologies. Over time, legislation, regulation and the evolution of managed care has increased the ways that CMS and Medicare policy influences access for all. It is important for all stakeholders to understand the required processes and how they influence access. CMS has implemented important changes to the various processes over the last decade. Many of these changes were the result of stakeholder advocacy. A good example is CMS' policy change that allows HCPCS applications on a biannual basis for DMEPOS as opposed to one-time a year.

It has become increasingly important for manufacturers to have evidence regarding the clinical significance of new technology. As budget pressures increase, we can expect the push for evidence to escalate. To improve prompt access to innovative technology, manufacturers would benefit from verifying their product development timelines, including the necessary regulatory processes, and determine the evidence required.

REFERENCE

1. All policy details are available on the CMS website at www.cms.hhs.gov

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Rita Stanley has 43 years of experience associated with durable medical equipment/Complex Rehab Technology and Assistive Technology. Stanley joined RxFunction Inc. as vice president of government relations in October 2022. Prior to that, she established Merriman Innovation Consulting, LLCS, a company primarily focused on health policy with an emphasis on improving access to innovative technology. Stanley has a strong understanding of coding, coverage and payment policies and believes that coding is the foundation for coverage and payment. She is engaged in efforts to improve the HCPCS coding system. Stanley was the founding president of NCART and currently serves as the RESNA liaison. Stanley also serves on the RESNA board of directors, is the president-elect of the RESNA executive board and chairs its government affairs committee. Stanley also serves on the Alliance for HCPCS coding reform and is a Friend of iNRRTS. Stanley has experience and insight that allows her to understand where policies are preventing adequate access to technologies and has dedicated her career to understanding the processes and strategies available to bring meaningful reform.

CLINICALLY SPEAKING

Guided by Purpose

WRITTEN BY: Rosa Walston Latimer

Twenty-four years ago, an inquisitive young EMT would wheel patients through the hospital doors and wonder what happened next. What came after the emergency? Who helped these individuals reclaim their independence and dignity?

These unanswered questions sparked a journey for Darcy Erickson, O.T., MAOL, ATP, that would touch countless lives. Erickson is now a highly skilled occupational therapist, a leader at the Mayo Clinic in Rochester, Minnesota, and a passionate advocate for disability access and neurorehabilitation.

What inspired you to enter this profession?

I have been an occupational therapist for many years and have practiced through the full continuum of care, including acute care, inpatient rehabilitation, subacute rehab, long-term care and home care over my career. I was an EMT in my early 20s and thought about a career as a paramedic. But when I would bring patients via ambulance to the hospital, I always wondered how they recovered and went home and felt there was so much more to each patient's story. I did some shadowing with occupational and physical therapists and determined that occupational therapy was the career for me, being part of the team to help patients recover and go home.

Tell us about your present work responsibilities.

I currently work at the Mayo Clinic in Rochester, Minnesota, as a therapy supervisor in neurologic rehabilitation. I specialize in spinal cord injury and dysfunction through the continuum of acute care, inpatient rehabilitation and outpatient. I also work with adults with acquired brain injury and neurodegenerative diseases. I am an ATP and supervise our outpatient wheelchair clinic. I am also an assistant director of our Occupational Therapy Neurorehabilitation Fellowship.

What is your favorite part of the work you do?

Darcy Erickson hiking with Kona and Zephyr at Lake Superior.

CLINICALLY SPEAKING

Darcy Erickson and her husband, Steve, at the Colosseum in Rome, Italy.

Steve and Darcy Erickson on Lake Yellowstone, Yellowstone National Park in Wyoming.

The people! I enjoy helping patients identify their goals and needs and helping to support them in recovery and getting back to their community. I also enjoy working with colleagues to develop new skills or problem-solve complex patient needs or scenarios.

Can you share one of your favorite moments where you really felt you made a difference in someone's life?

There isn't just one moment; there are many. My favorite part of my work is meeting previous or current patients out in the community with their families and friends — living their lives. It's incredibly rewarding to meet the important people in a patient's life for the first time and see the patient thriving.

It is also great if the patient tells me that I had a role in helping them achieve their goals and/or that they want to come back to see me in outpatient if they have needs. This response is a powerful affirmation that my work is making the impact I strive for.

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Darcy and Steve Erickson (right) with Dary's sister (left) and her family and Darcy's parents (center).

Darcy Erickson (center front) with occupational and physical therapists from Mongolia, Korea and Japan at the Mongolian National University for Medical Sciences in Ulaanbataar, Mongolia.

Is there an innovative approach or product in your field that you're really excited about right now?

The powered and nonpowered add-on devices for manual wheelchairs can be a game changer for a patient. I love being outdoors, so anything that can help manual wheelchair users do the same is a win. It is vital to keep a small footprint on a manual wheelchair at home and work, making access and transfers to other surfaces as easy as possible. But those benefits are a liability on uneven terrain, inclines and declines, and over long distances. Adaptive devices enhance wheelchair stability and make navigating grass, gravel, hills and other challenging terrain easier, helping users get the most out of their experience.

What keeps you engaged in your work?

My colleagues! I just cannot overstate how important a great team is in health care. Working in an academic medical center and a Level 1 trauma center can be very stressful; patients can be very sick, their medical journey

complicated and not everyone gets better. There is never enough time to help patients and their care partners prepare for life after hospital discharge. Working together as a team to get all perspectives on the table and identify patient and team priorities is necessary to have the best outcomes possible. We have a passion for our work that can make all the difference.

How has this career impacted your personal life?

I am, by nature, a curious person. Working in neurologic rehabilitation continually challenges me to think differently and to look beyond obvious issues and concerns to an underlying cause.

This approach has helped me be more patient, understanding and a better collaborator with my family and friends. It has also made me more aware of inequities in care and access, especially for persons with disabilities. This work has energized me to be a more vigorous advocate professionally in organizations I volunteer with and projects I am involved in.

Please tell us about your volunteer work.

Two organizations that are meaningful to me are the Academy of Spinal Cord Injury Professionals and the Clinicians Task Force. I have been a member of ASCIP for several years and am the incoming president of the Therapy Leadership Committee. The nonprofit organization is an excellent collaboration of therapists, providers, nurses, psychologists, social workers, researchers and others committed to providing the best care after spinal cord injury. The CTF is another nonprofit organization dedicated to advocating for access to appropriate equipment. This group is an excellent resource for clinical expertise in seating and wheeled mobility. I have made great friendships and professional connections through both of these organizations. Being a member of ASCIP and CTF has positively impacted my clinical knowledge and care for patients and helped me make a greater impact than I could do alone.

