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An Occupational Therapy's Role to Seating and Positioning

Introduction

Occupational therapy has many areas of practice that intersect with the roles of other rehabilitation disciplines, such as physical therapy. One example where the two professions overlap quite a bit is seating and positioning. Physical therapists typically focus on seating and positioning as a way to maintain a patient's strength and range of motion. While these goals are also pertinent to an occupational therapist's work, the work of an OT aims to improve an individual's functional performance through seating and mobility accommodations. Occupational therapists consistently strive to find accessible, personalized devices that safely encourage mobility and stability while allowing individuals to engage in meaningful occupations.

Section 1: Background & Team [1, 2, 5, 6]

According to the American Occupational Therapy Association, seating and positioning services provided by an occupational therapist can focus on the provision of durable medical equipment (DME), complex rehabilitation technology (CRT), mobility devices, and positioning apparatuses as needed to improve someone's ability to interact with their environment. Therapists may also need to assess a patient's appropriateness for custom versus stock equipment, home modifications, device maintenance, vehicle adaptations or recommendations, device transportation, and more depending on the individual's circumstances. The following duties are part of an occupational therapist's scope of practice as it relates to seating and positioning:

- Assessing, measuring, recommending, and adjusting equipment to improve accessibility and assist patients toward present and future goal achievement
- Training patients and their loved ones in the effective and safe use of new devices, including maintenance, to assist in self-care and daily routines
- Having an up-to-date knowledge of policies, reimbursement standards, and regulations as they pertain to the use and prescription of medical devices
- Assisting in securing funding by offering medical necessity and clinical rationale behind a patient's need for equipment or technology

Occupational therapists and physical therapists are not the only professionals equipped to address seating and positioning, especially if patients are within institutions like

hospitals and nursing homes. Assistive technology professionals, also known as ATPs, also play a part in the equipment recommendation and measurement process. While these specialists don't always have a rehabilitation or even medical-based background, they do have a good knowledge of biomechanics and how this pertains to various seating options. Occupational therapists and physical therapists with relevant experience can also hold an ATP designation. Suppliers are also a notable party in equipment prescriptions. Suppliers often have even less of a medical background, if any, than the aforementioned professionals. While it is important to note that suppliers are sales-oriented and some companies have quotas to fulfill, some sales associates have many years of experience and can offer good insight into the type of equipment (and accessories) that will best suit certain needs. Suppliers may also partner with rehabilitation technologists in order to custom-make wheelchairs and other equipment. Rehabilitation technologists are engineers by trade and, as such, they participate in the design, production, modification, and integration of a range of assistive technologies.

Third-party payers also work closely with suppliers to provide partial or full reimbursement for equipment. In billing and reimbursement situations, the patient receiving the services and/or equipment is considered the first party, the organization who provides the services and/or equipment is the second party, and the payer is the third party. Third-party payers include public and private insurers such as Medicare, Medicaid, and health maintenance organizations (HMOs) as well as federal organizations such as the Veterans Administration. Funding may also come from grant programs offered through federal and state social service agencies.

If an occupational therapist is providing seating and positioning intervention to a child within the school system, they will also need to interact with the child's teacher or vocational rehabilitation counselor. Teachers are typically part of the process in traditional school settings, while vocational rehab counselors are more likely to participate in community-based settings such as structured work programs. These professionals can provide valuable insight into the child's seating and positioning needs. In some cases, this means teachers and counselors will document the difficulties a child is having with their existing equipment. Teachers may also need to relay the extent to which a child is struggling on their own (without any equipment) as a way to support the therapist's medical justification for a device.

Physicians play an integral part in the equipment process, since they may be the first point of contact when someone needs a wheelchair. After seeing a patient with mobility deficits, a doctor will complete a physical examination and mobility assessment. If the

results indicate the patient is unsafe as-is and would benefit from a wheelchair to improve their function, they will write a prescription for one. Patients and their families may also request a wheelchair due to difficulty within their home, school, work, or the community. As a result, the doctor will perform a similar evaluation to determine if their request is medically necessary. From there, the doctor may recommend a wheelchair or other seating and positioning devices that may be more suitable for their needs.

Doctors may not play as big of a role in the prescription of other positioning devices. If patients are in need of more specific devices such as activity chairs, doctors may refer them to ATPs or rehabilitation therapists. Therapists should keep in mind that a prescription (along with demonstration of medical necessity) is required for wheelchairs, seating, and positioning devices to be covered by insurance. The exact coverage will vary based on the patient's plan, but they must show documentation. However, some patients and their families choose to pay privately or seek donated devices to speed up the process or lower their out-of-pocket costs. While they will not go through the same steps (e.g. contacting a doctor) as they would if they need a prescription, therapists may need to work with these patients to make modifications to their devices, especially if they are second-hand.

Patients are another party within the seating and positioning process that cannot be overlooked. It is clear that patients must be included due to the necessity of taking measurements to ensure recommended equipment fits their body type. However, getting outside feedback and participation from the patient along the way may not be common practice for other lay professionals. As part of an occupational therapy plan of care, patent input is valuable in areas such as goal-setting and identifying activities of interest.

Occupational therapists can further assert their knowledge and expertise in the area of seating and positioning by receiving a different certification much akin to an ATP credential. The SMS certification is a specialty designation that indicates competency as a seating and mobility specialist.

Section 1 Personal Reflection

Can you think of an instance when occupational therapists and physical therapists may collaborate to set a patient up with a new mobility device?

Section 1 Key Words

Durable medical equipment (DME) - Any home-based equipment that is used to assist with medical needs. According to Medicare, DME must meet the following criteria: it is medically necessary, it can last at least 3 years despite consistent usage, it is not helpful for individuals without an injury or medical condition, and it is used within the home.

Complex rehabilitation technology (CRT) - A range of intricate mobility devices that require fitting, adjusting, programming, or customization.

Mobility devices - Also known as mobility aids, this equipment assists individuals with impairments related to walking.

Health maintenance organization (HMO) - A type of health insurance that operates based on doctors and other providers being contracted with certain insurers to provide certain coverage

Positioning devices - Equipment that is used to assist people in adjusting, changing, or maintaining certain body positions.

Assistive Technology Professional (ATP) - A certification offered to rehabilitation therapists and other qualified professionals who have demonstrated ongoing competence assisting individuals with disabilities in selecting suitable technology to meet their medical needs and providing training in the use of these devices.

Seating and Mobility Specialist (SMS) - A certification offered to rehabilitation therapists and other qualified professionals who have demonstrated ongoing competence assisting individuals with disabilities in selecting suitable seating and positioning equipment.

Rehabilitation technologist - An engineer who uses scientific design to create, modify, and integrate assistive technologies for individuals and suppliers

Section 2: Tenets of Seating & Positioning [1, 3, 4]

There are many important principles to keep in mind when addressing seating and positioning with your patients. But first, you must understand the risks and complications associated with poor seating and positioning, since you will need to provide patients and their caregivers with education and evidence-based reasoning behind the recommendations you make. Individuals with no seating options and ill-

fitting devices may experience:

- Limited mobility
- Changes in muscle tone, such as spasticity
- Loss of independence
- Pain
- Poor respiratory function
- Cumulative stress injuries resulting from improper posture
- Psychosocial issues, such as depression or anxiety that may result from difficulty adjusting to a new or ongoing disability
- Joint contractures
- Pressure ulcers, also known as pressure sores or bed sores
- Decreased quality-of-life

While there are many considerations to keep in mind while assessing someone for seating and positioning devices, there are several client factors that a therapist should focus on at all times. Therapists should attempt to find a device that allows for comfortable anatomical positioning, skin integrity, and function. In the realm of positioning, function most concisely refers to achieving trunk stability while providing adequate mobility of the extremities as needed to interact with their environment.

