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Getting Lost in Gravity?

The science behind center of gravity and how to get the right adjustment. Plus: How important is gravity in seating, anyway?

Cover Story

Width + Depth + Height

Clinicians and ATPs want systems that fit well right now; payor demand built-in growth for system longevity. How can these different needs be balanced? Plus: Five-year funding for cushions?

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Gravity isn’t something many of us think much about. We know the story of Isaac Newton and the apple, of course, and we might recall that gravity is responsible for how much we weigh. But we rarely consider the part gravity plays in our everyday lives.

Gravity, as it were, is pretty important for people who use manual and power wheelchairs because gravity can greatly impact a wheelchair setup. In fact, center of gravity (CoG) may be one of the most important adjustments a clinician can make to a wheelchair.

“It’s a foundation measurement that many other measurements flow from and are affected by,” explains Jeff Adams, president/CEO of Icon Wheelchairs. “Changes in cushion height, growth, weight gain, weight loss, skill development and others can all have profound effects on the CoG setting and vice versa.”

Yet as important as this measurement is, CoG is often one of the toughest measurements to get right, partly because CoG is not only about empirical data.

“Center of gravity is also one of the measurements that is set by feel,” Adams says.

So how can a clinician balance both client demand and proper positioning so that clients get the most out of their mobility systems?

Science Behind CoG

The first step to setting CoG is figuring out what it is exactly. By definition, CoG refers to the point at which the weight of the wheelchair is balanced.

“Objects are balanced when the weight is evenly distributed,” says Kay E. Koch, OTR/L, ATP, rehab clinical consultant for Invacare Corp. “The center of gravity is this balance point.”

That might be a hard concept to visualize. Instead, think of CoG as a balanced seesaw. If no one is on the seesaw, the CoG is in the middle of the seesaw. If people of different weights are on each end of the seesaw, then all of the different weights must be taken into consideration. The CoG will be where the seesaw is balanced, which will be closer to the end of the heavier person.

In this example, the seesaw represents the wheelchair, which has its own unique CoG. But when you add a person to the chair, just like with the seesaw, the CoG changes. A wheelchair has a CoG low to the ground, but when the chair is occupied, the CoG shifts higher. As you can imagine, this shifting of balance can distort stability. That’s one reason it’s so important to get CoG right.

To illustrate the point, Koch uses the example of moving the rear wheels on a manual chair.

“When the rear wheels on a manual wheelchair are shifted forward, the center of gravity is changed, making it easier to pop a wheelie. If the wheels are shifted backward, the center of gravity is changed, making the wheelchair more stable and harder to pop a wheelie,” Koch says. “By understanding how this relates to performance, stability can be changed to help the client navigate his or her environment.”

Of course, stability isn’t the only factor to consider with CoG. In fact, stability has a negative relationship with ease of propulsion, which might spell trouble for manual users, especially on an incline and decline. For example, if more effort is required to change direction, fatigue is increased, Adams says.

“The less energy we have to spend steering, the more is left over to generate speed or cover more distance,” he says, which can dramatically affect how easy it is for someone to navigate his or her environment.

Of course, when the body moves in tilt or recline or when maneuvering...
Getting Lost in Gravity?

In 1991, Edward D. Lemaire and colleagues published a study in the Journal of Rehabilitation Research and Development regarding center of gravity and rolling resistance for tilt-seat wheelchairs. The study showed that moving the rear wheels toward the front of the chair reduces rolling resistance and decreases the rearward tip angle.

"These facts are directly related to the center of gravity position since, as the wheelbase is decreased, the center of gravity moves closer to the rear axle," explains Kay E. Koch, OTR/L, ATP, rehab clinical consultant for Invacare Corp. "This results in more weight being centralized over the rear wheels, thereby reducing the rolling resistance. However, when the wheelchair is tipped backward, the center of gravity does not have as far to move before the wheelchair passes the balance point (the point at which the center of gravity passes behind the rear axle)."