I also volunteer with the local sled hockey team, the Rochester Mustangs, specifically helping athletes with their seating and positioning in the sleds to prevent skin integrity issues that may keep them out of the game. I wish I could say my skating skills have improved, but alas, they haven't. I am better as an off-ice resource.

Outside of your work what is important to you? What do you enjoy?

Family, being outdoors and traveling are my loves. My husband, Steve, and I have been married for 22 years. We live close to our parents and siblings, so we spend much of our time as a group with our nieces and nephews and aunts, uncles and cousins. We have two dogs, Kona and Zephyr, our fur babies. I always joke that I work so my dogs can have a better life. They are very active dogs, so we love being outside hiking, visiting state parks in Minnesota and taking them fishing at the lake, one of their favorite pastimes. We also love to travel, visit friends and learn about different cultures and historic places. I had the opportunity to do education and training in Mongolia in 2023. That was such a great experience!

At the end of the day what do you consider a success?

At the end of the day, success is knowing I gave my best to my patients, my team and myself. And if I didn't? Then I ask what I've learned and how to do better next time.

That mindset — of curiosity, service, and constant improvement — has carried Erickson through more than two decades in health care and will take her forward as she lives her purpose.

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Darcy Erickson, O.T., MAOL, ATP, is an occupational therapist at the Mayo Clinic in Rochester, Minnesota, where she is a therapy supervisor in neurologic rehabilitation, specializing in spinal cord injury and dysfunction. She also supervises the outpatient wheelchair clinic and is an assistant director of the Mayo Occupational Therapy Neurorehabilitation Fellowship. Erickson is incoming president of the Therapy Leadership Committee of the Academy of Spinal Cord Injury Professionals, a member of the Clinician Task Force and an individual Friend of iNRRTS.

INDUSTRY LEADER

Simeon Hughes: All In, All Heart

WRITTEN BY: Rosa Walston Latimer

When you talk to Simeon Hughes, you quickly realize he doesn't do anything halfway. He's more than a man with a résumé — he's on a mission. Whether leading U.S. sales for a New Zealand-based custom wheelchair seating company or chasing ducks with his 5-year-old daughter, Hughes brings full-throttle energy to everything he touches.

"I'm kind of hyper, and I love people. I also love a challenge, and I just have this need to figure things out," Hughes said.

And figure things out, he has — often by jumping in with both feet, heart first.

Hughes is the director of U.S. sales and business development for Spex Seating, a company known for its customizable, modular wheelchair seating systems. It's a dream role for someone passionate about helping people, solving problems and shaping lives in meaningful ways. But his path to this role was anything but traditional.

After college, Hughes spent three years teaching English as a Second Language to adults and reading to fifth graders. Then, he took two years off to help establish a church congregation. After his first child was born, Hughes returned to teaching for more stability and a steady income.

While teaching, he launched a side business — power washing and window cleaning in Houston. But it wasn't just a hustle; it was a mission. Hughes aimed to hire refugees, many of whom had fled war-torn regions in Africa or were displaced during the Arab Spring and the Syrian refugee crisis. As they worked together nights and weekends, Hughes taught them English and helped them assimilate.

The business grew fast, too fast. "I was paying my guys too much and hiring too many. I led with my heart instead of my calculator," Hughes said. Eventually, the cash ran out, but the mission carried on.

One of his employees, an Iranian named Mateen who fled religious persecution, went on to launch Nations Houston, a nonprofit that distributes food and helps refugees find jobs.

"That's what matters," Hughes said. "Even if the business didn't last, the impact did."

Looking for something more stable after closing his business, Hughes took a neighbor's suggestion to check out an opening at Southwestern Medical Reps. "I had zero medical background, but I love people, and I knew how to hustle," Hughes said.

Melissa and Simeon Hughes on a hike to Mount Cooke and a glacier in New Zealand.

For the next nine months, he dedicated himself to learning the Complex Rehab Technology industry. Southwestern carried a range of custom rehab equipment, from beds and standers to power chairs and bath equipment. Hughes was all in, making cold calls, learning product specs and asking questions. He eventually found a mentor in Rafferty Laredo, CEO of United Spinal Houston, who taught him anatomy one-on-one. Hughes then took a 40-hour seating and positioning course through VGM, earned his Assistive Technology Professional certification, and later obtained additional certifications as a Certified Aging-in-Place Specialist and a Certified Environmental Access Consultant.

"I just kept going deeper and deeper. I love a challenge, and this industry is full of them," he said.

While attending the International Seating Symposium,, Hughes met the team from Spex Seating. He was immediately impressed with their modular seating system and recognized its potential applications.

INDUSTRY LEADER

Kids' church camp photo of Simeon with his two oldest children, Analise (12) and Joshua (9).

After consulting with Spex on business strategy, pricing, warehousing and more, Hughes joined full time to lead U.S. sales and business development. Today, he oversees a growing team of more than 20 independent sales representatives covering about 60% of the country.

"I'm basically all things U.S. for Spex right now — hiring, training, marketing, strategy. It's a dream job," Hughes said.

Simeon and daughter, Analise, at a Houston Astros game during the 2022 World Series.

His mission with Spex is threefold: empower his reps, support clinicians and improve the lives of clients and their families.

Sales, he insists, is about people not quotas. "It's not about 'always be closing,'" Hughes said. "It's about solving problems and helping people live better lives."

His first priority is his team. Hughes doesn't just hire people; he invests in them. "I love giving people tools and vision. My goal is to equip them, then get out of the way," he said.

Second, Hughes supports ATPs and clinicians by ensuring they have the tools to serve clients better. He recognizes a shift in the industry toward product-driven decisions instead of custom solutions. That's where Spex makes a difference.

"With our product, we offer a solution that starts with the person," he said. "Spex custom seating is whatever you need it to be in the moment. It allows practitioners to get creative and provide simple solutions to complex needs."