In occupational therapy school, we most often learn that the intention of bodywork is to first work on stability rather than mobility. In seating and positioning, these two concepts are often worked on simultaneously since they are equally important in the quest for functional, safe seating accommodations. A good rule of thumb is to focus on stability for the sake of using it to achieve mobility.

Ergonomics is another concept that is heavily emphasized in school. However, it is important to note that ergonomic principles used in employment settings for injury prevention, for example, differ largely from the ergonomic principles that therapists use when recommending seating. In reference to computer chairs and workstations, it is best practice to ensure that the hip, knee, and ankle joints are all neutrally positioned at 90 degrees. Many patients who require seating devices are not able to achieve such positions, potentially due to muscle tone or chronic conditions. In such cases, ergonomic

principles will depend on the patient's deficits, body type, and their goals.

Another core principle is the type of fit that therapists are aiming to achieve with the devices they recommend. Most devices will need to be adjusted over time, typically due to the aging process, the progression of a chronic condition, or the onset of a new medical concern. As such, it is important that therapists focus on appropriately fitting devices to a person's body, with a common analogy encouraging that they aim for a fit like jeans rather than sweatpants. While certain modifications can be made to extend the life of the device, such as the addition of accessories or adjusting foot rests, these are temporary and not intended to take the place of a new device if that is indicated.

Additionally, having a large surface area in contact with the body is one of the keys to minimizing the pressure that is exerted on joints and muscles. This tenet should also help therapists pay close attention to the effect that gravity has on seating accommodations. Be aware that an individual's center of gravity, including the upper body, should be balanced over their base of support. Since a person's center of gravity is lower when they are seated (as compared to when they are standing), their base of support extends to the backs of the thighs, feet, and buttocks. When someone is standing, their base of support only consists of the feet.

Pressure relief is another common term that plays a big part in assessing a wheelchair for goodness of fit. Many professionals who work in the seating and mobility realm prefer to use the term pressure redistribution instead because therapists can never entirely get rid of the pressure exerted on the body. Rather, they can use certain tools to distribute it more evenly across the surfaces their body comes into contact with. A good rule of thumb when making recommendations for pressure relief is to maximize the area making contact with the device to minimize the pressure being exerted. When a device provides poor pressure relief and patients are unable to shift weight on their own, this can result in pressure ulcers. Similarly, when a device causes friction on a person's skin, it can result in skin irritation. Over longer periods of time, this can cause skin shearing. However, therapists can use small doses of friction to their advantage to offer patients greater stability in a seated position.

Therapists should also have a basic understanding of the forces that are present within the context of a person and a seating or positioning device. The force of gravity is powerful and has a big impact on the goodness of fit between a patient and their device. Without taking this interaction into account, patients stand to get injured so it is part of a therapist's responsibility to ensure their safety. In any given situation, a person has internal and external forces that help them counteract the effects of gravity. Internal

forces refer to the force applied by structures such as muscles, tendons, ligaments, and bones. Most individuals have voluntary control over their muscles, so these are considered an active force. The forces applied by tendons, ligaments, and bones are passive since they play a more subtle role in movement and stabilization. A person is also affected by seating and orthotic components, which are both external forces. In order for therapists and seating specialists to achieve a good fit between the patient and their device, it's necessary they balance all forces in a way that results in static equilibrium. Static equilibrium means someone has a stable seated posture. A therapist can achieve this by ensuring the sum of all the torques and forces acting on the patient's body adds up to zero.

Another way to achieve a good equilibrium in a seating device is by considering where a device's base of support is and how large it is. This allows therapists to balance a person's center of gravity thoughtfully over their device's base of support. The mechanisms of movement are another seating and positioning concept that have roots in the foundations of physics. In order to ensure proper movement and device use, therapists must be sure all positioning devices utilize the longest lever arm possible. A lever arm is the perpendicular distance from the rotational axis to the position of force. In relation to wheelchair operation, for example, the elbow joint is perhaps one of the most notable lever arms. The elbow itself serves as the fulcrum while the biceps muscles exert the effort needed to move weight using the hand. The forearm acts as a stabilizing beam in this scenario. A longer lever arm requires more force from the muscles to encourage movement, which is why this is the safest and most effective way to operate a device.

Therapists should also use points of control to create a good balance between movement and stability when positioning a patient. There is a similar concept called key points of control (KPCs) in the neurodevelopmental treatment (NDT) approach. There are many KPCs, which vary depending on the type of movement and activity the therapist is attempting to engage their patient in. In terms of seating and positioning, there are three points of control. The first two points of control are on either side of a patient's torso with one being the upper/middle portion of the rib cage and the other being the lower portion of the rib cage. The only way for these locations to be used as points of control is if they are on opposite sides of the body. For example, a therapist can handle a patient more efficiently if they place one hand on their right upper/middle rib cage and their other hand is on the left lower rib cage. The last remaining point of control is the pelvis. This is the part of the body therapists look at the most when assessing a patient's positioning, since the pelvis must be stable and symmetrical to

balance the rest of the body. In particular, a patient will struggle to use their upper body if they lack a stable pelvis. This is a concern not only for the sake of ergonomics, but also for functional participation.

It's also important for therapists to keep in mind that the pelvis loses its mechanical stability when the hips are flexed, so therapists must ensure its stability before moving forward with other parts of the assessment. Any changes in the pelvis will impact other parts of the body.

In addition to body mechanics and applied science, therapists must also take care when addressing positioning with patients themselves. While some of this work involves taking measurements and working with devices, there are instances where therapists need to lay hands on patients who are not able to adjust their own position. They should always be gentle and tell patients what they are doing before they begin. This is not only professional, but it also helps maintain the patient's dignity. Therapists should encourage patients to do as much of their own positioning as possible with the help of verbal, visual, and tactile cueing. Therapists should always lift rather than slide a patient. If this is not possible, they can recruit the help of another therapist or staff member. Clinicians can also use patient lifts, slings, slide boards, and other equipment to help in the process.

The standard position for patients in bed is supine, since this makes examination easier. Patients in this position are flat on their back with their legs fully extended and arms by each side. Some patients may benefit from a second pillow or cushion behind their head, which may help with symptoms of gastroesophageal reflux or simply make them more comfortable. The use of added cushioning behind the head is contraindicated for patients who have had spinal surgery, so it's important to check the patient's medical record before making this change. If their legs are fully extended in front of them, it is common for patients to have a cushion under their knees to prevent lower back pain. Some patients in supine may also have their knees bent for comfort. In some cases, patients require lateral support on one or both sides to cushion the arm(s). This is most often the case with arm injuries such as fractures or hemiplegia after a stroke. If they are not mobile, supine positioning places patients at the greatest risk for pressure ulcers. So therapists should provide extra cushioning around the bony prominences for these patients: at the base of the head/upper neck and under the heels.

While less common, a patient may be placed in bed in a prone position, which entails laying on the stomach with the head turned to one side and both arms straight at the side. The hips are not flexed in this position. Patients may be instructed to lay prone to

get relief from certain symptoms, such as shortness of breath or respiratory distress resulting from a certain condition such as the coronavirus (COVID-19). Prone positioning is also used to increase drainage from the lungs, so patients who are recovering from mouth and neck surgery may be placed in prone as well as patients undergoing neck and spine surgery. However, this position is contraindicated in patients with longstanding back issues, since it impacts the natural alignment of the spine.