Koch also notes that a longer wheelbase increases the rearward tip as well as rolling resistance.

This research can help clinicians decide on the appropriate wheelchair configuration during setup by promoting safety and minimizing function loss, Koch says.

Benefits of the Correct CoG

So what does this complicated measurement mean for clients, and why is it so important to get it right?

As you already know, CoG can have a big impact on a client’s everyday efficiency in terms of propelling a manual chair.

"These adjustments can provide better wheel access, which leads to more efficient propulsion even if only minimal adjustments are made," Koch says.

Center of gravity (CoG) is the point in which the weight of an object is balanced. For example, if a seesaw is empty, the CoG is in the middle of the seesaw. If people with different weights occupy the seesaw, the CoG is closer to the heavier person. Likewise, a wheelchair has its own unique CoG. When a person occupies a chair, the CoG changes. A wheelchair has a CoG low to the ground, but when the chair is occupied, the CoG shifts higher.

Everyday efficiency becomes especially important as clients age or for clients with the most limitations, including those with weakness, reduced endurance and impaired balance, Koch says.

CoG can impact many other aspects of a client’s life, however, including shoulder/wrist/finger/joint health, fatigue, comfort, posture and confidence, Adams says.

For example, if a chair is too front heavy, a user might be in danger of incurring a shoulder injury because the chair is harder to turn, Adams says. Likewise, if a chair is too unstable, a user will have to worry about tipping over backward, resulting in posture issues or even loss of confidence.

"If feeling like tipping over backward is a constant concern, that can easily result in an enormous amount of anxiety," Adams says.

Shoulder injuries can be particularly concerning for someone with lower-extremity amputation. For these clients, “the adjustment in the center of gravity is crucial,” Koch says, as it will reduce the stress on the upper extremities.

Setting It Right: Manual Chairs

Setting CoG for manual chairs requires a fine hand. What clinicians are attempting to do is set the CoG for the optimal weight distribution over the back wheels and front casters, Adams says. As easy as that sounds, there are many ways to go about it.

“Getting the weight distribution somewhere in the 80/20 rear/front range is a good starting point for most riders,” Adams says. “From there, small adjustments can make a big difference.”

Tina Roesler, PT, MS, ABDA, director of international sales at TiLite, says that ideally the rear wheel would be in line with the shoulder or slightly forward of the shoulder to maximize propulsion.

Another way to determine CoG, Roesler says, is to look at the height of the front caster when the person is in a balance position in the chair.

“When holding the wheelie, the front caster should really be no more than 3” or 4” off the ground for safety reasons,” she says.

Koch says that clinicians must take into account the user’s height, weight and body type, strength and balance, position in the wheelchair, and the wheelchair and seating system when determining CoG adjustments. She recommends evaluating the user’s skill level and then moving the rear wheel forward in 1/2” increments.
Finding the CoG in Power

Unlike manual chairs, power chairs do not require exact measurements for CoG. Instead, the drive-wheel configuration determines CoG for a power chair user, explains Magdalena Love, OTR, ATP, at Permobil.

“Ideally, you want the majority of the individual’s weight over the drive-wheel tire,” she says.

To do so, the clinician will have to take into account the user’s weight and weight distribution. For example, in a rear-wheel-drive configuration, a user with a lot of weight anteriorly, such as a client with lower-extremity edema, will have that weight positioned over the front casters.

Consequently, the drive wheel will not be getting as much traction as it needs for optimal performance. When using power seat functions such as tilt and recline, all the weight of the user and seating system shifts backward, potentially making the system have a tendency to rock backward. This sensation often is very alarming for individuals to experience — potentially leading to a decreased likelihood of completing pressure-relieving activities,” Love says.

On the other hand, that same user might have other issues in a front-wheel-drive chair.

“Depending on the individual’s weight distribution, the wheelchair may have a tendency to rock forward if the user does not tilt back,” Love says.

“This is especially true when going downhill or if there is significant lower-extremity edema. However, the system would be well balanced during seat function use.”