Spex is also launching a continuing education program to bring fresh perspectives to custom seating. "Education is crucial. When you understand the 'why,' you can serve with confidence," Hughes said.

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INDUSTRY LEADER | CONTINUED FROM PAGE 33

The Hughes family: Joshua, Simeon, Jubilee, Analise and Melissa

Simeon Hughes (right) with a tri-crew from TIRR Memorial Hermann hospital in Houston, Texas, supporting Chad Walagura (front) to complete a spring triathlon.

Most importantly, he wants to help clients live fuller lives.

"Our product is built to adapt. People gain weight, lose weight, grow, change. We can modify the seating on the spot without starting over with a new mold. That's a game-changer," he said.

Hughes recalled a young woman who gained significant weight between her evaluation and the delivery of her chair.

"If we had brought a molded system, we would have failed her," he said. "Instead, we made the adjustments right there. She got her independence — and her dignity — back in a single day."

These days, Hughes is learning to slow down. "You can't drive 110 mph all the time," he said. "I've learned that the hard way."

When he's not training reps or supporting evaluations, he's hiking, woodworking, reading or spending time with his kids. His oldest is into tennis, his son takes karate, and his youngest loves picking flowers and chasing bugs outdoors.

That balance fuels Hughes professionally. "I love being the guy who sees something new and just goes for it," he said.

And what he sees is a future where custom seating is more personalized, more flexible and more focused on people rather than products.

"I get to shape better lives — for our reps, for clinicians and for the people sitting in these chairs," he said. "That's what gets me up every day."

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Simeon Hughes, ATP, CEAC, CAPS, is U.S. sales and business development lead for Spex Seating, New Zealand. Working with more than 20 independent sales reps, Hughes covers approximately 60% of the U.S. providing leading-edge postural support solutions for a wide range of special needs.

DIRECTIONS CANADA

Breaking Barriers in Diversity, Equity, Inclusion

WRITTEN BY: Linda Norton, B.Sc.OT, M.Sc.CH, Ph.D., OT Reg. (Ont)

As a Canadian, I usually do not comment on U.S. politics. Recently, though, I presented a workshop entitled, "Prescriptions without limit: breaking barriers with inclusion, equality, diversity and accessibility," in the United States at the same time I was hearing on the news of the U.S. government's direction to remove all references to DEI (Diversity, Equity and Inclusion) from government websites, institutions and curriculums. This governmental policy certainly provided an interesting context for this presentation.

In the context of the presentation, the view of DEI was consistent with other common definitions — "organizational frameworks that seek to promote the fair treatment and full participation of all people, particularly those groups who have historically been underrepresented or subject to discrimination" [Wikipedia].

A good example of this, relevant to the provision of Complex Rehab Technology, is pressure injury prevention and management. People with darkly pigmented skin have higher pressure injury rates and higher-pressure injury severity.[1] One of the contributing factors to this statistic is health care providers have been educated to look for skin redness as an early sign of skin damage related to pressure, which is not easily detected in people with darker skin tones. Since the pressure related skin damage isn't consistently detected, these individuals do not receive access to the same care that is triggered in people with lighter skin tones when redness appears.

To receive equal access to pressure injury prevention initiatives and equipment, the approach health care providers take to detect early signs of pressure related skin damage needs to change such that this damage is detected regardless of the client's skin tone. Fortunately, there is work occurring in this area. In the meantime, we can learn from people with dark skin tones who have pressure injuries. People with dark skin tones report early indicators of skin damage related to pressure include skin discoloration (including, a darker or lighter hue, additional colors such as purple, blue and red), pain, swelling or temperature change and that the changes may be subtle.[2] As CRT providers we need to include these indicators in our assessments when considering the risk of pressure injuries in our clients.

Clearly, using skin redness as the primary indicator of pressure related skin damage is a biased approach to detecting early signs of pressure injuries. Learning that there may be biases in the early detection of pressure injuries, our next question should be, "what are the biases that I may hold, that limit the opportunities or may have negative health outcomes for my client?" This is a difficult question for one to answer, as our biases may be invisible to us. One way to examine these is to notice when we fail to tell clients about equipment that may be of benefit. Consider why the equipment is not being offered. Because they can't afford it? Because they will never use it? Because?

Cultural humility defined as "a lifelong commitment to self-evaluation and self-critique, to redressing the power imbalances ... and to developing mutually beneficial and non-paternalistic clinical and advocacy partnerships with communities on behalf of individuals and defined populations"[3] can be a helpful approach to overcome biases we may hold. An example of cultural humility was shared in the first issue of DIRECTIONS in 2025 in the article "But there's no funding for that." Rather than limiting equipment options because the clinician or CRT provider believes the client cannot afford it, say, "There are several types of equipment that could be helpful for you. Would you like to hear about all the options, or just those where you would likely qualify for some funding?" This approach opens opportunities for the client and empowers them to make the decisions that they believe are the most appropriate for them — limit themselves to the equipment that is funded, ask for assistance from friends and family, advocate for new funding sources ... or something else.

Although I was worried about presenting a DEI topic in the United States in the political context at that time, the presentation went well and together we had some great discussions.

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DIRECTIONS CANADA | CONTINUED FROM PAGE 35

Once again, I was reminded that regardless of what country we come from, we have more in common with each other as providers of CRT than differences. Challenges with funding are common, although our funding agencies are different. Addressing clinical issues such as postural instability or risk for pressure injuries are the same, even if the equipment we can access is different. The perspective of being mindful of potential biases and empowering our clients with choices is also a perspective we share.

REFERENCES:

1. Oozageer Gunowa N, Hutchinson M, Brooke J, Jackson D. Pressure injuries in people with darker skin tones: A literature review. Vol. 27, Journal of Clinical Nursing. Blackwell Publishing Ltd; 2018. p. 3266-75.

2. Oozageer Gunowa N, Oti KA, Jackson D. Early identification of pressure injuries in people with dark skin tones: Qualitative perspectives from community-based patients and their carers. J Clin Nurs. 2024;

3. Tervalon M, Murray-García J. Cultural humility versus cultural competence: A critical distinction in defining physician training outcomes in multicultural education. J Health Care Poor Underserved. 1998;9(2):117-25.

