Patient Name: Sunshine -- MAB
DOB: 3-29-84

Power Mobility/Seating/Positioning Evaluation
Justification for Medical Equipment

Identification of Need:

Sunshine is a 39-year-old male with diagnosis of Spastic Quadriplegia Cerebral Palsy and severe Scoliosis. Due to his physical limitations, including significant contractures, he is not able to roll, crawl, or stand. Sunshine is in need of self-directed mobility to remediate limitations as per diagnosis, ameliorating deficits as it relates to functional participation. At present, a manual tilt 'n space wheelchair provides Sunshine with dependent mobility. With alternative access, Sunshine will be able to experience self-directed mobility. With custom seating, Sunshine is able to maintain midline orientation to isolate cervical motions to activate proximity switches in a custom head configuration.

Sunshine's manual is approaching 8 years old, has no potential to provide him with self-directed mobility, therefore shifting to a powerchair for therapeutic benefits, to minimize adverse health effects associated with static positioning.

To accommodate Sunshine's complex medical needs, a complex array of components is being recommended to provide Sunshine with mobility to not only reach intended destinations, but also to provide mobility within the system to reposition for circulatory, digestive, respiratory, and cardiac functions. The recommended powerchair is an Invacare AvivaRX narrow rear-wheel drive base, with customized seating frame to accommodate power seat functions of tilt/anterior tilt, recline, elevating center mount foot platform/telescoping, and adjustable seat height. The recommended configuration will allow for alternative access through ASL head driver control as well. Various mounts have been included to secure items and allow for flexibility of placement within Sunshine's available range.

Motor Status:

At present, Sunshine is dependent for mobility and MRADL's, including a dependent lift. Through use of the recommended powerchair, surfaces can be level with slight downslope, and components will move out of the way to enable combination stand-pivot/slide transfers, not only supporting weightbearing, but also beneficial participation during the transfer process. Sunshine exhibits abnormal muscle tone that interferes with daily activities. Spasticity interferes with strength, range, accuracy, and control. He has compromised fine motor, using a swiping motion. Requires assistance to maintain positions, including sitting and standing. When lying down, he lacks bed/mat mobility, with inability to roll.

Sunshine's asymmetries, including pelvic rotation, obliquity, leg length discrepancy, scoliosis, need accommodated by custom seating. He presents with tightness and tissue restrictions throughout. Due to tone interference, his upper extremities exhibit more range passively, but range decreases with active attempts. He is unable to isolate movements of his lower extremities, relying on power seat functions to support flexibility and comfort.

Due to his diagnosis, standard manual muscle tests are not applicable. Sunshine has atypical muscle tone affecting his muscle composition. Muscles under the influence of atypical tone alter the length-tension relationship for effective contraction. As a result, most of Sunshine's muscles do not function in isolation. He struggles to grade movements and over/under targets. He cannot functionally grasp, hold, carry, nor isolate many muscle actions. Fortunately, graded control of his head/neck was

observed, capable of isolating cervical rotation, flexion, extension for successful use of a head driver control.

Through use of a powerchair, Sunshine will be able to participate in MRADL's with more autonomy. Many activities become possible, supporting participation in the process. Approaching and leaving situations, and orienting to surroundings become possible with active engagement vs passive observation.

Sunshine intermittently becomes worried and upset with subsequent "explosive tone". Through use of a powerchair and power seat functions, Sunshine can initiate interaction, shift body positioning, and indicate needs. When an individual can anticipate and participate in the process, less worry and anxiety occurs as expectations become more predictable.

Voluntary, Isolated, Controlled Movements:

Volitional control of both upper and lower extremities significantly compromised. Sunshine attempts to reach, but is limited, not only with accuracy, but also with control. He lacks the ability to manipulate items and uses a swiping motion. He lacks fine motor control to manage a joystick. Not only does he lack strength to push the joystick, but abnormal tone interferes with intentional movements in a particular direction. Because Sunshine's fine motor control is significantly compromised, a head system will be used. When provided with adequate postural supports, Sunshine is successful at isolating movements to access directional commands at his head.

A functioning powerchair provides the foundation necessary to support mobility and participation in MRADL's in a stable, seated posture. Adjusting/repositioning to support respiration, swallowing, and adequate pulmonary toilet is possible.