The mid-wheel drive chair might be the best option for this client, as it would provide the most stability with the least number of restrictions during driving and power seat function use, Love says.

Koch says that when the drive wheel is behind the user’s CoG, such as on a rear-wheel-drive system, the chair will be stable but have a larger turning radius. The front-wheel-drive configuration provides stability with a tighter turning radius, and “the drive wheel in the center or the mid-wheel drive has the user’s center of gravity over the wheelchair and has the tightest turning radius,” she says.

When determining the best drive system, clinicians must also consider the user’s driving skills and environment. That often means explaining the differences among rear-, front- and mid-wheel drive.

Love uses the example of a person driving down a hallway and then turning right into a room. She says the rear-wheel drive requires a wide turn, but a wide turn with front-wheel drive would swing the rear casters into the wall. Love recommends a trial of the equipment in the home or community as well as specific training on driving techniques.

So what happens when the chair is configured with power tilt, power recline or both?

“The bases are designed to accommodate this change created by the seating system function, and the actual center of gravity on the base remains the same,” Koch says.

Even on manual chairs with a tilting seating system, the system is designed with fixed CoG changes that do not need adjusting, she says.

A Word on Adjustability

Adams tells the story of a client who is a professor at a local university and an experienced manual chair user. She ordered a fully welded chair. After the chair arrived, Adams did the final fitting and tweaks, and the client was happy. The professor then picked up her backpack and flipped over.

“We had done the eval and ordered the chair midsummer, and it didn’t come in until mid-September, after school had started,” Adams explains.

“Her backpack was now filled with books and papers, which made the CoG 2” off of her requirement during summer break from May to August.”

Although Adams found a solution that required mounting some of the professor’s books to the front of the chair, this situation convinced him that adjustability is critical, even for experienced users.

Roesler agrees.

“Adjustable center of gravity is one of the most critical adjustments that any chair should have,” she says. “The position of the wheel would dictate someone’s long-term function and their ability to function within their environment.”

Changes in cushion height, growth, weight gain, weight loss, skill development and others can all have profound effects on the CoG setting and vice versa — Jeff Adams, Icon Wheelchairs

Adjustable center of gravity is one of the most critical adjustments that any chair should have

— Tina Roesler, PT, MS, ABDA, TiLite
Getting Lost in Gravity?

When determining center of gravity (CoG) for a power chair, consider the drive-wheel configuration. “Ideally, you want the majority of the individual’s weight over the drive-wheel tire,” says Magdalena Love, OTR, ATP, at Permobil. Consequently, a rear-wheel configuration places the weight over the rear wheel, which provides stability. A front-wheel configuration places the weight over the front casters, which could result in less stability depending on the user’s weight distribution. The mid-wheel drive configuration places the weight right in the center of the chair, giving the user the benefit of stability as well as a tight turning radius, says Kay Koch, OTR/L, ATP, rehab clinical consultant for Invacare Corp.

Adams says that even a 1/4” can make a difference, especially because “If someone lives in Topeka or San Francisco, the practical application of the theoretical setting of the CoG can be wildly different.”

In fact, the ability to adjust CoG on the go would be ideal. “One of the things that often messes up the center of gravity of my personal chair is having to carry something — groceries or laundry. Or horsing around with my nephews on my lap causes the CoG of my chair to be very front heavy, and my chair becomes cumbersome to maneuver,” Adams says. “On the other hand, if I’m carrying something up a ramp and am prevented from leaning forward, my chair becomes way too unstable. Being able to make on-the-fly changes to the CoG while out in the real world could have dramatic benefits.”

As the client changes over time, CoG might also need to change. For example, weight gain, changes in environment, and progression or regression of disability might warrant an adjustment. Even age can be a motivator for CoG adjustments. “Older clients may feel less comfortable with a more tippy chair, while young kids, as they progress and propel better, may require center of gravity more forward,” says Roesler.

Sometimes the adjustment is all about the client’s personal needs as well. “Personal preferences may also change after a significant time spent in a powered mobility device,” Love says.