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Linda Norton, B.Sc.OT, MSc.CH, Ph.D., OT Reg. (Ont), is an occupational therapist who is passionate about the provision of appropriate seating and mobility equipment and the prevention of chronic wounds. Her diverse experience in various settings including hospital, community and industry, and in various roles including clinician, educator, manager and researcher, gives Norton a unique perspective. Wound prevention and management are also Norton's passions. She has completed the International Interprofessional Wound Care Course, a master's in community health focusing on pressure injury prevention and a Ph.D. in occupational science focusing on chronic wounds.

REHAB CASE STUDY

The Cat's Meow:

A Wheelchair User's Journey with Blind Spot Sensors

WRITTEN BY: Pooja Viswanathan, Ph.D., founder and CEO, Braze Mobility Inc.

THIS ARTICLE IS SPONSORED BY BRAZE MOBILITY

Innovation rooted in lived experience

In Complex Rehabilitation Technology, innovation isn't just about launching new features, sensors or smart systems. True innovation is measured by how much more freely people can move, how confidently they can live and how well their needs are understood.

This case study explores how a team of clinicians, engineers, caregivers and advocates worked together to help Marine veteran Phil Ratzlaff navigate safely and independently with blind spot sensor technology. His journey illustrates the potential for all wheelchair users to benefit from intuitive, user-centered advancements that enhance mobility while respecting autonomy.

It's also a reminder that the most impactful solutions in CRT emerge from listening — to pain points, goals and personal experiences — rather than simply pushing technology forward.

Meet Phil Ratzlaff

Ratzlaff served in the U.S. Marine Corps from 1970 to 1974. Though decades have passed since his time in uniform, he still carries the discipline and resilience of a life dedicated to service. His sense of humor is equally unmistakable. He often introduces himself as "a Marine with no legs, ALS, traumatic brain injury, a tracheostomy, legally blind ... otherwise in good shape."

For years, Ratzlaff used a manual wheelchair for mobility. Transitioning to a power chair increased his independence, but as his vision declined, navigating safely became increasingly difficult even at home.

"I was dragging the couch across the living room without knowing it," he said. "I needed caregivers to help me, even inside my own home."

Then came a turning point.

"I ran into a child's stroller," he recalled. "Thankfully, the child wasn't in it, but it scared me."

With his vision deteriorating, Ratzlaff worried: Could he maintain his independence, or would he lose the ability to safely operate his wheelchair?

Searching for a solution

Determined to find an answer, Ratzlaff researched proximity sensors and obstacle detection systems. He also consulted his therapists at the Minneapolis VA Spinal Cord Injury and Disorder Center.

Closeup of the Braze Sentina mounted in the front of Phil Ratzlaff's power wheelchair.

Braze Controller offering auditory and visual (LED) feedback from the Braze Blind Spot Sensors.

In 2018, his search led him to Braze Mobility, a Toronto-based company specializing in blind spot sensors for wheelchairs. These devices, which I developed following years of research into mobility challenges, provide real-time feedback via lights, sounds and vibrations, allowing users to detect obstacles while retaining full control of their wheelchair.

"This is exactly the kind of system I've been thinking of!" Ratzlaff said upon learning about the technology.

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REHAB CASE STUDY | CONTINUED FROM PAGE 37

Braze Sentina mounted to the rear of Phil Ratzlaff's power wheelchair.

Phil Ratzlaff with Braze Sentina mounted on his power wheelchair base.

Tailoring technology to real life

The VA's assistive technology team acted quickly. His wheelchair configuration was customized through collaboration among his therapists (including physical therapists Ryan Bouslog and Chris Schieffer, and ATP/SLP Beau Bedore), equipment supplier Numotion, our team at Braze Mobility and Ratzlaff himself.[1]

The setup included:

- A rear-mounted sensor with 180-degree horizontal coverage called **Braze Sentina™**
- Front-mounted peripheral sensors with 45-degree coverage called **Braze Echo Heads™**
- **Vibration modules** on both armrests and backrest
- **Braze Controller™** mounted near his joystick, offering visual (LED) and auditory feedback.
- **BrazeConnect™ app** on his tablet to customize LED brightness and colors, and feedback modes

During clinical trials, Ratzlaff successfully navigated therapy gyms and open hallways using vibratory and visual feedback.

When the front peripheral sensors didn't provide sufficient coverage, an additional front-mounted Sentina unit was installed — creating the new Sentina 360 configuration, which he was the first to use.

"The Sentina in both the front and rear has been the cat's meow for me," Ratzlaff said. "It's everything I had hoped for and expected."

The impact: safety, confidence, and quality of life

Using the Braze system, Ratzlaff regained confidence and independence. He now navigates his home, stores and community spaces with reduced anxiety and less reliance on caregivers. He even traveled out of state alone for the first time, using his power wheelchair in conjunction with a white cane.

"If there's a box or someone in the way, the system lets me know," he said. "I can stop, analyze the situation and decide what to do, or turn around. I don't have to worry about hurting someone."

Beyond functionality, the system has restored Ratzlaff's sense of safety and control — something many wheelchair users lose due to vision impairment, fatigue or complex environments.

Videos of Ratzlaff's experience can be found here: https://brazemobility.com/testimonials/

A peer-reviewed study published in Disability and Rehabilitation: Assistive Technology found that power wheelchair users detected obstacles more accurately and quickly, with lower cognitive task loads, when using the Braze Blind Spot Sensor System compared to without one.[2]

These benefits extend beyond veterans. We've worked with children and older adults, rural and urban users, individuals with vision impairments, cognitive challenges and more. Whether navigating tight living spaces, classrooms or sidewalks, our users report greater peace of mind and fewer accidents.

Innovation through collaboration

Ratzlaff's success was made possible by a community that believed in his vision. His team, including family members, therapists, vendors and engineers — all contributed to customizing and refining the solution.

REHAB CASE STUDY

Phil Ratzlaff, U.S. Marine veteran, served from 1970-1974.

Phil Ratzlaff uses the BrazeConnect app on his tablet.

At Braze, we prioritize co-creation. We recognize that wheelchair users are experts in their own experiences, and we listen to their feedback when developing new technology. Ratzlaff's insights led to product improvements that now benefit others, illustrating how CRT should evolve through direct user input and iterative design.

While his system was provided through the VA, Braze technology has also been funded through Medicaid and private insurance across the U.S. With strong letters of medical necessity demonstrating improved spatial awareness and enhanced independence, many payers recognize the value of blind spot sensors.