MOBILITY ASSISTIVE EQUIPMENT ALGORITHM

Is a **"cane, crutches or walker"** recommended? No
Is a **"standard weight"** manual wheelchair base recommended? No
Is a **"lightweight"** manual wheelchair base recommended? No
Is a **"high strength lightweight"** manual wheelchair base recommended? No
Is a "**ultralight weight"** manual wheelchair base recommended? No
Is a **"power operated vehicle/scooter"** recommended? No
Is a **"power wheelchair"** recommended? Yes

MOBILITY RELATED ADL'S (Bathing/Toileting/Grooming/Dressing/Eating/Food Prep):

At present, Sunshine is dependent for MRADL's and mobility, relying on caregivers to push him in his manual chair. However, with the recommended powerchair with alternative controls (ie. custom configuration hand switch system), not only will Sunshine participate in self-navigation, but also provide the capability of participating in the process of MRADL's. Due to Sunshine's compromised motor function, he will be able to actively engage in activities such as meal prep through switch access. Anticipate improvements during mealtime as upright orientation to the table surface will be possible. Supporting clothes on lap, with laundry between destinations is possible. Alignment with sinks, mirrors for hygiene and grooming becomes possible, as well as adjusting position to locate and indicate items of choice at home and while out acquiring essentials, including groceries, clothes, shoes/slippers.

Through use of the power seat functions, shifts in position are possible to align with activities. He will experience more autonomy. Adjustments to support flexibility, pain control, respiration, swallowing, and adequate pulmonary toilet will be possible.

Home Environment/Transportation: The AvivaRX narrow was trialed in the home with adequate space to access living space, kitchen, bedroom, and bathroom. A ramp is located at the side door. Family has a side-entry wheelchair accessible vehicle for transport.

Equipment Trial:

Sunshine participated in an equipment trial process, including simulating custom molded seating in order to achieve stability for access. Sunshine not only lacks strength and coordination to propel a manual wheelchair, but also lacks ability to reach and sustain grasp of the wheels. His compromised fine motor precludes use of the joystick. Consequently, switches were necessary. Both hand and head switches were considered, having success at his head. When supported in midline, Sunshine was able to slightly extend, and rotate to activate proximity switches placed in a custom configuration head array. Because Sunshine is not able to successfully activate switches in a planar seating system (significant collapse with lack of supportive contact), molding bags were used as a temporary supportive seating system during the trial process. When supported well, he activated the proximity switches to move through his environment. He particularly enjoyed turning in the living room to orient to those that entered and exited. Sunshine's demeanor settled as he explored and initiated movement with intention throughout the sessions. Initially movements were "all or nothing". His movements became more accurate and subtle as his body acclimated to the seating. Through experience, he will be able to reorient himself in relationship to his environment to manage items in his available range.

Transfers were simulated in the demo AvivaRX narrow base using power seat functions, including adjustable seat height. No dependent lifting was necessary. Repositioning was possible to extend tolerance to being in a wheelchair seated position.

Due to Sunshine's physical presentation, other bases were considered, but eliminated due to the method in which their electronics function. Invacare's electronics have a unique auditory feedback (series of beeps). The beeps indicate where the user is in the system, not needing to read or sequence/scroll, necessary with other manufacturer's electronics.

Current Seating and Mobility:

At present, a manual Sunrise Medical Iris is used for dependent mobility. This manual chair has no potential of self-navigation, requiring him to be pushed and physically moved between locations. It also has no potential for self-repositioning, negating benefits associated with active movement within the system through use of power seat functions. Sunshine needs a powerchair to address his complex needs and compensate for deficits as per diagnosis. With the recommended powerchair, Sunshine will be able to sustain upright positions for access and function.

INVACARE/MOTION CONCEPTS:

AvivaRX Narrow: The AvivaRx is a rear-wheel drive configuration with programmable electronics. It has suspension to assist in pain management when being seated over lengthy time intervals. It supports a variety of seating systems, power seat functions, and driver controls to meet individual needs.

Invacare's bases have clinically demonstrated durability and electronic adjustability for accommodating medical conditions such as Quadriplegia Spastic Cerebral Palsy. Technology of Gtrac is a

feature that improves functional capabilities. It assists with smoother transitions over obstacles, including door thresholds and ramps, and small curbs. Because there is constant communication between the electronics and the motors with G-track, the chair will track more directly than typical 4pole motors alone, despite sloped/inclined or uneven surfaces. This base will navigate tight spaces and maneuver around obstacles smoothly.