The Importance of Center of Gravity

You might be wondering, What’s all the fuss about center of gravity (CoG)? According to Jeff Adams, president/CEO of Icon Wheelchairs, many clinicians are starting to realize how critical the fit of the chair is, especially adjustments such as CoG, seat angle and back angle.

“Examining the center of gravity position helps illustrate how the configuration can also be much more important than the overall weight of the chair,” Adams says. “It’s well understood in the industry that the goal when setting the center of gravity is to try to keep the loaded weight of the front of the chair as light as possible, while maintaining a usable center of gravity — in other words, we want the chair to be as tippy as possible, as long as it’s safe. Everyone who is familiar with manual chair setup knows that when the center of gravity is too far forward (meaning that more weight that is being carried by the front wheels) the chair loses maneuverability.

“Imagine a scenario where a rider with a theoretical ideal center of gravity setting of 3” (rearward) from the center of the rear axle to the front of the back tube is asked to choose between two chairs, one that weighs 15 lbs. and one that weighs 5 lbs. more. The heavier chair is set up to be idealized for maneuverability, with the center of gravity set at 3”, and the lighter chair set at only 2”. The 1” difference in the setting will make the lighter chair more difficult to steer and will cause strain on hands, elbows and shoulders.”

Ultimately, a properly configured chair trumps a lighter chair that’s not set up correctly every time.

Final Thoughts on CoG

Perhaps the most predictable piece of CoG is that it is never predictable. Even after years of adjusting CoG, Adams is surprised occasionally. “We had a customer about 18 months ago who I had known for over 15 years. She was requesting a chair with a very aggressive rearward CoG and anti-tippers, which I had never known her to use. We were talking about what she wanted in terms of her configuration, and I asked her why she was configuring her chair in such a different way than her previous chairs,” Adams says. “She eventually told me that she was expecting a child and was going to be going through an enormous personal CoG change.

“I promise that in any of the design sessions I’ve done, in all the late nights I’ve spent trying to understand the ever-elusive perfect combination of theory versus practical when it comes to the design of manual wheelchairs, I didn’t consider getting pregnant.”

Adams’ point: It’s impossible to imagine every possible scenario. There’s always a chance something new will come up in a client’s life that will require an adjustment in CoG.

Ultimately, helping the client live a better life is at the heart of the CoG adjustment.

“Center of gravity combined with proper chair fit and configuration will have a huge impact on everyday efficiency. If we can optimize fit, center of gravity and configuration, the client will be able to maximize their potential and have better skills acquisition,” Roesler says. “It will help them integrate better into their community and enjoy a better quality of life longer term.”

Elisha Bury is a freelance writer and editor who has worked in the mobility sector since 2005. She previously served as the editor of The Mobility Project and associate editor of Mobility Management.
It’s simple: When building a seating system, measure the client to determine how wide and deep the wheelchair seat should be. Backrest height can be determined by the client’s stability and personal preferences. Get those three measurements — width + depth + height — and you’re ready to go.

Of course, in the real world, it’s not that easy. A number of factors, some clinical and some environmental, can influence how wide and deep a seat should be for a particular client, and how high the backrest should be.

Once funding sources chime in, the noise level rises. With their insistence on product longevity, reluctance to pay for replacements, and shrinking budgets, payors can seem to have the loudest voices of all.

So how can ATPs and seating clinicians work so that clinical, functional and funding concerns are all diligently addressed?

Why Seat Size Matters

To a world accustomed to standard-sized hospital wheelchairs, being so meticulous about seat width and depth as well as backrest height may seem strange. Why are exacting measurements so critical to functional success?

Generally speaking, clinicians advocate for wheelchairs with small footprints, which directly correlate to the size of the wheelchairs’ seating systems.

Tricia Garven, PT, ATP, clinical applications manager for ROHO Inc., notes two main advantages of a smaller footprint — and thus of a properly sized seating system.