When looking to relieve pressure on the tailbone, individuals may be placed in side-lying (sometimes called the lateral position) with the hip and knee of their top leg flexed. This top leg is placed further out from the bottom leg so it can be supported by a pillow. Side-lying creates a triangular base of support, which allows patients greater stability. Due to the flexion in the lower extremities, this prevents excessive lordosis in the spine and promotes good alignment. Side-lying also relieves heel and sacral pressure, so this may be a good position for patients to rotate through if they are confined to bed.

Sims position is a cross between side-lying and prone and, as such, is called semi-prone. The lower arm is straight by the side while the elbow and shoulder of the upper arm are both flexed. The knee and hip of the lower leg are slightly flexed, while the upper leg is almost fully flexed. This is usually used to place enemas and complete specific medical tests such as exams of the rectum or vaginal wall. Since this posture drastically reduces any pressure on the lower body, it is recommended as a comfortable sleeping position for pregnant women. It also helps unconscious individuals by preventing aspiration of fluids. For patient comfort and the preservation of circulation, it's important to ensure the arms are not trapped beneath the torso in this position. Ideally, one pillow will be placed in three spots: under the head, the upper arm, and the upper leg. This keeps the body in good alignment by preventing the legs from internally rotating.

The Trendelenburg position involves bed adjustments rather than positioning adjustments. The patient is lying in supine with the head of the bed lowered and the foot of the bed raised. This is ideal for patients with venous insufficiency or hypotension, since it promotes improved blood flow back to the heart. For this reason, it is the go-to position when a patient is experiencing a medical emergency since it can help revive vital organs. The Trendelenburg position can also assist with clearing drainage from the basal lobes of the lungs.

Section 2 Personal Reflection

What are some core tenets of occupational therapy practice that are foundational parts

of seating and positioning?

How can occupational therapists help patients adjust to using a wheelchair or other mobility device?

Section 3: Seating Evaluation and Recommendation [3, 7, 8]

Before a patient can receive any type of DME, they must first receive a prescription from their doctor. This marks the start of the intake process. A prescription not only demonstrates that the equipment is medically necessary as outlined by the Medicare criteria, but it also assists in the insurance reimbursement process. If an individual is in an assisted living facility, skilled nursing facility, or even long-term acute care hospital, individuals will often simultaneously receive a referral to OT or PT alongside their equipment prescription. This allows therapists to be part of the fitting, adjustment, and training process from the start. Both hospitals and suppliers will then verify the patient's insurance to determine what wheelchair will be covered.

Next, suppliers and therapists will make a home visit to determine what type of chair is appropriate for the patient's environment. This is when therapists will make recommendations for home modifications to ensure the safe use of the wheelchair in each area. Therapists should visit home, school, community settings, and anywhere else that the patient frequently visits. From here, therapists are able to get a sense of the patient's exact needs. For patients who already use a wheelchair, this may mean therapists assess the patient's current equipment to see if a repair would serve them the same purpose. Therapists along with doctors will also determine whether patients are best suited for a long-term or short-term wheelchair based on the extent of their deficits. For example, short-term seating options are appropriate for patients who recently had an ACL repair or an ankle surgery and are expected to make a full recovery. Whereas, patients with severe Parkinson's or a high-level spinal cord injury are best served in a long-term accommodation due to their prognosis.

The next and perhaps the most important step is a wheelchair evaluation. This gives therapists a comprehensive look into a patient's needs and abilities to help determine exactly what type of chair is best for them. Here are the major components that should be included in all wheelchair evaluations:

History

An overview of the patient's relevant diagnostic- and treatment-related information

- Diagnosis
- Treatment and surgical history
    - For children, this may include a review of the most recent hip and spine scans to ensure there are no major concerns
- Their present level of assistance, if they currently use a wheelchair
- Pain levels
- Caregiver's ability to assist
- History of seizures
- History of skin issues
- Benefits and disadvantages of their current wheelchair, if they currently use one

Current functional status

An observation in real-time of how the patient manages in the major performance areas

- Dressing
- Grooming/hygiene
- Bathing
- Feeding
- Toileting
- Completion of relevant IADLs
- Engagement in school and/or work activities
- Engagement in productive leisure

Patient goals

- Main reasons the patient wants a new wheelchair
- Likes and dislikes about their current wheelchair, if they have one
- Type of wheelchair patient hopes to get
- Acceptance of short-term or long-term need for a wheelchair

Comprehensive exam

A look at the major physical and mental structures and functions that impact wheelchair use:

- Reflexes
    - Are all reflexes integrated?
    - If not, do they impact the ability to remain safely seated in a neutral or active position?
- Motor control and coordination
    - Is the patient's ability or inability to control all parts of their body impacting their capacity for remaining in a neutral position, assisting with propulsion, keeping feet on foot rests, etc.?
- Range of motion
    - Range of motion testing is important for every part of the body (all extremities, trunk, and neck), since they all impact the patient's use of a wheelchair
    - Testing should be completed in seated and supine to get a true picture of body parts like the pelvis and spine
- Mat assessment
    - While in supine on a mat or sitting at the edge of a plinth, analyze the patient's breathing along with their posture, performance during transfers, and ability to complete basic functional tasks

- Skin integrity
    - Does the patient have a history of skin issues?
    - Where are past or current pressure ulcers located?
    - Does the patient have a history of incontinence? This can cause skin breakdown if not fully managed
    - Are they able to adjust their body as needed throughout the day to relieve pressure?
    - Individuals who are seated for more than 4 hours on a regular basis are at a greater risk of pressure ulcers, as are individuals with impaired sensation or gross immobility
    - Anyone with a spinal cord injury, muscular dystrophy, multiple sclerosis, stroke, or amyotrophic lateral sclerosis (ALS) are also at an increased risk of bed sores
    - The following factors contribute to the development of pressure ulcers:
        - Repeated and/or sustained pressure over time
        - Poor nutrition
        - Moisture and heat
        - Incontinence of any kind
        - More local pressure, especially over bony landmarks such as the heels, ankles, back of the head, and elbows
        - Increased friction leading to skin shearing
        - Age
        - A history of infection(s)
- Muscle strength
    - Manual muscle testing is important for every part of the body (all extremities, trunk, and neck), since they all impact the patient's use of a wheelchair

- Balance
    - Test dynamic and static balance in both standing and seated positions
    - How much support does the patient need to remain in a seated/neutral position?
- Sensation
    - Does the patient have any loss of sensation secondary to conditions such as diabetes or spinal cord injury?
    - Does this impact their ability to keep their limbs and other body parts free of injury (e.g. feet and arms inside the wheelchair, skin free from sores due to inability to adjust)?
- Vision
    - Does the patient have any visual impairments such as field cuts or depth perception issues?
    - Are they able to identify hazards in their environment?
- Cognition and behavior
    - Are they able to safely participate in managing the wheelchair, including locking/unlocking brakes, propelling, avoiding hazards in their environment, and staying up-to-date with general upkeep of the device?
    - Are they able to avoid pinching their arms and legs when maneuvering tight spaces?
    - Do they demonstrate unsafe behaviors such as throwing themselves from their wheelchair or reaching for items that are too far away?
- Transportation
    - Does the patient or their caregiver have the means to manage this chair within the community?
    - Can it fit inside a standard vehicle with or without modifications?
    - Do they need an adapted van to help transport the wheelchair to doctor's appointments and recreational outings?