Unfortunately, Sunshine has spent numerous years dependent, but through the equipment trial process, has again demonstrated the ability to be successful with subsequent excitement, observed through facial expressions. A custom head configuration of proximity switches is necessary. He needs a power mobility base that has Invacare's electronics. Only Invacare offers a unique auditory feedback and simplistic method of changing modes and drives. He will rely on auditory beeps instead of the visual display. Apart from Invacare, other manufacturer's electronics require extensive sequencing. The single "swipe" of the reset with LiNX to move through functions is beneficial to minimize sequencing load and physically possible.

Expandable Controller: Required for multiple power option and alternative switch control.

Harness for Expandable Controller: Required for multiple power option and alternative access method (ASL) of which Sunshine medically needs for supporting functional participation.

G-Trac: Gtrack is a feature that improves course navigation, especially switch systems, at slow speeds. Despite unlevel or uneven surfaces, the chair will respond as the command is given, both indoors and out—particularly important for switch systems. It will provide a smoother travel of thresholds and transition between surfaces more effectively. Otherwise, unintentional veering interferes with consistent movement through environments. Continual course correction as per terrain is not only time-consuming, but also fatiguing. Through use of G-track, fatigue is lessened, providing longer duration of participation-- promotes accurate pairing of command with response of chair—need for constant realignment is minimized to expand endurance in multiple settings. The response of the powerchair for commands activated becomes predictable and consistent through G-Track, achieving desired intent in a more reasonable time frame.

LiNx Display (REM500): The display is the LiNX electronic component that is the means to turn the chair on and off. Used in conjunction with alternative access methods (ASL).

Mount REM500: (TRC2339-C02- Rovi): This secures the above LiNx Display.

Output Module: Since Sunshine has numerous switch commands on this powerchair, a combination of "direct" and "through" the electronics will be used to access commands. This component is needed to access "through" the electronics.

Input Module: This will be used in conjunction with ASL proximity head array—provides the D9 connection of his head driver control to LiNX electronics.

ACU: As mentioned previously, Sunshine is not able to use a joystick. This will be mounted on the rear of the chair to be used when Sunshine is not able to drive (ie. sick, fatigued, unfamiliar/unsafe environments). Due to the heaviness of the powerchair (approx.. 400+ pounds), it is not possible to push any distance, especially through unlevel terrain or up ramps. The ACU will be used to load and unload chair for transport.

Access Key: In order to match Sunshine's physical capabilities and situational needs with the response of the chair, it must be programmed. Programming is necessary ongoing for controlled access in a variety of environments.

Multiple Power Option – Tilt/Recline/PSB: Power tilt and recline will be used for tone management, to minimize effects of spasticity on function. Sunshine cannot unweight for pressure relief without power seat functions. With combination of power seat features, pressure redistribution is possible to minimize

risk to skin integrity, especially as he continues to age. When his range restrictions are accommodated, Sunshine is able to slightly lean forward, with upper extremities in a more settled, relaxed position.

Through use of combination of power tilt, recline, and elevating center mount platform, body movements are possible to minimize discomfort and tightness associated with static positioning to assist with pain management. Being that recline starts at a closed angle and tilt moves into the anterior position, Sunshine will have supports to maintain a slight forward weightshift, facilitating pelvic weightbearing, righting reactions during participation in MRADL's. Pelvic angle is readily changed for adjusting stability and maintaining a balanced posture.

Changing postures promote increased respiratory capacity as it allows the trunk to extend and subsequently the lungs to expand. Power tilt is not adequate to achieve the change in trunk position necessary for tone management and functional participation. Movement within our seating systems is critical to medical management. Our bodies digest better, void better, and are more alert after changing position. Straightening the lower extremities and matching it to hip extension allows the pelvis and hips to stretch out (minimize progression of hip flexion contractures), allowing a different and more complete relationship with the trunk, shoulder girdle, head and neck. This adds to increased strength, control of posture, and range of motion in the head, neck and upper extremities.

Digestion is not only supported by change of position, but alignment for adequate swallow is supported as well. When fatigued, power functions can be used for gravity-assisted positioning to extend ability to participate.

Orientation can be adjusted while proceeding up/down ramps, small curbs, and over unlevel terrain for increased stability and safety. These power seat functions will improve Sunshine's ability to assist with MRADL's and participate in the process in more of a reasonable timeframe.

