LUCI IS A MEDICALLY NECESSARY ASSISTIVE TECHNOLOGY TO SUPPORT SELF-GENERATED MOBILITY

Countering the belief that the inability to drive independently without LUCI renders a client inappropriate for power mobility

A misconception sometimes raised in coverage reviews or when clinically considering a LUCI system states that if a client cannot "safely and independently" operate a power wheelchair (PWC) without a LUCI system, then the client is not appropriate for power mobility at all. This position paper contends that this reasoning is clinically unsupported and logically flawed. **This misconception inverts the very purpose of assistive technology: to bridge the gap between a person's functional limitations and the activities they need to perform.**

LUCI is a sensor-based advanced driver assistance system that functions as an enabling accessory to power mobility. Just like alternative drive controls expand access to power mobility for individuals whose motor impairments prevent standard joystick operation LUCI, as an alternative drive system, expands access for individuals whose navigational, visual, and physical limitations would otherwise prevent independent use. It does this through environmental sensing, active collision avoidance, and unsafe drop off mitigation - addressing the navigation barrier directly, rather than changing how the chair is operated.

Denying a power wheelchair because the client requires LUCI to drive independently, efficiently, or safely is equivalent to denying a power wheelchair to a client with a high-level spinal cord injury because they require a sip-and-puff control. The technology that enables independent mobility, in this case the LUCI system, is the appropriate clinical solution, not the problem.

This paper also supports that power wheelchair candidacy remains a clinical decision based on the entire evaluation process - including the individual's functional need, realistic mobility related goals, environmental context, available caregiver support, and overall potential for safe operation. It must also reflect the individual's own priorities, preferences, and desired level of independence as an active participant in the decision-making process.

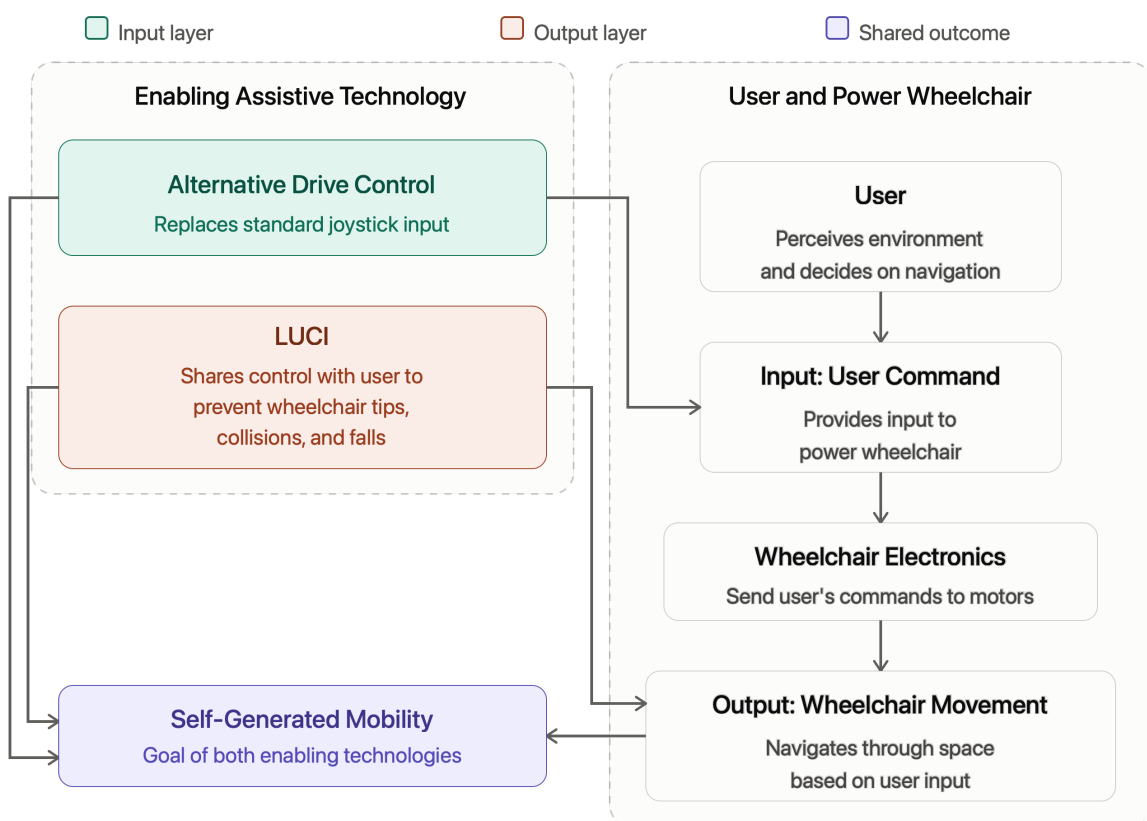
The purpose of this paper is to establish that an individual's need for LUCI for operation of the power wheelchair should not disqualify that individual from access to medically necessary power mobility. Clinicians are still responsible for determining, on an individual basis, whether a given client can achieve meaningful, self-generated mobility with LUCI as an enabling component of the overall solution.