- Functional movement
    - Upper extremity use
    - Weight shifting
    - Influence of tone and reflexes on movement
    - Reaching
    - Trunk stability
- Tone
    - Are there any abnormalities in tone (increased or decreased) in the extremities, trunk, or neck?
    - Are there any triggers for the tone?
    - Does the tone abnormality improve or hinder their functional abilities?
- Posture
    - Look at the alignment of the pelvis with the hips, knees, and feet as well as the alignment of the spine with the shoulders, neck, and head
    - You will also want to analyze the alignment of the spine on the pelvis
    - What is the natural alignment and symmetry of the patient's body?
    - Is this something that a wheelchair can safely accommodate with or without modifications?
    - According to their body posture, can patients ergonomically engage in functional activities while in their wheelchair?
    - Therapists should be sure to focus on function before posture, since the perfect posture and set-up may not always be possible for the patient
    - Look for the following major deviations:
        - Excessive posterior or anterior pelvic tilt, which can be assessed by observing the placement of the pelvis while a patient is laying flat on their back, standing up straight, and bending over to touch their toes while standing; if a patient has anterior pelvic tilt, the front

aspect of the pelvis will point downward, which causes the torso (stomach and chest) to be farther forward than the pelvis; if they have posterior pelvic tilt, the rear aspect of the pelvis will point forward, which causes the torso to be positioned farther back than the pelvis; wheelchair adjustments to assist with excessive posterior or anterior pelvic tilt include the use of moldable seat cushions, ensuring for sufficient back support, and installing anti-tip bars

- Pelvic obliquity or rotation appears in individuals who have one anterior superior iliac spine (ASIS) higher than the other, which causes asymmetry; therapists can test patients for pelvic obliquity by palpating both of a patient's ASIS or posterior superior iliac spine (PSIS) and comparing their positions; wheelchair-based considerations for those with pelvic obliquity include offering deeper back support and getting a custom-fit, adjustable cushion

- Excessive kyphosis or lordosis, which are both tested by having a patient stand up with their legs straight and bend at the waist as far forward as they can to try to touch their toes; while in this position, the therapist will look at the spine's curvature and potentially palpate to see if there are any abnormalities; patients with these postural abnormalities benefit from their back remaining in contact with the back support, which should be high enough to reach the shoulders; other wheelchair adjustments may include giving the wheelchair some posterior tilt, a fixed posterior angle, or widening the angle between the seat and the back

- Lateral, anterior, and posterior scoliosis, which are tested by having a patient stand up with their legs straight and bend at the waist as far forward as they can to try to touch their toes; while in this position, the therapist will look at the spine's curvature and potentially palpate to see if there are any abnormalities; patients with lateral scoliosis will need wheelchairs with lateral support (lateral pads, thoracic pads, etc.), those with anterior scoliosis should have anterior support (safety belts and other supports to keep them seated upright in the chair), and those with posterior scoliosis should have posterior and anterior support to keep them as close to a neutral position as possible

- Hyperextension of the head or neck, which can be assessed through a basic range of motion test performed while seated; patients with hyperextension in these joints would benefit from a curved headrest with lateral supports to offer postural control for the head and neck
- Excessive adduction and abduction or internal and external rotation of the hips, which is also tested by assessing range of motion in seated and in standing positions; an individual with excessive hip movement should have a wheelchair seat that prevents whichever excessive movement the patient demonstrates; for example, the seat cushion should be built up to keep the hip in neutral if it tends to slip into internal or external rotation
- Excessive inversion and eversion of the ankles, which can be tested by assessing the patient's position of comfort when seated in the wheelchair; patients with excessive movement in the ankles should have leg rests and footplates with the addition of toe straps to keep their foot in a neutral position
- Windswept deformity, which is when both hips are in different positions while seated (one in abduction and external rotation, other in adduction and internal rotation); this is typically the result of poor lower body alignment, specifically in the knee, so an assessment of that part of the body should help identify it; individuals with a windswept deformity need well-fitted legrests that keep the knees properly aligned; this will allow for movement and symmetry in the feet and stability from the pelvis by allowing it to rest in neutral

- Therapists will commonly see collapsed trunks, more thoracic kyphosis, less lumbar lordosis, and more posterior pelvic tilt in those sitting in wheelchairs, so they should be ready to make adjustments accordingly

Simulation and equipment trials

This will help the therapist determine what supports the patient needs to have in place for an appropriate device. You can start off simulating different seating scenarios and then trial various types of equipment, if you are able.

- Simulation
    - Use magazines, towels, bolsters, foam wedges, bubble wrap, bean bags, pillows, and other similar materials to determine the impact that certain postural modifications will have on the patient's function
    - The main areas to address using this simulation include changes in seat slope, trunk rotation, lateral supports, obliquities, and joystick or wheel rim access
- Equipment trials
    - This may entail having the supplier drop off or assist with testing out some loaner equipment in the home or the hospital, or trying different wheelchair types that you have on hand at your facility.

Measurements

- Measurements taken from the lateral aspect of one joint to the other:
    - Shoulder width
    - Chest width
    - Hip width
    - Between the knees
    - Upper leg length (knee to hip)
    - Lower leg length (knee to ankle)
- Measurements taken from the base of the seat to the:
    - Top of the head
    - Base of the neck
    - Top of the shoulder
    - Inferior angle of the scapula
    - Elbow

- Additional measurements:
    - Elbow to fingertip
    - Foot length

This sample evaluation form is a good starting point for therapists who are doing a mobility assessment and determining what device(s) are best for their patients. Once an evaluation is completed, a therapist can collaborate with patients to form goals that allow for optimal use of seating and positioning devices. Some general goal areas that are applicable for most patients who are fitted for wheelchairs include:

- Preventing patients from sliding/falling out of their wheelchair or excessively leaning to the side (or shifting into other positions of comfort that can lead to injury or pain)
- Training and providing education regarding proper use of seating and positioning devices (e.g. use of brakes on wheelchairs, adjustment of reclining features on activity chairs, etc.)
- Increasing engagement in functional tasks while seated in or using the device
- Maximizing mobility (e.g. ability to self-propel and weight shift in wheelchair; ability to use upper extremities when seated on cushion)
- Using specific surfaces to support the body in a position that is ideal for that patient
- Offering various surfaces (e.g. cushions, pads, etc.) that lower the patient's risk of skin breakdown
- Providing various techniques for position changes on weight bearing surfaces
- Slowing the development or progression of deformities, which often occur with conditions such as spina bifida and rheumatoid arthritis

While positioning in places like a bed or a chair are most often intended to prevent injury and encourage function, this type of intervention can serve multiple purposes. Positioning intervention can also help preserve a patient's privacy and allow better visibility of certain areas such as body parts that have open wounds, infections, burns, and other concerns that need to frequently be monitored and treated.