Lessons for CRT: human-centered innovation

Ratzlaff's story underscores that CRT is not just about developing smarter hardware; it's about designing solutions that address real-world challenges. Whether through wearables, neurofeedback, robotics or sensor technologies, innovation must focus on user needs rather than engineering assumptions. Accessibility and affordability must also be prioritized, ensuring that those who need these solutions can obtain them.

Ratzlaff didn't ask for unnecessary features. He asked for safety, peace of mind and the ability to keep doing pottery in his home studio. His journey reminds us that the simplest goals are often the most profound and the most worth innovating for.

Conclusion: From one user to many

Ratzlaff began his search with one question: Is there something out there that can help me stay independent as I lose my vision?

The answer was yes. But his experience highlights a larger truth: Thousands of veterans and civilians, adults and children, manual and power chair users face similar challenges.

By listening, collaborating, and designing with purpose, we can create technologies that do more than transport users from point A to point B. We can help them move through life with confidence, autonomy, and dignity.

And that is what CRT, at its best, is all about.

REFERENCES

1. Bouslog, R., Schieffer, C., & Bedore, B. (2019). Veteran Highlight...The Cat's Meow: Braze Mobility System for Veteran with Legal Blindness. Department of Veterans Affairs Assistive Technology: PM&R Assistive Technology Programs, 8(1), 10-11. https://www.polytrauma.va.gov/news-and-resources/ATNewsletterSpring2019.pdf

2. Pellichero, A., Best, K. L., Routhier, F., Viswanathan, P., Wang, R. H., & Miller, W. C. (2023). Blind spot sensor systems for power wheelchairs: obstacle detection accuracy, cognitive task load, and perceived usefulness among older adults. Disability and rehabilitation. Assistive technology, 18(7), 1084–1092. https://doi.org/10.1080/17483107.2021.1983654

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Prior to founding Braze Mobility, Pooja Viswanathan completed doctoral and postdoctoral research on the development of "smart" wheelchairs designed to prevent collisions through autonomous interventions and provide wayfinding assistance via adaptive prompts. Dr. Viswanathan has received awards from organizations including Google and worked at Honda Research Institute in Silicon Valley on computer vision and robotics technology.

Dr. Viswanathan has published several peer-reviewed papers and book chapters (www.brazemobility.com/publications) and organized international workshops on "smart" wheelchairs. She was named to the WXN Top 100 Most Powerful Women list and recognized as a BMO Entrepreneur in 2021. In 2022, she was featured on Robohub's international list of 50 Women in Robotics You Need to Know.

Dr. Viswanathan is currently CEO of Braze Mobility and a professor at Western University in Canada.

CRT UPDATE

NCART Update:

Late Spring/Early Summer Update

WRITTEN BY: Wayne Grau

State legislative activity

Legislative hearing season is upon us. State legislatures are holding public hearings to get the public's position on legislation. This is a standard but essential part of the legislative process to ensure that all voices are heard.

The National Coalition for Assistive and Rehab Technology and our members have been participating in the hearing process in Illinois, Oregon, Connecticut, Rhode Island and Massachusetts. We have 17 different state bills that we have been engaged in this year. The bills deal with the right to repair, eliminating prior authorization for repairs and expansion of coverage for Complex Rehab Technology products and services.

We want to thank the iNRRTS executive director and board for supporting the CRT industry legislative efforts.

Legislative site visits

One of the most impactful ways to communicate the value of CRT to legislators is to host them at your facility for a site visit. This past month's legislative meetings have once again proven that legislators do not understand the CRT industry or the value our members bring to the lives of individuals who utilize CRT equipment. A site visit gives you an hour to educate the legislators about the products, services and obstacles you face in providing CRT services to their constituents. A perfect time to host these visits is during the summer recess for both state and federal legislators.

To start the process, simply call the legislator's office (federal or state) and ask to speak to the legislator's scheduler. The legislator has certain weeks to set aside for in-district or in-state work to meet with constituents. We encourage all of our members to consider a site visit, and if you need materials, don't hesitate to contact NCART.

Washington, D.C. Legislative Fly-in

NCART, iNRRTS and US Rehab will be hosting Washington, D.C., Legislative Fly-in on Sept. 16-17, 2025. After a successful 2024 Legislative Fly-in, the CRT industry needs to keep up our good work with the U.S. House of Representatives and U.S. Senate. There are a lot of different programs being discussed in Washington right now, and we need to ensure that anything that is being debated that may have a positive or negative impact on CRT is discussed with legislators. We encourage everyone to put a hold on these dates to add your voice to our legislative efforts.

Thank you

Andrea Madsen and I want to take this opportunity to thank the NCART and iNRRTS staff for all their hard work and dedication to keeping our organizations running smoothly. We both run small organizations that are very busy with many projects, deadlines and strategic objectives. We could not focus on these things if we did not have incredible staff members. For NCART, this is Julie Piriano and Debi Renehan— two amazing people with whom I have the privilege of working every day. For iNRRTS this is Amy Odom, Bill Noelting, Kathy Fisher, Weesie Walker, Lois Bodiford and Sandi Noelting.

Advocacy quotes

"There is no greater disability in society than the inability to see a person as more."
— Robert Hensel

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Wayne Grau is the executive director of NCART. His career in the Complex Rehab Technology industry spans more than 30 years and includes working in rehab industry affairs and exclusively with CRT companies. Grau graduated from Baylor University with an MBA in health care. He's excited to be working exclusively with CRT manufacturers, providers and the individuals who use CRT equipment.

CLINICIAN TASK FORCE

The Posture of Leadership:
CTF's New Executive Director Tamara Kittelson

WRITTEN BY: Leslie Jackson, OTD, OTR/L, ATP, CEASIII, LSVT BIG Certified

When Tamara Kittelson stepped into the role of executive director of the Clinician Task Force in January 2025, she brought with her more than 40 years of experience in occupational therapy, a lifetime of advocacy and a deep personal connection to the work. Kittelson's professional and personal experiences have shaped her for this leadership role — one that she believes she is meant to fulfill at this moment of time. Let's find out more about Kittelson's professional journey, what motivates her and where she hopes to lead the CTF in the years ahead.