“First of all, shoulder-to-wheel alignment for shoulder preservation,” she explains. “If your arms aren’t having to reach out to the wheels, then you’re going to be set up for more success in terms of less pain and better alignment.

“But then also there are accessibility issues in the environment — getting through doorways, turning around in restaurants — because the wider your chair is, the bigger your turning space is. Being in crowded places, getting into bathroom stalls — the handicapped stall isn’t always there or available.”

A seating system that fits properly is especially important to the consumer who self propels, Garven says.

“You don’t want them to have to bend their elbows outward,” she explains. “Of course they’re going to be bending their elbows to push, but you don’t want them to be reaching out, opening up the armpit.”

— Lauren Rosen, PT, MPT, MSMS, ATP/SMS, program coordinator, Motion Analysis Center, St. Joseph’s Children’s Hospital of Tampa (Fla.).

“If you’ve got a kid who is a manual chair user and the chair is too wide — the [smallest children] already have trouble reaching the wheels and handrims as it is. Imagine the handrims even further out by making the chair too wide, and they can barely touch the wheel itself.

“Also just by doing that, you’re pre-disposing those kids to shoulder problems because the research tells us the more you abduct your shoulders, the more damage you can do from propulsion.”

Children who use power chairs can also run into access problems if their seats are wider than necessary.

“You can’t reach to the joystick, you can’t reach to the armrest,” Rosen notes. “If the chair is too wide, you can’t reach everything. In some cases, we will make the power chair a little bit wider than we would a manual chair and just put a bunch of hip guides up against the kid, but they’re still reaching for the joystick, which makes it more difficult to operate the chair.”

And that difficulty could be costly to a child trying to demonstrate that he or she could indeed be a successful power chair operator.

“With all of the things coming out about what somebody should be capable of doing before qualifying for a chair — if you put the joystick farther away, any of us would have a harder time of navigating successfully through a maze or cones or whatever,” Rosen says. “It just makes it harder to control the chair if you’re having to reach too far.”

As for determining how deep the seat should be, Rosen says, “If you choose a seat depth that’s too large, you end up with a kid who has to slide forward, so they sit with a posterior pelvic tilt. You’ve got the problem too that a lot of the kids who use wheelchairs are kids with cerebral palsy who have spasticity, so most of those kids have really tight hamstrings. And so they’re already needing to tuck their feet underneath them as much as they can; that alone is causing them to sit with a posterior pelvic tilt. You add a too-deep seat depth, and you’ve got a kid who’s kind of lying down.”

Regarding how high a back should be, Garven says, “You want backrest height to be as much support as necessary without being too much. Too much back height, too much anything in the back, is probably going to limit upper-extremity movement, and it may even hinder their ability to have small corrections with what balance they do have if that backrest is too high. It might not allow as much movement as they personally have.”

Rosen says the thought process is much the same for kids.
"If it’s a kid who has good trunk control, I’ll do the backrest just like I would do with an adult and try to go right below the scapula," she says. "If I’ve got a kid with [less trunk control], then we’ll cheat a little bit higher. I try to never go up to the shoulder height. I try to always stay at least an inch or two lower, even in those kids. The kids who have really bad trunk control will end up with a solid back and laterals, so those tend to be a little bit taller to give you more support and room.

"I don’t want the back getting in the way of propulsion. It’s the same as with an adult: If my scapula can’t move like it needs to move, I can’t propel nicely. I can’t do everything I need to do because I hit my chair every time I go to push."

Sizing Up Tomorrow’s Measurements
If clients generally do better with seating that’s just right instead of too big, why not just build systems that fit clients exactly the way they are?
In a word: time. Garven and Rosen both indicated that payor expectations force the seating team to make their best estimates in determining whether today’s "perfect size" will also work years into the future.

"It’s a challenge, and that’s where the therapist interview with the client and family members, the whole healthcare team, is important," she says. "When somebody’s first injured, it’s tough. If somebody’s been injured for a long time, then it’s ‘What is your history? Have you been gaining five to 10 lbs. a year?’ Because we can probably expect that to continue unless they’re going to do something about it. If somebody says, ‘Yeah, I’ve been gaining weight, but I’m going to quit’ — you have to be realistic."