While these goals can be applied to nearly any patient who requires seating and

positioning assistance, there are other goals that are beneficial to certain populations. For example, older adult patients who are non-ambulatory might have goals related to:

- Enhancing comfort while using their device
- Improving postural stability and widening the patient's base of support as it pertains to their device
- Demonstrating better pressure management via weight-shifting and other techniques
- Boosting engagement in functional and social tasks
- Training staff and patient on the management of safety concerns related to the device
- Making the device easier for the patient and/or caregivers to use and maintain

More specific goals for patients with neurological conditions such as cerebral palsy and spinal cord injuries may include:

- Minimizing the effects of abnormal tone on device use
- Inhibiting abnormal reflexes to improve occupational engagement and performance
- Supporting community integration, functional mobility, and accessibility to preferred and essential activities and environments
- Improving postural stability

Some seating goals that may be appropriate for individuals with residual effects from a stroke include:

- Achieving and maintaining midline
- Maximizing comfort
- Supporting the affected upper extremity in a protective manner that also allows for function, if possible

The list goes on depending on the symptoms that a patient is experiencing. For example, a patient who has muscular dystrophy may work with their therapist on a goal to improve their sitting tolerance in preparation for academic tasks as their disease

progresses.

Therapists recommending any positioning device, especially wheelchairs, should be sure to provide sufficient training on pressure ulcer prevention and/or management. In order to prevent the development of pressure ulcers, patients and caregivers alike should be educated on proper skin care and hygiene, positioning schedules and other pressure relief techniques (this is especially crucial if patients are unable to shift weight and reposition themselves), and safe transfers in and out of the positioning device.

Section 3 Personal Reflection

Can you think of an instance when occupational therapists and physical therapists may collaborate to set a patient up with a new mobility device?

How might a co-treatment or collaboration between these two disciplines for the purposes of mobility and device training be structured?

Section 4: What's in a Seating Device? [3, 9]

There are many features that most or all wheelchair styles have to ensure for safe and comfortable use of their mobility device.

Push handles: These help caregivers with propulsion of the wheelchair; there are certain types that allow some variety for this feature:

- Bolted on, which cannot be removed
- Folded down, which remain connected but flatten to make the wheelchair more compact for the sake of storage and transport
- Attached to the back post, which are affixed to the bars that make up the chair
- Height-adjustable handles, which can be raised or lowered based on the height and comfort of the caregiver manipulating the handles
- Stroller handle, which is a single curved bar used to push a wheelchair

Armrests: These allow individuals to rest their arms in neutral while also giving them a surface to assist with repositioning in their chair; the standard is a fixed size that extends the entire length of the chair, provides support to the entire arm, and allows for

accessories to be attached; armrests are available at “desk length” for those who want to be more easily positioned at tables and do not require as much stability; individuals can also opt for various types of armrests:

- Height-adjustable, which can assist in making the wheelchair more comfortable for people with arms that are longer or shorter than average
- Tubular, which appear more sleek and modern with a style similar to that of traditional handlebars
- Swing-away, which can be moved laterally while still attached to allow for easier transfer in and out of the wheelchair; these are also more sleek than traditional armrests and are similar in style to tubular
- Mounted to the seat, which is a design more commonly found on power chairs and motorized scooters since it allows for easier transfer without users needing to detach/attach any pieces
- Flip-up style, which are also often part of power chairs and motorized scooters for the ease of getting in and out of the device more frequently and easily

Legrests: These provide support for the legs; they can be fixed at 70, 80, or 90 degrees or swing-away; other options include:

- Swing-away legrests that be pushed to the side, which allows users the option of moving their feet for propulsion; this type of legrest is less durable than the fixed and may require more maintenance
- Elevating option, which offers the user more precise movements so they can have greater control over their positioning; this allows users to position themselves in certain ways to alleviate inflammation, maintain surgical precautions, and comply with other medical recommendations
- Articulating legrests, which elevate and extend at the same time; this option can be more difficult for users to adjust on their own, especially if they are unable to independently get out of their wheelchair to do so

Foot plates: These provide support for the feet; there are several options for foot plates:

- Composite, which are fixed in a set position
- Angle-adjustable with two separate plates, which offer some movement from one

side to the other or from front to back

- Angle-adjustable with a single, large platform for both feet to rest on
- High-mounted foot plates, which are recommended for individuals with leg length discrepancies who would not be comfortable and risk injury with traditional foot plates

Brakes: These safety measures put or relieve pressure on the tires to stop and start, which allows someone to safely transfer in or out of the chair; the options for brakes include:

- Push-to-lock brakes are the most common mechanism found on wheelchairs, since their design offers sufficient clearance for the tires when not in use; this design involves pushing a small handle to place a stopper up against the tires and lock the brakes; to disengage the brakes, the user or caregiver must pull on the same handle to release the stopper and allow the tires to move freely
- Pull-to-lock brakes involve the opposite mechanism and are a better fit for wheelchairs with smaller frames and swing-away leg rests, since these brakes don't block the lower part of the chair; as the name indicates, those wishing to engage pull-to-lock brakes should pull rather than push
- Scissor-lock brakes fold under the seat when not in use; pull- and push-to-lock brakes are both positioned with the handle on the top and the stopper below it; scissor lock brakes operate from side to side; for example, the left-hand scissor brake has its handle perpendicular to the tire and the stopper of the brake is located proximally; these brakes are not as common and many wheelchair users struggle with them due to the sometimes awkward angle they rest at; users who do operate these brakes will find they require significant dexterity and upper body strength

Anti-tippers: Two small wheeled bars that attach to the frame of the wheelchair to prevent tipping while making navigation up inclines or around tight corners easier and safer; there are two options for anti-tippers, also known as tip bars:

- Adjustable anti-tippers, which can be placed on the front, rear, or side of the wheelchair and attach directly to the frame; these are also more versatile because they come in several basic sizes (¾", ⅞", and 1") to accommodate a range of wheelchairs; it's not uncommon for adjustable anti-tippers to be curved to allow for better contact with the ground from different angles

- Rear anti-tippers are placed at the rear of the wheelchair and are typically attached to the wheelchair's main axle; these are straight bars that prevent the wheelchair from tipping backwards

Casters: Ball-bearings that surround the smaller, front wheels and provide increased maneuverability; there are two size casters and two main types for various situations:

- Small casters are more appropriate for level surfaces so they can provide a rougher ride if the surface is bumpy
- Large casters are better-suited for uneven terrain, longer rides, and smoother propulsion; these casters also keep the wheelchair's center of gravity higher, which is important to note in case any center-of-gravity adjustments need to be made to the chair (due to amputations or paralysis)
- Pneumatic casters offer the most shock absorption along with a smoother, quieter ride; these are best-suited for moving individuals who are fragile or have medical precautions that require them to remain steadily positioned; these casters may puncture, in which case they can come along with more maintenance than other models
- Semi-pneumatic casters are thicker and suited for uneven floors indoors and bumpy, grassy surfaces outdoors; these casters are not made for various types of outdoor terrain and cannot handle sand or gravel; they cannot puncture since they are not pressurized and the air within the caster is contained in certain compartments

Wheels: Rear wheels range from 22 to 26 inches based on patient need; wheel size should be chosen based on what allows the patient to achieve a 30 degree elbow bend when propelling; additionally, it's important to consider who will be operating the wheelchair:

- Wheelchairs with smaller wheels are more suitable to be pushed by a caregiver, since it will be more difficult for users to reach the wheels themselves
- Wheelchairs with larger wheels will be equipped with pushrims that patients can use to propel the wheelchair without assistance

Tires: Tires for the rear wheels help the wheelchair move and can be either:

- Pneumatic, meaning they are filled with air and have good shock absorption;

these can puncture so they will require some maintenance

- Solid, which means they are made entirely of some combination of foam and rubber; they contain no air so they are considered lower maintenance than other types of tires; however, solid tires do not always last longer than pneumatic ones and generally offer a bumpier ride with less shock absorption
- Treaded, which offers increased traction on a variety of surfaces