I. LUCI is an Enabling Assistive Technology: The Precedent of Alternative Drive Controls

The field of complex rehab technology has long recognized that no single configuration of a power wheelchair, including its drive control, suits every individual. Clinical practice acknowledges that a broad spectrum of enabling technologies — each selected to match the individual's functional presentation — is necessary to achieve independent operation across clients. This is the foundational logic of alternative drive controls.

Standard joystick controls require adequate upper extremity strength and coordination. For clients who lack this, the clinical response is not to deny power mobility; it is to identify the appropriate alternative drive control. Clinicians and insurers alike recognize sip-and-puff systems, head arrays, chin controls, eye-gaze systems, and other alternative input devices as medically necessary components of a power wheelchair prescription — precisely because these technologies enable a class of users who would otherwise be excluded from self-generated mobility (Lange, 2025).

An important distinction merits acknowledgment here: Alternative drive controls replace the input interface —the individual continues to process the environment, make navigational decisions, and direct the wheelchair through intentional action. LUCI addresses a different layer: it intervenes in the output when it's sensor-based hazard detection identifies a collision or unsafe drop-off risk (see Figure 1). This means LUCI is not simply a parallel to a different drive control; it is a cooperative navigation system[1] that shares some decision-making with the driver. However, the core point of the analogy holds: both types of technology serve to make an eligible class of users able to achieve self-generated mobility. **In both cases, the technology is not a workaround for an ineligible client; it is the clinical solution that enables an eligible client to achieve efficient, self-generated mobility.**



1 This design philosophy —that driver assist technology should complement the driver's intent without replacing it —is supported by a growing body of engineering and rehabilitation research on cooperative driving systems for power wheelchairs. As such, LUCI responds to client drive control input and intervenes only when hazard detection warrants it — preserving the driver's agency while reducing collision and tip risk. This framework appears across the intelligent wheelchair literature and reflects established clinical and engineering thinking, not an experimental approach (Pacini et al., 2024; Loke et al., 2026).

This framing has clear precedent in the CRT space: a head array is not denied because the client cannot operate a standard joystick. A power tilt seating system is not denied because the client cannot independently manage their own pressure relief. The same logic holds in medicine at large: cochlear implants do not require a patient to demonstrate hearing ability without them before qualifying, and prosethtic limbs do not require a patient to demonstrate walking ability without them before qualifying. In each case, the device is the solution to a functional gap — not evidence that the client is inappropriate for the device. LUCI's role in power mobility is the same in structure.