Seating team members may have to dig deeper for information when the client is newly diagnosed.

"I think the real challenges are the clients who have gained or lost a ton of weight in the hospital," Garven says. "You’re sort of guessing: Are you going to keep this weight, or are you going to lose some more? I know you have a spinal cord injury so you’re going to atrophy, but that doesn’t necessarily mean your belly’s going to get smaller."

Understanding the client’s lifestyle before diagnosis, as well as their intentions post diagnosis, is also important.

"What do you expect, person in the wheelchair, to be doing in two to three years?" Garven asks. "What do you think you’re going to be doing? I think that’s also where the whole multi-disciplinary team becomes..."
involved because especially if somebody is newly injured, you’re going to have access to probably neuropsychology, to nursing, to physicians. Everybody has conversations with this person, and they’re going to know — how is this guy coping? Because even the most active, fit person can become severely depressed, and that’s going to lead to sedentary, static behavior, eating, things like that.”

**Anticipating Kids’ Growth**

With children, from infancy right through their teens, the challenge can be in anticipating how much growth they’ll experience before they’re able to qualify for their next wheelchair or seating system.

“All the pediatric chairs have some kind of growth built into them,” Rosen says. “In the manual chairs, most of them have 2” or 3” of depth and 2” or so of width growth built into the system, where you just have to change out some parts and all that. If I’ve got to grow a chair during the five years, insurance is willing. Sometimes with older kids in manual chairs, if we do a rigid-frame chair, most manufacturers have a growth program where if you outgrow the frame, they will send you a new frame for cost, and it’s counted as growth, not as a whole new purchase.”

But the seating team must still determine the size of the initial system.

“The big thing that I’ve looked into is growth in kids with disabilities,” Rosen says. “Kids with disabilities don’t grow as fast — [not] at the same rate as able-bodied kids. The thought process is ‘They’re going to grow a ton in the next five years.’ Our kids don’t grow as much. They especially don’t tend to grow in width as much. In kids with cerebral palsy, their bodies are working so hard all the time that their metabolism is off the charts. So a lot of those kids don’t have as much of a tendency to gain a ton of width growth; they tend to grow in depth more. The measurement that seems to be the most off on kids is the width. Everybody is planning for a ton of growth that these kids just don’t have.”

As a general rule, Rosen says she asks ATPs to build in an inch of width growth for a pediatric self-propelled chair.

“For an adult chair, for somebody who propels, I tend to put it at the width the person is. But with kids, I will usually give them an inch, or if they’re a 10.5, we’ll go 12,” Rosen says.

“In power, I will probably give them 2” only because it’s not as critical. I’m not giving them more than 2”. That’s the most I will give anybody, width wise, on a power chair. I don’t want them reaching, and I don’t want them to feel like they’re swimming in the chair.”

Rosen says her clients haven’t outgrown their chairs and seating systems, despite relatively conservative widths. And she has another reason to prescribe seating that’s not overly large: It can be a self-fulfilling prophecy.

“A lot of the kids I see around here are in ‘diagnosis seating’ — where every kid has the exact same chair and the chairs are too wide,” she says, adding that those clients are overweight, sometimes very significantly.

Noting friends who have spina bifida and who are in excellent physical condition as elite athletes, Rosen says, “I know that spina bifida as a diagnosis does not lead to being fat. So I look at chair setups and how hard it is...
Width + Depth + Height

Trends: Cushions Get the “5-Year” Treatment

Much of the anxiety of choosing the width/depth/height for a seating system stems from payors’ insistence that the system last a certain amount of time — a period that continues to lengthen as budgets and allowances continue to shrink.