Pushrims: Small bars on the outer edges of wheels that patients can use to propel their wheelchair; the pushrim options are mainly in terms of their material:

- Aluminum pushrims are more durable and long-lasting, but they may be less comfortable (e.g. have a colder feel on the patient's hands); since they are small and thin, these pushrims can also be difficult to grasp and may not be suitable for someone with arthritis or other orthopedic concerns that impact their hands; patients can wear gloves or get single-use hand warmers to avoid the cold feeling of the rim, but this may not be the preference of some wheelchair users; since this is the standard material for pushrims, another work-around that patients can use is installing plastic tubing around the pushrim to make it warmer, larger, and more comfortable to grip
- Stainless steel pushrims have many of the same features, advantages, and disadvantages as aluminum pushrims do, but they are often made with grooves on the pushrim to allow for increased traction on the hands
- Plastic pushrims are less durable and can also be difficult to grasp, but they may offer some added comfort for patients
- Projection-based pushrims are an ideal option for individuals with limited upper body motion and sensation because they come equipped with large bumps that users can grasp and push off of to manipulate the pushrim; for this reason, they can be moved with less dexterity and even require less energy from the patient

Back support: The back of the chair that is intended to contour the spine to maximize support; ideal back support minimizes excess moisture and regulates the patient's temperature; there are several back support options for wheelchair users:

- Sling back is one of the most common back support options, but it is not always preferred by wheelchair users; the material in slingback-style back support sags, which lessens the amount of support given to the pelvis and the lumbar spine

- Solid back is the more favorable option, since the material in a solid back seat does not sag and provides appropriate support for the body's natural curves; this means users will get good trunk and back support, which allows for improved use of the upper extremity with stability of the torso and lower body
- Tension-adjustable upholstery (TAU) comes with several large straps located on the outside of the chair's back; these straps can be loosened or tightened to improve comfort and distribution of pressure; ideally, these straps should be adjusted before assembly (or simply without the chair sitting on the frame) so the user and caregiver can get a clearer idea of the back support the straps will provide; anyone adjusting the straps must avoid over tightening them, as this can harm the integrity of the wheelchair frame and provide the wrong sort of postural assistance for the user; it's also important to note that these straps will impact the patient's center of gravity, so the therapist should make adjustments as necessary to ensure for patient safety
- Solid contoured backs offer winging on the lateral borders of the back support to stabilize the core (which is especially helpful for users with poor trunk control) and allow for improved upper extremity motion; many times, solid contoured backs are designed to support individuals with cervical kyphosis; the lateral wings are flexible and can be adjusted to patient comfort or therapist preference
- Off-the-shelf back support is purchased as a standard back support option; this type of back support comes with multiple components, which makes it highly adjustable; individuals with specific postural considerations (e.g. asymmetry) and health concerns that complicate the fitting process would need one of the above options or possibly even custom-molded back support
- Planar systems are lightweight and typically made of aluminum; this type of back support is ideal for those who need pelvic stability and suffer from postural concerns stemming from a highly movable pelvis; planar systems are also a good fit for those with pressure ulcers (or those who are at risk of developing pressure ulcers) since it's often made of high-stretch material that reduces skin shearing; the best planar back support models are advanced enough that the user can make adjustments without leaving their chair
- Custom molded back supports are individually-crafted based on each patient's needs; this is the best option for individuals with specific postural abnormalities or unique health concerns that make the patient unable to utilize other forms of

back support

Cushions: Padding on the seat of the chair that distributes pressure and provides even support for the pelvis and legs; options include:

- Foam cushions provide level support and retain heat; in some cases, this is good but it can make the users too hot or uncomfortable; foam cushions also tend to lose their shape and wear out more quickly than cushions made of other materials
- Water cushions are most ideal for individuals who need significant assistance with postural control; these cushions are also a good way to relieve pressure on joints, which can help ease chronic pain; the downside to water cushions is they can be messy and difficult to repair in the event they rupture
- Gel cushions can absorb vibration well so they may make a bumpier ride a bit smoother for the user; these cushions do not handle impact well, so they are not well-suited for individuals who often "plop" down in their chairs with little to no control since they will not stand up to that type of pressure; gel cushions are also heavier than other cushions, so they can make the wheelchair unit a bit heavier, which may impact a user's ability to self-propel
- Contoured cushions shape to the buttocks and thighs in response to the user's weight; because of the type of contouring these cushions offer, they allow users to be positioned in hip abduction and external rotation, which can assist with maintaining certain medical precautions, especially those related to orthopedic concerns
- Air cushions also adjust to the shape of the body, but they must be inflated just the right amount in order to do this; leaks are the most common concern with this type of cushion, since they greatly impact the effectiveness of the cushion; air cushions are not considered as stable as cushions made of other materials, so they are not ideal for users who shift around in their chair a lot (though this type of movement is recommended for users to help relieve pressure)
- Convoluted cushions, more commonly known as egg crate cushions, have convex foam bumps that improve circulation, help with pressure relief, and make wheelchair users more comfortable; this material is often used to make mattress toppers, which serve to make an overly flat or old mattress more plush; a disadvantage of convoluted cushions is that the foam will eventually sag, making

the cushion unusable; it may take a while for this to happen depending on the quality of the foam used, but it will still occur at some point regardless of the type; convoluted foam cushions comes with fabric covers to make the cushion last longer so it may even be uncomfortable without this covering

Cushions are a good option for individuals who are especially at risk for pressure sores. This includes individuals with spinal cord injury, muscular dystrophy, multiple sclerosis (MS), amyotrophic lateral sclerosis (ALS), or a history of stroke. Immobile older adults are also at risk, along with anyone who is seated for more than 4 hours at a time, patients who cannot position themselves, and those with impaired sensation.

Lateral trunk support: An option for some wheelchair users with poor core strength, scoliosis, or decreased tone; this option can encourage functional use of the arms but prevents lateral lean and can make transferring more difficult

Anterior trunk support: An option with a minimalistic strap that helps some wheelchair users with poor core strength keep their torso safely aligned and in place

Anterior pelvic support: An option with a minimalistic strap that helps some wheelchair users with poor pelvic strength keep their hips safely aligned and in place

Lateral pelvic support: An option that helps some wheelchair users maintain a neutral hip position rather than abducted or overly internally/externally rotated

Anterior knee support: An option that helps some wheelchair users keep their knees in neutral and aligned with the rest of the leg while seated

Head support: An option that helps some wheelchair users keep their head and neck supported while seated; this is often an option for tilt-in-space wheelchairs or power chairs with high back support

There are also a range of seating styles to accommodate individuals with both high- and low-level needs.

Manual wheelchairs

Starting on the end of lower support is a manual wheelchair, which is a standard option and the mobility device that most people picture when they first think of a wheelchair. Manual wheelchairs can either be caregiver-attended or self-propelled with some styles offering both options. They can sometimes be transported easily, depending on if they have a rigid or folding back. Manual wheelchairs can be standard size, lightweight, or

ultra lightweight. The latter option is often called a transport chair since it doesn't have the extended features or comfort that other manual wheelchairs do. For this reason, it is used most often by individuals who only need mobility support during long trips in the community. Specialty or sports chairs come with special wheels and low backs to allow for maximal upper body movement and fast propulsion. These are used for a variety of sports, including rugby, basketball, track, and tennis. Sports chairs are an example of manual wheelchairs with a rigid frame that cannot be transported as easily as some other styles can.