II. Mobility as a Human Right and the Role of Assistive Technology

Personal mobility is widely recognized as a foundational human right, critical for equity, and a prerequisite for access to participation in virtually every domain of life —daily self-care, healthcare access, employment, education, social connection, and community engagement (Logan et al., 2018). The United Nations Convention on the Rights of Persons with Disabilities (CRPD), ratified by more than 180 nations, addresses this directly. Article 20 requires nation states to facilitate personal mobility for persons with disabilities "in the manner and at the time of their choice" and to facilitate access to "quality mobility aids, devices, assistive technologies and forms of live assistance" (United Nations, 2006).

The evidence base confirms the functional and psychosocial consequences of limited or no access to self-generated mobility. Independent mobility is associated with increased frequency of community participation, instrumental activities of daily living, vocational and educational engagement and reduced caregiver burden. Conversely, reductions in functional mobility are linked to reduced participation, loss of social connections, emotional loss, reduced self-esteem, isolation, and fear of abandonment (Simpson et al., 2008).

For many individuals with mobility limitations, a power wheelchair is the technology through which independent mobility — and by extension, full life participation — becomes possible. Power wheelchairs, in the words of Pellichero et al. (2021, p. 1), "promote independence, social participation, and quality of life for individuals with mobility limitations." They are not simply a convenience; they are, for many clients, the foundation of autonomy.

Article 20 of the CRPD explicitly calls for access to assistive technologies as the mechanism by which mobility rights are realized. The CRPD does not condition the right to mobility on whether a person can achieve it unaided. It frames assistive technology as the means through which the right is made functional. LUCI sits squarely within this framework.

III. LUCI and the Impairments It Addresses

Three broad impairment categories are particularly relevant to the misconception addressed by this paper: cognitive impairment, visual impairment, and motor impairment. While these categories are useful for organizing the evidence, they are not the starting point for clinical decision-making. Every evaluation should begin with the individual client —their goals, their environment, and their own account of what mobility means for their life — with impairment category serving only as a lens for understanding barriers to that goal in order to identify potential solutions, never as a proxy for the person's potential.

A. Cognitive Impairment

Cognitive impairment is one of the most challenging factors in power wheelchair provision. Physical limitations can often be addressed through seating, positioning, or alternative access methods – but cognitive deficits raise harder questions about safety, judgment, and the ability to learn and generalize driving skills. Clinicians consistently identify cognitive impairment as a primary concern when evaluating candidates for powered mobility — and these concerns are legitimate. Skills like visuospatial perception, sustained attention, organization and planning, and problem-solving all play a role in safe PWC operation, and deficits in any of these areas can affect a person's ability to navigate environments, anticipate hazards, and make real-time decisions (Pellichero et al., 2021; Rider & Patterson, 2023).

While the concern is valid, the clinical response has, at times, moved beyond appropriate caution into categorical exclusion. Mortenson et al. (2013) found that prescribers often used informal cognitive screening as an initial filter, operating under the assumption that cognitive deficits disqualify a candidate rather than call for a more thorough evaluation and training. As a result, many individuals with dual motor and cognitive impairments are screened out before they have an opportunity to demonstrate functional capacity.

The evidence, however, does not support cognitive impairment as a hard disqualifier. Pellichero et al. (2021), reviewing 17 studies across age groups, concluded that "cognitive impairment should not preclude [PWC] provision" (p. 23). The authors cautioned against over-reliance on screening scores, recommending instead that cognitive assessment be combined with functional real-world trials to capture the complex interactions between person, environment, and task. Mortenson et al. found the same in practice: prescribers reported that people they expected to struggle sometimes surprised them, and that extended real-world trials often revealed functional capacity that screening alone could not predict. Across the studies Pellichero et al. reviewed, people with a range of cognitive impairments were able to improve their PWC capacities with training. In fact, six of the 13 studies that looked at PWC provision or training found improvements in both mobility and cognitive outcomes, suggesting that the act of driving itself may have developmental and rehabilitative value.