Anterior tilt 5 degrees: Based on pelvic range restrictions, Sunshine needs this feature to achieve an active balanced posture with upright alignment for participation and function.

Power adjustable seat height: This function will support slide transfers, with heights being adjustable (slightly down slope). Components will swing away to promote transfers to the side once surfaces are level (or slightly downslope). Adjusting visual field orientation is possible to interact with others, engage with various heights including countertops, as well as displays in the community, including groceries, clothing, shoes, etc. Being adequately supported, combined with subsequent unweighting of upper extremities, and access to different heights, will provide access to swipe the automatic hand dryer and soap dispenser in the bathroom, swipe the light switches, and swipe the automatic door opener to exit the building, among other activities. Unfortunately, all too often, these items are mounted out of reach to an individual in a standard height wheelchair, especially an individual with compromised range, accuracy and control, such as Sunshine.

Sliding back canes, required for combination seat depth/width: Required to accommodate short seat depth as per manufacturer.

Adjustable hooking handles, pair: Based on the complexity of Sunshine's system, numerous mounting surfaces are necessary to securely attach components, especially those that are tubular, such as these.

Push handle assembly: Despite the name, these will not be used to push the base. They will instead serve as a mounting surface for the numerous required electronic components.

I-back recessed, multi-rails: Sunshine's back will mount and securely attach to this plate. Multirails will provide flexibility of placement of chest support.

Cantilever armrests: These armrests come off of the back only, remain close to body for adequate upper extremity support. These will move out of the way to clear for transfers.

Hardware- track nuts/screws (Pkits): Track nuts/screws of the size that fit into the seat and back track rails.

LNX Center mount elevating foot platform and telescoping power down feature: Sunshine is unable to move his lower extremities with volitional and accurate control—over/undertargets with compromised strength. He is unable to activate muscle groups in isolation, developed contractures at his knees and hip angles. Access to this feature will help to diminish further progression. Frequent adjustment of distance to weight/unweight his pelvis for further pressure redistribution and to diminish pain occurs.
Multi-axis adjustable left/right footplates: The adjustable angle footplates will replace the center mount single platform to appropriately align and support Sunshine's lower extremities. As Sunshine's lower extremities are asymmetrical, each foot needs positioned separately.
Multi function Power seating controls: As LiNX electronics is the "brains" of the Invacare power base, the multi-function control is the "brains" of the Motion multiple power seat function system. These 2 controllers will communicate and provide programming capabilities of the power system.
Quad push button, 8-way rocker: Access to the seating commands to prepare for transfers.
M616 x2: With many seat functions, some will need to go through the switch alternative control electronics. Ones that need to be activated quickly and more readily will need to be accessed through use of separate switches. M16 splitter allows separate switches to activate power seat functions separately and linked to speed up access and minimize sequencing time for activation in a more reasonable timeframe.
Accessory port supply: Provide power to items.
Memory seating: This feature links actuators so that positions can be repeated for functional application easily in a reasonable timeframe. Positions can be programmed to be activated by a single switch activation, including a position for pressure redistribution, a position for transfers, a position for alignment with supportive surface, a position for stretching/elongation, etc. Being able to achieve these positions frequently, predictably, and in a reasonable timeframe will facilitate postural readiness and control.
Ground effect lighting: As named, illuminates ground for visual acclimation darkened areas, visibility parking lots, etc for safety. Also, illuminate tie-downs for securement during transport, especially as we live in a geographic area in which darkness occurs at 5pm during some months, with darkness early am as well.
Transfer handles: Used to grasp while stretch of upper extremities can occur, stabilize when in various positions.
Batteries, pair: This size battery is required to power the system—2 are required. They are sealed for transport.
Libra cushion, leg length discrepancy, incontinent inner cover, fit kit (accommodate obliquity): Being seated for lengthy duration, Sunshine needs cushion with pressure relieving properties, cover with air exchange, asymmetrical cut to accommodate leg length discrepancy.

SYMMETRIC DESIGNS:
Symmetric Designs Freeform Back kit, bundled, mounts, adjustable/removable, alloy balls, Stimulite, universal headrest mount: Due to asymmetries, scoliosis, kyphosis, unlevel pelvis, rotation, a planar back cannot accommodate, needing a customized back unique to his shape. In addition, adjustable hardware for flexibility of placement, including rotation. Through use of this freeform system, a custom unique shape is achieved. It is considered dynamic seating in that it absorbs shock and provides flexibility while maintaining proper positioning. The surface modules, paired with Stimulite overlay, provide

pressure relieving properties and shear reduction, and support airflow for decreasing moisture and heat retention for skin integrity.
Freeform LUBS, pair: Sunshine needs customizable supports to maintain a midline orientation, and alignment with seating components. These are customizable to unique shapes to provide stability, will move to enable transfers.