Reclining wheelchairs are another option with an especially high back that allows individuals to go from an upright, 90 degree position to a flat, resting position at 180 degrees. This option is ideal for individuals who want optimal comfort and need to assume this position for medical reasons throughout the day. A manual tilt-in-space wheelchair offers full-body reclining to redistribute pressure on the pelvis while allowing the head to remain upright and protected. While individuals who use this style can propel themselves, they will need assistance from someone else to engage the tilt feature from the rear of the chair. This chair also reduces skin shearing, which may occur with reclining wheelchairs.

Other manual mobility devices that differ from wheelchairs but assist with positioning are gait trainers, which offer support and postural alignment while walking. You can think of this device as an alternative to a walker for someone whose needs aren't extensive enough to warrant wheelchair use. Standers, on the other hand, are specifically designed for wheelchair users and allow them to engage in standing activities.

Power wheelchairs

Push rim active assist and smart drive wheelchairs have motors installed in the wheels, which helps individuals who have limited endurance as they propel themselves. While these units can be heavy and cumbersome to independently manage, they reduce the amount of effort the user exerts by around 80%.

A one-arm drive wheelchair is a style that is ideal for individuals with functional use in only one upper extremity. The wheel axles on these chairs are linked, so propulsion on one side makes both wheels turn. This style is large and difficult to transport.

Power wheelchairs also come with features such as front wheel drive, all-wheel drive, or rear-wheel drive to assist in navigating a range of terrains. Controls for power wheelchairs include switches, joysticks, head controls, mouth controls, and more.

Pediatric Seating and Positioning

Children with complex medical needs often benefit from a variety of seating options from a very young age. Since children are growing quickly and often have more evolving needs than most adults, equipment that is recommended in the early years is expected to last about 3 years. Equipment adjustments should be made every 6 months to ensure the device is still presently appropriate for the child.

Supportive strollers allow caregivers to easily place and remove babies from the chair while also offering storage for DME such as ventilators, fluid bags, and more. From a supportive stroller, most children transition to a more lightweight stroller, manual wheelchair, or a power wheelchair.

Supportive feeding chairs serve a similar purpose by giving a child more structure and stability than a standard high-chair, allowing kids to actively participate in meal time. Children with epilepsy or poor postural control may benefit from bathing chairs that are a plastic-mesh mix and gently strap them in for safe grooming. Most also recline and some are tabletop and sink-sized for small children. Similarly, toilet seating is a good option for individuals who want to participate in toileting but lack the postural control to safely assist.

Children at school also have positioning needs that can be addressed in unique ways. Children with medical concerns such as a traumatic brain injury, cerebral palsy, sensory processing disorder, spina bifida, and more may be unable to tolerate the standard desk and chair that other students use. Here are some tools and household items that school-based occupational therapists can use to provide children with alternative seating and positioning options:

- Lap desks
- Bean bag chairs
- Couches
- Rocking chairs
- Stools
- High tables
- Coffee tables

- Blankets
- Mats
- Restaurant booths
- Wobble chairs or t-stools
- Yoga ball chairs or milk crates with a large exercise ball inside
- Standing desks
- Collaboration tables
- Swivel cushions
- Bumpy cushions
- Smooth air cushions
- Bolsters
- Duvet loungers or body pillows
- Beach chairs
- Camp chairs
- Papasan chairs
- Cube seats
- Partially-inflated beach balls
- Peanut seats
- Sensory swings
- Platform swings
- Scoop rocker chairs
- Portable laptop stands
- Futons
- Foam blocks

- Tents or sensory spaces
- Scooter boards
- Floor pillows

As you can see, sometimes positioning doesn't have to be as formal as a wheelchair or specific device. Addressing positioning can also be as basic as setting patients up comfortably in their bed to prevent injury or pressure sores. These are the rules-of-thumb for in-bed positioning:

1. Position the patient so they are lying between supine and prone with their legs flexed in front of them.
2. Place the patient's arms comfortably beside them and not underneath other body parts.
3. Adjust the head of the bed to rest at a 45 degree angle.
4. Stabilize and align the pelvis as much as possible. Depending on patient comfort and needs, the hips may be placed in a flexed position.
5. Maximize the contact area between the body and the bed.
6. Redistribute the patient's weight over an area with more skin and fat that have less bony prominences.
7. Train caregivers on ergonomic transfers, pressure redistribution strategies, and proper skin care.

Section 4 Personal Reflection

What are some crucial differences between recommending seating options for children versus adults?

What are some pieces of education that therapists should give parents who are taking a disabled child home after a hospital stay?

Section 5: Clinical Considerations [3, 4, 10, 11]

Due to a range of performance deficits, therapists must be mindful of certain factors that

can make seating and positioning more difficult. For example, some patients who do not use a wheelchair safely are at risk for subluxations of the shoulder and hip and sliding out of the chair. Some patients' primitive reflexes also impact their ability to safely and functionally use certain style wheelchairs. If patients are not frequently monitored or do not demonstrate good self-awareness, they may begin to demonstrate excessive cervical kyphosis and posterior pelvic tilt due to slumping forward. Therapists who notice wheelchair users developing these signs should offer them weight-bearing surfaces and alternative strategies to use.

Aside from the extensive wheelchair evaluation, therapists should also complete standardized assessments with patients who are candidates for a mobility device. Some assessments that provide helpful information include the Timed Up and Go (TUG), Wheelchair Skills Test (WST), Functional Mobility Assessment (FMA), Berg Balance Scale, Modified Barthel Index (MBI), Functional Independence Measure (FIM), and the Functional Reach Test. First and foremost, the results from these assessments can help inform a therapist's decision regarding what mobility device is best for their patient. Outcomes from these tests can also help identify potential goal areas for providers to focus on during therapy sessions.

Certain populations also present with more unique needs that need to be accounted for during the evaluation, fitting, and training process. The size of pediatric patients can make it more difficult to fit their bodies to larger equipment. Here are some basic steps to follow:

- Spread the knees slightly apart to promote hip abduction.
- The hips should have a slight anterior tilt, so children may need a belt to secure their hips in this position.
- Ensure that the seat covers the entire thigh but does not directly touch the knee. Leave 1 inch between the knee and the back of the chair.
- Determine if a horizontal- or forward-tilted seat works better for the child's head control and functional reach skills.
- Offer a tray table for the child to rest their forearms on. This not only allows for participation in activities, but encourages upper body stability.
- Make some adjustments to the height and the angle of the footplate so the child's feet are firmly supported.

Diagnostic-specific considerations can also vary based on co-occurring conditions, new injuries, and complications. For example, patients with Spina bifida often have short stature, spinal deformities, upper extremity weakness, lower body paralysis, and can experience significant weight gain. This means that seating devices should focus on enhancing mobility, redistributing pressure, and slowing the progression of the condition. For older adults who do not walk and are full-time wheelchair users, therapists should be considerate of comfort, activity levels, the user's ability to readjust, poor sitting balance, and excessive thoracic kyphosis and posterior pelvic tilt. Seating should address all safety concerns while improving engagement and postural stability.