This finding aligns with an emerging body of work in pediatric and early mobility literature suggesting that for some populations — particularly young children and individuals with profound cognitive impairment — the traditional skills-based model of PWC training may not fully capture how learning occurs. **Rather than acquiring prerequisite skills before being given access to a power wheelchair, some learners develop those skills through the experience of driving itself.**

This "driving to learn" framework, advanced by researchers including Nilsson and colleagues, reframes power mobility not as the outcome of readiness, but as the context in which readiness develops (Nilsson et al., 2011). While a skills-based training model remains the dominant clinical approach and can be appropriate for many populations, awareness of the process-based approach is relevant when evaluating candidates who may not meet traditional cognitive thresholds for power mobility. Something that's particularly relevant for children and individuals of any age with complex communication and cognitive profiles for whom extended real-world experience, rather than prerequisite screening, may be the more appropriate path to functional mobility.

No validated cognitive threshold for safe PWC use has been established. That means clinical judgment remains the primary decision-making tool in most clinical settings — a tool the literature consistently identifies as prone to premature exclusion (Rider & Patterson, 2023; Mortenson et al., 2013). Rider and Patterson (2023), in a clinical practice article, recommend moving beyond screening-only approaches toward functional observation, simulated trials, and real-world assessment, with cognitive concerns addressed through targeted training and skill-building rather than exclusion from evaluation.

This evidence base informs where LUCI fits in the clinical picture. Pellichero et al. (2021) address this directly in their implications for clinical practice, cautioning against allowing cognitive functioning — or any single functional limitation — to serve as a categorical disqualifier. For the populations they describe as neither clearly capable nor clearly incapable, the authors argue that "evaluating objectively this third population and proposing adapted training would offer more individuals a chance to learn to use a [PWC]" (p. 22). LUCI is exactly the kind of assistive technology to support this scenario: it changes what's possible, and what a trial can reveal for clients who fall in this uncertain middle ground. The cognitive skills most tied to PWC driving difficulty — visuospatial perception (evidence covered in more detail under Visual Impairments section)[2], sustained attention, executive processing of environmental complexity — are what LUCI's sensor and collision-avoidance system is built to support.

Pellichero et al. (2021) noted that intelligent powered wheelchairs may reduce cognitive load for some users, while cautioning that technology cannot take over entirely. The SWADAPT2, a randomized controlled pilot study (Fraudet et al., 2023), offers direct evidence: in participants with neurological conditions (e.g., ABI, CP) and documented driving difficulty, a robotic collision-avoidance system reduced collisions by more than 80% on the most complex course. Critically, it did so without increasing cognitive load. The system corrected wheelchair trajectory automatically – no user reaction required. LUCI works in a similar way: it intervenes automatically to prevent collisions and driving off unsafe drop-offs, and can be calibrated to each individual's

2 Visuospatial neglect is addressed in Section B because its most direct functional consequence in PWC operation is a spatially defined gap in hazard detection – the same gap LUCI's sensor coverage is designed to address. Its neurological and cognitive underpinnings are acknowledged in Section A. Clinicians evaluating clients with both cognitive and perceptual impairments should consider the compounding effect on PWC operation.

reaction time. This matters because warning-only systems still depend on intact reaction time and processing speed, which may become more problematic with increased cognitive load.

Clinical takeaway on cognitive impairment: Cognitive functioning matters in PWC evaluation – but the evidence does not support a fixed cognitive threshold for candidacy, and it does not support skipping power wheelchair evaluation altogether. The appropriate clinical response is a thorough, functional trial, with training tailored to the individual. For clients with mild-to-moderate[3] cognitive impairment who have clear mobility goals and the motivation for self-generated mobility, LUCI addresses the safety gap that makes independent operation possible. **A client who cannot drive safely without LUCI is a client for whom LUCI may be the enabling technology – when the broader clinical picture supports power wheelchair use.**