ADAPTIVE SWITCH LABS:
ASL head array, 106 cable, mini backpad size: ATOM head array: As per successful trials, a custom head array to be used as Sunshine's driver control with mounts for flexibility of placement. This custom head array consists of forward, right, left, and reset, proximity sensors that do not require pressure for activation. Sunshine's compromised strength and accuracy continue to preclude use of mechanical switches for functional driving application. As mentioned previously, he also lacks ability to use a joystick, needing this alternative.
Flip down headrest hardware: The headrest will be mounted to the back through use of Link hardware. With Link hardware, headrest positioning is flexible to get proper placement for access. The headrest will flip away as to not interfere with transfers and return to position once he is in alignment. The flip feature will allow for thoracic extension of the chest to counteract collapsed trunk/forward head/shoulders posture.
Proximity sensor x2: Sunshine was not successful activating mechanical switches for any duration, struggling with strength, accuracy and control with single activations. These switches are proximity (require no power for activation)—to be placed in spot pads (to eliminate edges/corners), mounted on s lateral rods, to readily interface with the included mounts to place switch in Sunshine's available range. It will be used for activation of functions in a reasonable timeframe.
Switch mount, swing-away and figure 8: Mounting locations for proximity spot pads with flexibility of placement in available range.
Power source cable LiNx: Provides power to ASL components.
Auxiliary interface cable: Connects electronics.
Protective covering for electronics: Due to the expense and complexity of Sunshine's system, a protective covering is being included. Not only does it provide a mounting surface for ASL's components, but also will house these interface boxes and components to minimize potential for damage.

MISCELLANEOUS:
One piece chest strap: This anterior support will be used during transport and when fatigued to help maintain an upright sitting posture.
Bodypoint padded pelvic belt: The pelvic belt is padded to minimize bruising on bony prominences and is included to maintain pelvis in a position to support alignment within seating system and driver control.
Universal strap, small: Supportive strap for lower legs.
Stealth custom foot straps, 1" PB buckle: Sunshine's feet will need to be intermittently secured to promote alignment and minimize them getting caught on hardware or doorway frames.

****Please note:**

This system consists of a complex combination of various items to address Sunshine's complex body and facilitate participation in MRADL's. Careful consideration was given to determining components Sunshine needs to acquire mobility and postural skills. Components that will contribute to success have been included. Cost-effectiveness is always a consideration—components chosen are based on medical need. A systematic approach was used starting with the least costly. If a less costly component is available and would not interfere with function, it would be chosen. If the item would not be appropriate to adequately address medical needs, it would be eliminated and another would be considered. For instance, a joystick driver control was first considered. When it was ruled out based on physical limitations, the next costly driver control option of mechanical switches was considered. When his medical condition precluded success with that method as well, electronic (proximity) switches were considered. Because these require no pressure for activation, Sunshine has been able to successfully utilize this method. It is a costlier option than a joystick, but due to Sunshine's medical involvement, it was necessary. Unfortunately, the more complex the individual, the more complex the powerchair--the more components required, the more cost involved.

Sunshine requires this configuration not only to experience self-directed movement, support development of postural control, but also for ongoing repositioning. Postural adjustments are necessary for pressure redistribution, circulation, and comfort. Pressure is continually being redistributed as included power seat functions are activated throughout the day. Participation in care with more autonomy, repositioning for tone and pain management is supported. Transitioning between active and passive postures is possible to conserve energy needed for extending participation with daily functional activities. With the recommended system, Sunshine will expand control to minimize potential difficulties in the future. This system will provide a stable foundation to promote active participation in daily activities and consequently, facilitate participation in MRADL's. It will adequately compensate for limitations and encourage movement for therapeutic benefits in his cardiac, respiratory, and circulatory functions.

Please promptly consider the medical recommendation to address ineffective mobility. Without this powerchair, Sunshine's participation is directly hindered.

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Christina Mayer/Guisbert, PT, ATP/SMS, SEP

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Prescriber Signature/Date
**signature agrees with recommendation, brand-specific, no changes without prescriber approval