From Montana to Minneapolis: Life in motion

Kittelson has seen herself as an educator and advocate throughout her 50-year career as an occupational therapist. She served both children and adults with complex needs for nearly 40 years before relocating back to Minneapolis, where she was raised. When her daughter, Eleanore, was born with cerebral palsy and profound deafness, everything shifted. She considers Eleanore as her greatest teacher.

Raising Eleanore sparked a deeper understanding and passion for specialization in seating, positioning and mobility equipment for children. Kittelson earned her RESNA certifications (ATP/SMS) and became an Intermediate Wheelchair Provider through the International Society of Wheelchair Professionals. She is the founding chair of RESNA's 24/7 Posture Care Management Special Interest Group. After decades in Montana, she returned to her hometown of Minneapolis in 2022, bringing her expertise and passion for advocacy with her to continue her occupational therapy career and passion projects.

Advocacy from the ground up: Eleanore's legacy

Kittelson is best known for founding Eleanore's Project in 2004, named in honor of her daughter. The nonprofit promotes access to wheeled mobility and 24-hour posture care management for children in under-resourced areas — especially through ongoing work in Lima, Peru, in partnership with the organization Yancana Huasy.[1]

Kittelson with dog, Graham.

Universal needs for CRT

Kittelson also leads Posture 24/7, where she consults internationally and recently co-authored the "RESNA Position Paper on Assistive Technology for Lying Posture Care Management" — a resource advocating for preventive strategies to reduce secondary complications in individuals with limited movement.[2]

Regardless of where her career has taken her, the mission is the same. The need for appropriate equipment and posture care is universal. Listening and mentoring remain the key to supporting and empowering families and clinicians.

New geography, same mission

Though the urban diversity of Minneapolis differs from Montana's rural health care landscape, Kittelson is energized by the community's complexity and multicultural backgrounds. While needs

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and backgrounds may differ, the value of advocacy remains central. Kittelson believes diversity offers perspectives and opportunities to collaborate and think creatively, particularly for CRT access. She is proud of the mission and value that CTF brings to the industry.

Why CTF and why now?

As a CTF member for 17 years, Kittelson already understood the importance of the organization's mission before stepping into leadership. Kittelson highlights the strength of the CTF is rooted in its members — clinicians who bring deep expertise and real-world experience to their advocacy efforts. Whether educating others, shaping policy or tackling local access challenges, members are actively engaged in driving meaningful change across the CRT landscape.

Recent examples include CTF members testifying before the Minnesota State Senate in support of funding for standing power wheelchairs, advocacy around Medicaid telehealth policy in Colorado and engagement in Right to Repair legislation in Washington state.

Looking ahead: Growth, engagement, and representation

Kittelson and the executive board are focused on expanding CTF's reach, both geographically and professionally. They are working to increase CTF representation from 40 states to all 50 states to expand their ability to advocate at local and state levels.

CTF continues to invest in:

- Work groups that connect clinicians to policy and education efforts.
- Scholarship programs that support conference attendance and ongoing learning.
- Collaborations with organizations like iNRRTS, RESNA and NCART.
- Recruitment and mentorship, including micro-volunteering opportunities for newer members.

Interested clinicians can read Kittleson's recent call to action on iNRRTS website and apply for membership on the CTF website.[3,4]

Off the clock

When not advocating for posture care or leading a work group, Kittelson enjoys spending time with her husband and their dog. One will likely find her gardening and hiking during summer months. Kittelson recharges at weekly yoga classes and cross-country skis when there is enough snow.

She beams with pride when talking about her daughters. Her eldest daughter is earning her second master's degree — in social work. Her younger daughter is an accessibility specialist and improves mobile apps. Both are deeply engaged in work that reflects a shared family commitment to making a difference.

Kittelson and husband, Andy.

A leader who listens

As CRT continues to evolve in an unpredictable health care landscape, Kittelson remains rooted in values shaped by decades of care and collaboration. Kittelson's goal is clear: to build on the CTF's mission, support the voices of clinicians and help shape a more accessible CRT system for all.

REFERENCES

1. Eleanore's Project. (2024). Our partners in Peru. Retrieved from https://www.eleanore-sproject.org/peru

2. Rehabilitation Engineering and Assistive Technology Society of North America. (2025). RESNA position on assistive technology for lying posture care management. Retrieved from resna-position-on-assistive-technology-for-lying-posture-care-ma.pdf

3. International Registry of Rehabilitation Technology Suppliers. (April 23, 2025). Message from Tamara. Retrieved from https://nrrts.org/40738-2/

4. Clinician Task Force. (2023). Become a member of the Clinician Task Force. Retrieved from https://www.cliniciantaskforce.us/become-a-member

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Leslie Jackson has served as an occupational therapist for over 25 years in various settings, including outpatient, acute care, home health, acute rehab and a doctoral-level academic program. She currently leads the outpatient Seating and Mobility Clinic for Marion Health and serves as an occupational therapist for the Veteran's Affairs. Jackson earned the ATP certification from RESNA in 2008 and is certified in ergonomics and LSVT BIG, a treatment protocol for individuals living with Parkinson's disease. Jackson is honored to contribute through the Clinician Task Force's advocacy and educational initiatives.

Renewed iNRRTS Registrants

The following individuals renewed their iNRRTS Registration between March 11 through May 26, 2025.

PLEASE NOTE **IF YOU RENEWED AFTER MAY 26, 2025**, YOUR NAME WILL APPEAR IN A FUTURE ISSUE OF DIRECTIONS.
IF YOU RENEWED PRIOR TO MARCH 11, 2025, YOUR NAME IS IN A PREVIOUS ISSUE OF DIRECTIONS.

FOR AN UP-TO-DATE VERIFICATION ON REGISTRANTS, PLEASE VISIT WWW.NRRTS.ORG, WHICH IS UPDATED DAILY.