B. Visual and Visual Perceptual Impairment

Visual impairment is a commonly cited barrier to safe and independent power wheelchair use, and the population it affects is substantial. Simpson et al. (2008) estimated that approximately 380,000 wheelchair-users in the United States have vision loss significant enough to affect wheelchair navigation – roughly 100,000 who are legally blind and 280,000 with low vision. These figures reflect that about 9.6% of legally blind individuals and 5.3% of those with low vision in the U.S. also rely on a wheelchair or scooter for mobility. For these individuals, many find it difficult or impossible to independently use a wheelchair, often relying on caregivers for mobility assistance (Simpson et al., 2005). Researchers were developing sensor-based obstacle detection systems for wheelchairs specifically for this dual-disability population more than two decades ago, recognizing that traditional white cane and guide dog strategies are not, in themselves, enough to achieve independence for non-ambulatory users (Simpson et al., 2005).

While visual impairments can make obstacle detection, spatial navigation, hand-eye coordination and use of orientation cues difficult for wheelchair users, the evidence does not support visual impairment as a reason to exclude someone from power mobility. **In a structured driving assessment of 48 visually impaired participants — including those with low acuity, peripheral field defects, and multiple visual impairments — all but one acquired adequate driving skills** (Cordes et al., 2018). While this study was conducted with scooter users, the findings are directionally relevant to PWC evaluation. More complex cases required more training, not disqualification. The same pattern holds for visuospatial neglect. Mountain et al. (2014) found that post-stroke patients receiving PWC skills training showed a 39% relative improvement in wheelchair skills compared to 3% in the control group, and the presence of visuospatial neglect did not significantly change outcomes. Patients with neglect improved to an equivalent degree as those without.

The navigation effects of neglect are real and predictable. Observational research shows that PWC users with left unilateral neglect consistently deviate leftward in a corridor — a pattern specific to powered mobility that was not seen when the same patients walked (Turton et al., 2009). Moretta et al.'s (2024) systematic review of visual vertical neglect in acquired brain injury similarly documents poor wheelchair handling and collisions with unnoticed obstacles. Training can help in both cases, but it does not fully close the gap. Lateral and vertical neglect create identifiable, predictable navigation risks – and sensor-based compensation is a direct clinical response to them.

LUCI's 360-degree sensor coverage is designed to compensate for these types of visual and perceptual deficits. Sensors positioned around the full perimeter of the chair — front, sides, and rear — detect obstacles in spaces the client cannot see, whether due to blindness, low visual acuity, visual field deficits, visuospatial neglect, cerebral visual impairment, limited head and neck movement, or other causes. When the individual's visual or perceptual systems cannot reliably detect an obstacle or unsafe drop-off, LUCI detects and intervenes. The white cane filter on LUCI further supports individual's who are legally blind and using a white cane. This is not supplemental nor a convenience. For clients with visual or perceptual deficits requiring powered mobility, LUCI is the technology that makes self-generated mobility possible.

Clinical takeaway on visual impairment: Low vision,

3 The evidence reviewed in this section is generally relevant to clients in the mild-to-moderate range of cognitive impairment - those who have functional mobility goals, who can communicate intent through a drive control, and for whom LUCI addresses specific, identifiable efficiency and/or safety gaps. The evidence base is less developed at the severe end of each impairment spectrum, although clinical framework does exist for this population (Nilsson et al., 2011). Clinicians should exercise independent judgment, in conjunction with the client's desires and realistic mobility related goals, in those cases and not extrapolate these findings beyond the populations studied.

blindness, visual field deficits, visuospatial neglect and cerebral visual impairment are conditions for which LUCI provides direct sensor-based compensation. They are clinical indications for LUCI, not grounds for denying power mobility.