Tricia Garven, PT, ATP, clinical applications manager for ROHO Inc., says durability expectations for seating systems and components are increasingly being applied even to seat cushions. In the past, funding sources were relatively amenable to replacing cushions more often than wheelchairs, for example. But now, more payors are holding cushions to the same five-years-of-usage parameters that wheelchairs have.

“It is getting tougher,” Garven says. “[There’s a] five-year replacement rule even for cushions, which typically were sort of an exception. Maybe the [five-year] idea kind of existed, but the enforcement never did, for sure.”

Garven adds that the trend is occurring among various payors.

“If anything, some of the insurances are even tougher than Medicare,” she notes. “We sort of treat Medicare like they’re the worst ones, and they are definitely trend-setters. Lots of people copy them, but there are plenty of insurances and Medicaid in different states that are even tougher. Or their allowances and such are even lower. It’s definitely going that way for whatever funding source isn’t there yet.”

One of the translations for ATPs might be choosing seat cushions and mobility components with greater durability. Garven says, so the products can last through five years of rigorous use.

“Patient education is important for making it last that long. Choose a product that you expect to last that long, and if [they’re] a really hard and heavy user, anticipate that in your frame selection. If the cushion needs to last this long, it needs to be cleaned often. Choose something that can be cleaned often, whatever that might be.”

Knowing differences between products and codes could also be crucial for sound decision-making.

“General-use cushions have a 12-month warranty; that’s the Medicare standard, that they have a 12-month warranty,” Garven says. “Twelve months to 60 months — quite a difference. [General-use cushions] are not expected to last that long, so if somebody does qualify for a better, longer-warranted-type product, get it. They’re going to be using the chair for two or three or four or five years, so understand that you have to choose the correct width, but also the durability.”
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The Focus CR puts the client in the driver seat with customizable tilt and rotation. The Complex Rotation seating system offers an easily adjustable center of gravity that can be accomplished with the client seated in the chair. Two control paths and two centers of rotation minimize misalignment. The Focus CR also features tilt that is both secure and smart: It tells you where adjustments need to be made. The chair weighs 33 lbs. and can seat up to 300 lbs. Seat width ranges from 14” to 22” with a seat height range of 13” to 19.5”. WC19 transit approved.

Ki Mobility
(800) 981-1540
kimobility.com

Airpulse PK2
Clients with or at risk for pressure sores can now take the benefits of an alternating mattress on the go with the Airpulse PK2. The Airpulse PK2 offers automatic pressure sore treatment in a wheelchair cushion, complete with adjustable internal air bladders and cycle times. The product also features waterproof, coated foam; a custom antimicrobial cushion; and a 40-hour-per-charge battery. Upgrades include lumbar support, a deluxe remote control and a pelvic positioning pad.

Aquila Corp.
(608) 782-0031
aquilacorp.com
**Product Revue**

**TRU-Balance 3 Power Positioning Systems**
Designed to fit like a suit, the TRU-Balance 3 Power Positioning System offers options to truly tailor the system to the user via seat depth, width, back height, multi-axis armrests and center of gravity. In addition, the base comes standard with modular tilt, recline, scissor lift and articulating foot platform. Users can choose from a wide range of accessories, seating sizes ranging from 12x12” to 24x24”, and standard 300-lb. or HD 400-lb. weight capacities.  
**Quantum Rehab** (866) 800-2002 quantumrehab.com

**Removable Medial Hardware**
Need hardware that allows for the easy removal of a pommel pad for easier client transfers? Look no further than MTHW-650 Removable Medical Hardware. The product bolts directly to the front edge of the seat pan and enables the quick release of the pommel pad by simply pressing a button.  
**Stealth Products** (800) 965-9229 stealthproducts.com

**JAY Positioning Supports**
What you're looking for in positioning supports, the JAY line has. Options include adult and pediatric versions of Whitmyer head supports as well as upper-body, pelvic and lower-body positioning supports. New to the line are single and dual foot boxes for pressure and tone management and arm troughs for positioning and pressure distribution. Order on or off chair.  
**Sunrise Medical** (800) 333-4000 sunrisemedical.com

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