Alex Biello, ATP, CRTS®
Amanda Couper, RRTS®
Andrew Foster, OTR, ATP, CRTS®
Anne L. Kieschnik, BSW, ATP, CRTS®
Anthony Martinelli, ATP, CRTS®
Benjamin Paull, ATP, CRTS®
Bhavin Joshi, ATP, CRTS®
Bradley Dutkowski, RRTS®
Brent P Fadler, ATP, CRTS®
Brian McGuire, ATP, CRTS®
Calum Nicol, ATP, CRTS®
Carlos Roca, RRTS®
Cassandra Hardiman, RRTS®
Cassi Jo Martin, ATP, CRTS®
Charlotte Zulawski, PTA, CLT, ATP, CRTS®
Christian Beaman, RRTS®
Christian Raffield, ATP, RRTS®
Christopher Ford, ATP, CRTS®
Christopher Donald Stasiuk, RRTS®
Christopher E. Bridgeman, ATP, CRTS®
Colin Fairley, ATP, CRTS®
Colleen Oberley, ATP, CRTS®
Corey Hileman, ATP/SMS, CRTS®
Cyglenda Abbott, ATP, CRTS®
Daniel Pino, OTR, ATP, CRTS®
Daniel Barrett, RRTS®
David Regnier, RRTS®
David Park, ATP, CRTS®
David D. Russell, ATP, CRTS®
Dearl Scott, ATP, CRTS®
Deborah Morgan, ATP, CRTS®
Debra McFarlane, RRTS®
Deidra White, ATP, CRTS®
Denise Wilson, RRTS®
Deven Caron, RRTS®
Devin Oliver, RRTS®
Dexter Carter, RRTS®
Dimitrios Mallios, RRTS®
Doug Ambrusko, ATP, CRTS®
Douglas Praytor, ATP, CRTS®
Drew Oursbourn, ATP, RRTS®
E. Scott Filion, ATP, CRTS®
Edward Lai, RRTS®
Gene Uweh, ATP, CRTS®
George A. Turturiello, ATP, CRTS®
Hector David Acevedo, ATP, CRTS®
Ira Wall, RRTS®
James Hutchinson, ATP, CRTS®
James Wiese, ATP, CRTS®
James Brett, RRTS®
Janet Richardson, RRTS®
Jason LaTray, ATP, CRTS®
Jason Smith, ATP, CRTS®
Jason Ray Miller, ATP, CRTS®
Jean Lefebvre, RRTS®
Jeanette Howell, RRTS®
Jeffrey Christianson, ATP, CRTS®
Jeffrey Kempel, RRTS®
Jeffrey M. LaRosa, ATP, CRTS®
Jenifer Johnson, PTA, ATP, CRTS®
Jeremy Adkins, BS, ATP, CRTS®
Jerry T. Mitchell, ATP, CRTS®
Jessi Albarado, RRTS®
Jill Arrowsmith, RRTS®
Jim Frid, RRTS®
Jodi Daniels, RRTS®
Joe C Hill, III, ATP, CRTS®
Jon Starich, ATP, CRTS®
Jordan Yancey, OTA, ATP, RRTS®
Jose I Lopez, ATP, CRTS®
Joseph Uccello, ATP, CRTS®
Joyce Miodownik, PT, ATP, CRTS®
Julie Harkness, RRTS®
Justin Horn, ATP, CRTS®
Justin Harris, ATP, CRTS®
Kacey Newman, ATP, CRTS®
Kalin Omo, ATP, CRTS®
Katherleen Fallon, ATP, CRTS®
Katie Hobbs, RRTS®
Kendall Richards, ATP, CRTS®
Kenmakara Sok, ATP, CRTS®
Lance C. Guest, ATP, CRTS®
Lisa Powell, PT, ATP, CRTS®
Lori Nolte, RRTS®
Luis Navarro, RRTS®
M. Will Olstad, ATP, CRTS®
Marie Mete, RRTS®
Matthew Miller, ATP, CRTS®
Matthew C. Traynor, ATP/SMS, CRTS®
Michael Bavaro, ATP, CRTS®
Michael Hohler, ATP, CRTS®
Michael A. Edney, ATP, CRTS®
Michele A. Gunn, ATP, CRTS®
Michelle Harvey, BSC HONS OT, RRTS®
Morgan Lundquist, RRTS®
Noel Riley, ATP, CRTS®
Pamela Crutchfield, ATP, CRTS®
Peter Eastman, RPTA, ATP/SMS, CRTS®
Randy Schmitt, ATP, CRTS®
Richard Samay, ATP, CRTS®
Richard Walls, ATP, CRTS®
Richard Evans, RRTS®
Richard Demers, RRTS®
Robert Lyles, ATP, CRTS®
Robert Connelly, ATP, CRTS®
Ronald Whiting, ATP, CRTS®
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Victoria Mitchell, RRTS®
Wayne Gould, ATP, CRTS®
Wayne Wright, RRTS®
Wayne Kuroda, RRTS®
Wayne M. Jones, RRTS®
William Leoutsacos, RRTS®
William Darcy Bennett, RRTS®
Zachary Myers, ATP, CRTS®
Zachary Taylor, ATP, CRTS®

New iNRRTS Registrants

CONGRATULATIONS TO THE NEWEST INRRTS REGISTRANTS. NAMES INCLUDED ARE FROM MARCH 11, 2025, THROUGH MAY 26, 2025.

Abdul Hassan, RRTS®
Independent Living Specialists
Brisbane, Queensland

Aleesha Patrick, RRTS®
Durham Medical
Oshawa, Ontario

Amanda Griffiths, RRTS®
HME Mobility & Accessibility
Nanaimo, British Columbia

Andrew Kucher, RRTS®
Macdonald's Home Health Care
Vancouver, British Columbia

Blair Gallant, RRTS®
Lawtons Home Healthcare
Charlottetown, Prince Edward Island

Bo Liu, RRTS®
Motion
Saskatoon, Saskatchewan

Brandon Byler, RRTS®
Integrity Medical
Evans, GA

Bree Neale, RRTS®
Motion
Courtenay, British Columbia

Cal McGrattan, RRTS®
HME Mobility & Accessibility
Richmond, British Columbia

Charles Major, RRTS®
Reliable Medical
Rancho Cucamonga, CA

Charlotte Cullen, RRTS®
Independent Living Specialists
Brisbane, Queensland

Crystal Goldsworthy, RRTS®
Motion
St Catharines, Ontario

Daniel Steinhauser, ATP, RRTS®
National Seating & Mobility, Inc.
Wall Township, NJ

Daniel Duley, ATP, CRTS®
Axios Medical Equipment - Wound Care Solutions
Chicago, IL