C. Motor Impairment

Motor impairment affecting the precision, speed, and consistency of joystick control is a well-documented source of driving difficulty. Fehr et al. (2000) found that approximately 40% of power wheelchair users had difficulty with steering tasks (e.g., maneuvering in tight spaces, doorways) with 5–9% finding these tasks impossible without assistance. Conditions including spasticity, tremors, ataxia, bradykinesia, and dystonia — present across diagnoses including, but not limited to, cerebral palsy, multiple sclerosis, Parkinson's disease, amyotrophic lateral sclerosis, acquired brain injury, and spinal cord injury — can each produce unintended drive commands, delayed responses to hazards, or inability to execute precise maneuvers (Fehr et al., 2000; Simpson et al., 2008). Notably, the same Fehr et al. survey found that clinicians believed nearly half of patients unable to operate a power wheelchair by conventional methods would benefit from an advanced driver assistance navigation system. That finding — now over two decades old — identified the need that LUCI now fills.

LUCI's collision avoidance directly compensates for the effects of inconsistent motor control on driving safety. For example, where a spasticity related unintended joystick deflection would otherwise result in a collision, LUCI's obstacle detection and speed modulation prevent the collision. The previously referenced pilot SWADAPT2 trial demonstrated exactly this dynamic, and the effect was larger for users with greater driving difficulty. Regression analysis showed a statistically significant relationship between driving difficulty level and the benefit conferred by assistance ($p = 0.044$), meaning advanced driver assist technology provides the greatest benefit to precisely the users for whom it is most clinically indicated (Fraudet et al., 2023).

An important distinction applies to LUCI compared to warning-only systems. The SWADAPT2 authors noted that warning systems "require action following the perception of the alert and therefore depend on the user's reaction time, which is often increased in the case of cognitive disorders" (p. 5) or, by extension, motor slowing or fatigue. LUCI's active collision avoidance does not depend on typical reaction time, rather is calibrated to the individual's actual reaction time. This is a critical feature for users with spasticity, ataxia, tremor, or fatigue-related motor variability: the protection is automatic and does not require a corrective motor response the user may not be able to execute in time.

Clinical takeaway on motor impairment: LUCI acts as an active assist layer that compensates for motor execution errors or delays — whether the source is neuromuscular, cognitive, or perceptual. For many users, these factors co-occur, and LUCI addresses the functional result regardless of its origin.

IV. Direct Rebuttal of the Denial Reasoning

The denial argument — "if the client cannot drive safely without LUCI, they are not an appropriate candidate for power mobility" — reflects a fundamental error in reasoning. Without the enabling technology, the user appears unable to drive – but it's the technology that's missing, not the ability.

Applied consistently, this same logic would lead to several clearly invalid conclusions:

- A client who cannot independently operate a power wheelchair without a sip-and-puff controller would be deemed ineligible for power mobility.
- A client who cannot ambulate without a prosthetic limb would be deemed ineligible for walking.
- An individual who cannot meet visual acuity requirements without corrective lenses would be deemed ineligible for a driver evaluation or license.

Each conclusion is inherently flawed because each ignores the essential role of assistive technology as the mechanism that enables functional participation. In each case, the individual is not excluded from the activity because of a baseline limitation; rather, technology serves as the accommodation that allows safe and effective performance.

The same principle applies to power mobility and LUCI. The appropriate clinical question is not "Can this individual safely drive a power wheelchair without LUCI?" Rather, the clinically relevant questions are "Can this individual efficiently and safely achieve self-generated power mobility with LUCI as part of the wheelchair system? And is a power wheelchair the most appropriate mobility solution based on the comprehensive evaluation process?"[4]

Power wheelchair candidacy should not be determined by evaluating an individual in the absence of the very assistive technology required to make safe and functional operation possible.

V. Clinical Training and Ongoing Monitoring

When LUCI is the enabling technology that makes a power wheelchair prescription viable for a given client, the clinical responsibility does not end at the point of provision. Appropriate support includes:

- **Training:** Clients and caregivers should receive structured orientation to LUCI's features, including how the collision avoidance and unsafe drop-off detection systems function, what the user will experience during a LUCI intervention, and how to use the system in a variety of environments.