Patients with a spinal cord injury often have impaired respiratory function, limited sensation, spasticity, and medical complications such as autonomic dysreflexia and heterotrophic ossification. Seating priorities should minimize deformities, support accessibility, and prevent pressure sores. Individuals with cerebral palsy often have abnormal tone, poorly-integrated reflexes, orthopedic limitations, and impaired cognition, so seating should inhibit the tone and reflexes while improving accessibility. Patients who have a history of cerebrovascular accidents (CVAs) often have visual field cuts, hemiplegia, and impaired sitting balance. This means their wheelchairs should encourage midline positioning and allow for upper extremity support and function.

There are also additional measurements that therapists must take into account for bariatric patients. These will provide more accurate dimensions that will help in the wheelchair selection process:

- Hip width
- Back of head to scapula
- Lateral elbow to lateral elbow
- Lateral calf to lateral calf
- Seat pan to under forearm
- All toes together
- Seat pan to top of buttocks
- Back of knee to thoracic/lumbar spine
- Back of knee to back of buttocks

Therapists must also keep in mind that some patients require positioning assistance apart from any device. For example, some patients may be at risk for injury due to poor positioning in bed or a standard chair in a hospital setting. Some patients may also need better positioning in their own bed at home. There are a range of ways

Section 5 Personal Reflection

What accessories and modifications may make a wheelchair more comfortable for bariatric patients?

Section 6: Documentation & Insurance [3, 12, 13]

Documentation

Each professional involved in the wheelchair evaluation and fitting process must meticulously fill out documentation to ensure that medical necessity is not only met but recorded across the continuum of care. Therapists are responsible for writing up a wheelchair evaluation, their detailed recommendation, and a letter of medical necessity. Suppliers must also write up a detailed recommendation along with a quote for the cost of the entire device and applicable attachments. Lastly, physicians must write up a progress note and what is called a “seven element order,” which includes the beneficiary’s name, the item ordered, the date of the last in-person physical exam (Medicare requires physicians to see patients within 45 days of the wheelchair evaluation), the diagnosis, the length of need for the device (short-term or long-term), their signature, and the date. Physicians must also sign all of the aforementioned documents from therapists and suppliers.

Insurance

Wheelchairs and other types of durable medical equipment can quickly get expensive, so the reimbursement process is important to connecting patients with accessible, affordable devices. Coverage can get tricky, so therapists must ensure that their documentation is airtight and demonstrates the patient’s medical need for the device.

Medicare has set forth some requirements for wheelchair reimbursement that state the patient must:

- Utilize their wheelchair within their home
- Demonstrate impairments in a mobility-related activity of daily living, such as getting to the bathroom or the bedroom to groom, bathe, and toilet
- Be unable to functionally ambulate with or without a device in their home

If patients are seeking reimbursement for a power wheelchair, they must also demonstrate the inability to functionally propel a manual wheelchair throughout their home. Medicare also requires the wheelchair evaluation to be completed by a physical or occupational therapist and the supplier must have an ATP designation.

Pressure ulcers also play a part in justification for certain Medicare coverage. Patients qualify for specialized wheelchair cushions if they presently have a pressure ulcer or a history of ulcers, absent or decreased sensation, or the inability to functionally shift their weight to redistribute pressure. The first two criteria must be specific to sitting surfaces, or areas of skin that come in contact with the seat of the chair. Additional criteria states that patients must have a qualifying diagnosis that results in significant postural impairments. If patients meet all the criteria aside from demonstrating postural asymmetry, they will only qualify for a skin protection cushion. If patients meet all the criteria, they qualify for a covered skin protection and positioning cushion. On the other hand, patients who do not have a current or past pressure ulcer on a sitting surface but do have a postural asymmetry will qualify for a positioning cushion. If patients only meet one or two isolated criteria from this list, Medicare will only reimburse for a general use cushion.

Section 6 Key Words

Mobility-related activity of daily living (MRADL) - A self-care task that can only be completed with functional mobility skills; examples include getting to the bathroom to bathe and toilet, getting to the bedroom to groom and dress, and getting to the kitchen to cook or eat

Section 6 Personal Reflection

How would you document a note that demonstrates medical necessity for a patient who needs a mobility device? What keywords would you use? What functional activities would you reference?

Section 7: Case Study

The patient is a 70-year-old woman with a history of osteoporosis, dementia, and hypotonia. She is in a long-term care facility and consistently is found sitting in the day room slumped over asleep in her chair. When assistants remind her to reposition or attempt to adjust her posture, she becomes agitated and hostile.

1. What is the best course of action to make adjustments to this woman's wheelchair?
2. What is a potential recommendation to be made to encourage more repositioning in the future?

Section 8: Case Study Review

This section will review the case studies that were previously presented in each section. Responses will guide the clinician through a discussion of potential answers as well as encourage reflection.

1. What is the best course of action to make adjustments to this woman's wheelchair?

   Therapists should start by adjusting the seat depth, which may be too narrow for this woman to comfortably sit up straight. Therapists should also offer lumbar support in the form of a rolled up towel or a small cushion with a strap that can be added to the back of the chair. The angle of the back may also need to be adjusted, as a slight adjustment -- even from 90 degrees to 95 degrees -- can encourage less of a forward posture. The addition of legrests, or reinforcement of existing legrests, can also help this woman sit up straight. Start by shortening the legrests so they are fitted to her legs. Therapists may also want to consider small braces or hip pillows that will help keep her knees in neutral while slightly spread. A belt may also help stabilize her hips in neutral, which will give the pelvis stability and prevent asymmetry on this level.

2. What is a potential recommendation to be made to encourage more repositioning in the future?

   Tight hamstrings can also contribute to slumped posture, so provide the aides on this woman's floor with some exercises to complete with her. If she is too

cognitively impaired to participate, consider requesting a therapy evaluation so a provider can offer strategies and set her up with a consistent stretching routine to be completed by caregivers who know her well.

Section 9: Case Study

A 50-year-old man living in his home with his wife just began using a standard manual wheelchair to assist with postural orthostatic hypotension syndrome (POTS). This man is of average height, weight, and body mass index. He has been using this wheelchair for one month and reports that it has fallen over several times when he tries to transfer from his living room recliner to the chair. He has been compliant with all home modifications, training, and positioning recommendations thus far. He has no cognitive impairments, demonstrates good safety awareness, and has been able to ask his wife for help when this occurs. However, he is beginning to fear this will happen while he is about to or already sitting in the chair.

Section 10: Case Study Review

This section will review the case studies that were previously presented in each section. Responses will guide the clinician through a discussion of potential answers as well as encourage reflection.

1. What is the best course of action to make adjustments to this man's wheelchair?

   Observe him going through the transfer process and double-check whether he is locking/unlocking brakes as needed. It is also a good idea to test his reflexes, since factors such as dizziness or vision changes secondary to his condition may be impacting his sense of equilibrium. If his technique is safe and appropriate and there are no health concerns, look into modifications. A good initial recommendation is anti-tip bars. A therapist should also recruit assistance from the supplier or an ATP to check the position of the axles and the wheelchair's center of gravity. Uneven or faulty axles can cause an unstable chair to behave in such a way. When unoccupied, the center of gravity on most standard wheelchairs is 0 degrees for safety reasons. A supplier can help you adjust this, if needed.

2. What are some additional recommendations you might make to ensure this

man's safety?

Be sure to avoid placing any extra objects in or on the wheelchair, such as bags, oxygen tanks, totes, etc. to avoid issues with weight distribution. Educate the patient on pacing, deep breathing exercises, and righting techniques to assist in making more purposeful, safe movements. These preventive measures help ensure that client factors will not impact the wheelchair's safety or performance.

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