Francis Domingo, RRTS®
Macdonald's Home Health Care
Vancouver, British Columbia

Gianluca Ciaffi, RRTS®
Independent Living Specialists
Eastern Creek, New South Wales

Grant Holmes, Occupational Therapist, RRTS®
Independent Living Specialists
Moledinar, Queensland

Hailey Yonge, RRTS®
HME Mobility & Accessibility
Richmond, British Columbia

Isaac Saavedra, RRTS®
Medical Plus Supplies
Houston, TX

Jacob Martinez, RRTS®
SG Homecare
Bellflower, CA

Jared Drieschner, BScKin, RRTS®
Motion
Kelowna, British Columbia

Jennifer Andrew, RRTS®
Motion
Toronto, Ontario

John Mosley, ATP, RRTS®
Quipt Home Medical
Flowood, MS

Josh Burton, ATP, CRTS®
Reliable Medical
San Jose, CA

Keesha Ouellette, RRTS®
Tango Medical
Fredericton, New Brunswick

Lucas Wood, RRTS®
Motion
Kamloops, British Columbia

Matthew Daigle, RRTS®
Lawtons Home Healthcare
Saint John, New Brunswick

Matthew Mohr, RRTS®
HomEquip
Winnipeg, Manitoba

Michael Smock, RRTS®
National Seating & Mobility, Inc.
Anaheim, CA

Miguel Navarro-Gonzalez, RRTS®
Independent Living Specialists
Caulfield South, Victoria

Miriam Kluczny, RRTS®
Motion
Penticton, British Columbia

Neelab Badri, RRTS®
Motion
Toronto, Ontario

Nicholas Alameda, RRTS®
National Seating & Mobility, Inc.
Chamblee, GA

Paul Wulff, RRTS®
Independent Living Specialists
Maroochydore, Queensland

Pierre Gaudet, RRTS®
Lawtons Home Healthcare
Moncton, New Brunswick

Reginald Moffat, RRTS®
Motion
Terrace, British Columbia

Shane Kelly, RRTS®
Independent Living Specialists
Sydney, New South Wales

Shannon Popovich, RRTS®
Motion
Kelowna, British Columbia

Tianna Fischer, RRTS®
Motion
Courtenay, British Columbia

Tom Murphy, RRTS®
Motion
Regina, Saskatchewan

BE SURE TO FOLLOW iNRRTS ON SOCIAL MEDIA!

Congratulations to the following individuals who have completed Level 1 of the CRT Supplier Certificate Program.

These individuals can state they are a iNRRTS Certified CRT Supplier, Level 1.
NAMES LISTED ARE FROM MARCH 11, 2025, THROUGH MAY 26, 2025.

Kayla Capurso, RRTS®
Jeffrey Decker, ATP/SMS, CRTS®
Rachel Dickison
Nicholas Reginato, RRTS®
Emily Wischer

Former iNRRTS Registrants

The iNRRTS board determined RRTS® and CRTS® should know who has maintained his/her registration in iNRRTS, and who has not.
NAMES INCLUDED ARE FROM MARCH 11, 2025, THROUGH MAY 26, 2025. FOR AN UP-TO-DATE VERIFICATION ON REGISTRANTS, VISIT WWW.NRRTS.ORG, UPDATED DAILY.

Roger G. Lichty, ATP
Rockford, IL

Grant Klinedinst, ATP
Lebanon, IN

Brenda L. Roehl, ATP
Kimberly, WI

Vincent Wolrab, Jr., ATP
Waterloo, IA

Steven Edwards, ATP
Birmingham, AL

David Lobato, ATP
Henderson, NV

Christopher Jay Pickelman
Saginaw, MI

Zach Gural, ATP
Niantic, CT

Benji Braund
Virginia, Queensland

Emily Vennor
Ottawa, Ontario

Moises Vasquez
Palm Desert, CA

Trevor Eichelbaum
Medicine Hat, Alberta

Emma-Jane Pollitt
Bundaberg East, Queensland

Robert Colley
Gloucester, Ontario

Jeff Burns
Edmonton, Alberta

Renee Bird, ATP
Tampa, FL

Darice Cochrane
Ottawa, Ontario

Victor Camara
Lake Forest, CA

Amy Todd
Eastern Creed, New South Wales

Charles Fielder
Anaheim, CA

Meghan Proctor
Nanaimo, British Columbia

Kevin Wilson
Kitchener, Ontario

Ryan Shaffer
Franklin, TN

New CRTS®

CONGRATULATIONS TO iNRRTS REGISTRANTS RECENTLY AWARDED THE CRTS® CREDENTIAL. A CRTS® RECEIVES A LAPEL PIN SIGNIFYING CRTS® OR CERTIFIED REHABILITATION TECHNOLOGY SUPPLIER® STATUS AND GUIDELINES ABOUT THE CORRECT USE OF THE CREDENTIAL. NAMES LISTED ARE FROM MARCH 11, 2025, THROUGH MAY 26, 2025.

Daniel Duley, ATP, CRTS®
Axios Medical Equipment - Wound Care Solutions
Chicago, IL

Deidra White, ATP, CRTS®
National Seating & Mobility, Inc.
Chattanooga, TN

Dylan Vanderpool, ATP, CRTS®
Rehab Medical Inc.
Tampa, FL

Francesca Whitaker, ATP, CRTS®
National Seating & Mobility, Inc.
Parma, OH

Hope Villines, ATP, CRTS®
Alliance Rehab & Medical Equipment
Lenexa, KS

Josh Burton, ATP, CRTS®
Reliable Medical
San Jose, CA

William Bingaman, ATP, CRTS®
National Seating & Mobility, Inc.
Biddeford, ME

Zachary Taylor, ATP, CRTS®
CoxHealth Home Support
Springfield, MO

iNRRTS | INTERNATIONAL REGISTRY OF REHABILITATION TECHNOLOGY SUPPLIERS

5815 82nd Street, Suite 145, Box 317
Lubbock, TX 79424
P > 800.976.7787

Friends of iNRRTS [FONS]

As Corporate Friends of iNRRTS, these companies recognize the value of working with iNRRTS Registrants and support iNRRTS' Mission Statement, Code of Ethics and Standards of Practice.

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BIG SKY Association of Medical Equipment Suppliers
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