- **Contingency planning:** Clinicians should discuss with clients and caregivers what happens if LUCI is temporarily unavailable (e.g., during servicing or sensor maintenance). If the client's safety depends on LUCI being active, driving may need to be supervised or restricted during those intervals. This is not a disqualifying condition -- it is analogous to the management of any other critical assistive technology, such as an alternative drive control.

- **Ongoing monitoring:** LUCI's usage data — including logged collision and unsafe drop-off interventions — can serve as an objective clinical monitoring tool over time provided that the LUCI driver grants permission to share this data with their clinician. Significant changes in intervention frequency may indicate changes in the client's functional status or environmental demands that warrant reassessment.

- **Reassessment:** Power wheelchair operation with LUCI, like all prescribed assistive technology, should be revisited when the client's condition changes substantially. A client who initially requires LUCI for safe operation may improve through training and real world experience. Likewise, a client may experience condition changes that require revisiting of the LUCI settings to optimize performance with their new clinical presentation.

VI. Conclusion

The denial rationale addressed by this paper mischaracterizes the clinical role of LUCI as an enabling technology and, by extension, of assistive technology more broadly. **Power wheelchair candidacy is determined by the need for the mobility device, not by the ability to operate it without the enabling technology the prescription may require. LUCI is an enabling assistive technology — one that expands access to self-generated power mobility for individuals with cognitive, perceptual, visual, and / or motor impairments.**

The evidence base supports this position: international human rights frameworks require access to assistive technologies as the mechanism of mobility rights; clinical literature confirms that cognitive, perceptual, visual, and/or motor impairments should not categorically exclude individuals from PWC provision; empirical trial demonstrates that sensor-based collision avoidance significantly and safely reduces driving hazards without increasing cognitive load; and clinical consensus in alternative drive controls has already established the principle that enabling technology is a clinical solution, not a disqualifier.

The firsthand accounts of power wheelchair users (Böttger et al., 2022), the published outcome of LUCI provision (Lange, 2021), and the growing literature on cooperative intelligent wheelchair systems (How et al., 2013; Pacini et al., 2024; Loke et al., 2026) point to the same conclusion: when sensor-based technology expands the mobility of a person who would otherwise be limited by collision/tip risk, anxiety, or functional barrier, that technology is not a luxury add-on to be scrutinized — it is the medically necessary solution.

The clinician's responsibility is to evaluate each client as an individual to determine whether power mobility is indicated; whether LUCI closes a specific, documentable gap; and whether the totality of the clinical picture supports a realistic goal of self-generated mobility.

When the answer to all three statements is yes, the conclusion follows directly. For the client who requires LUCI for self-generated, efficient, and/or safe power wheelchair mobility, LUCI is not the reason they should be denied a power wheelchair. It is the reason they should receive one.

4 It is equally important to clarify what this paper does not argue. It does not assert that the need for LUCI should automatically satisfy the clinical threshold for power wheelchair candidacy. Some individuals will present with levels of cognitive, behavioral, visual, or motor impairment that render power mobility inappropriate even with LUCI's advanced driver assistance capabilities. This paper's argument is narrower: requiring LUCI is not, by itself, a disqualifying condition.

VII. References

Böttger, T., Dennhardt, S., Knape, J., & Marotzki, U. (2022). “Back into life—with a power wheelchair”: Learning from people with severe stroke through a participatory photovoice study in a metropolitan area in Germany. International Journal of Environmental Research and Public Health, 19, 10465. https://doi.org/10.3390/ijerph191710465

Cordes, C., Heutink, J., Brookhuis, K. A., Brouwer, W. H., & Melis-Dankers, B. J. M. (2018). Mobility scooter driving ability in visually impaired individuals. Disability and Rehabilitation, 40(12), 1372–1378. https://doi.org/10.1080/09638288.2017.1295471

Fehr, L., Langbein, W. E., & Skaar, S. B. (2000). Adequacy of power wheelchair control interfaces for persons with severe disabilities: A clinical survey. Journal of Rehabilitation Research and Development, 37(3), 353–360.

Fraudet, B., Leblong, E., Piette, P., Nicolas, B., Devigne, L., Babel, M., Pasteau, F., Routhier, F., & Gallien, P. (2023). SWADAPT2: Benefits of a collision avoidance assistance for powered wheelchair users in driving difficulty. Disability and Rehabilitation: Assistive Technology. https://doi.org/10.1080/17483107.2023.2253339

How, T. V., Wang, R. H., & Mihailidis, A. (2013). Evaluation of an intelligent wheelchair system for older adults with cognitive impairments. Journal of NeuroEngineering and Rehabilitation, 10(1), 90. https://doi.org/10.1186/1743-0003-10-90

Lange, M. L. (2021). Complex rehab innovation: Lauren’s power wheelchair gets smart. DIRECTIONS, 2021.6, 38–42.

Lange, M. L. (2025). Power mobility: driving methods.. In M. L. Lange and J. L. Minkel (Eds.), Seating and Wheeled Mobility: A Clinical Resource Guide (pp. 391-408). Taylor & Francis Group. https://doi.org/10.4324/9781003526377

Logan, S. W., Bogart, K. R., Ross, S. M., & Woekel, E. (2018). Mobility is a fundamental human right: Factors predicting attitudes toward self-directed mobility. Disability and Health Journal, 11(4), 562–567. https://doi.org/10.1016/j.dhjo.2018.06.001

Loke, L. Y., Goh, J. X., Puckett, K. S., Zhang, M. H., Zaino, N. L., & Argall, B. D. (2026). A Minimal, Deterministic Approach to Shared Control for Safe Powered Wheelchair Driving. Proceedings of Robotics: Science and Systems (RSS).

Moretta, P., Cavallo, N. D., Fonzo, E., Maiorino, A., Ferrante, C., Ambrosino, P., Femiano, C., Santangelo, G., & Marcuccio, L. (2024). Visual vertical neglect in acquired brain injury: A systematic review. Frontiers in Psychology, 15, 1360057. https://doi.org/10.3389/fpsyg.2024.1360057

Mortenson, W. B., Clarke, L. H., & Best, K. (2013). Prescribers’ experiences with powered mobility prescription among older adults. American Journal of Occupational Therapy, 67(1), 100–107. https://doi.org/10.5014/ajot.2013.006122

Mountain, A. D., Kirby, R. L., Smith, C., Eskes, G., & Thompson, K. (2014). Powered wheelchair skills training for persons with stroke: A randomized controlled trial. American Journal of Physical Medicine & Rehabilitation, 93(11), 1031–1043. https://doi.org/10.1097/PHM.0000000000000229

Nilsson, L., Eklund, M., Nyberg, P., & Thulesius, H. (2011). Driving to learn in a powered wheelchair: the process of learning joystick use in people with profound cognitive disabilities. The American Journal of Occupational Therapy, 65(6), 652–660. https://doi.org/10.5014/ajot.2011.001750

Pacini, F., Dini, P., & Fanucci, L. (2024). Design of an assisted driving system for obstacle avoidance based on reinforcement learning applied to electrified wheelchairs. Electronics, 13, 1507. https://doi.org/10.3390/electronics13081507

Pellichero, A., Kenyon, L. K., Best, K. L., Lamontagne, M. E., Lavoie, M. D., Sorita, É., & Routhier, F. (2021). Relationships between cognitive functioning and powered mobility device use: A scoping review. International Journal of Environmental Research and Public Health, 18, 12467. https://doi.org/10.3390/ijerph182312467

Rider, J. V., & Patterson, K. (2023, October 26th). Assessing cognitive abilities for power mobility use. Rehab Management. https://rehabpub.com/mobility/power-wheelchairs/assessing-cognitive-abilities-for-power-mobility-use/

Simpson, R. C., LoPresti, E. F., & Cooper, R. A. (2008). How many people would benefit from a smart wheelchair? Journal of Rehabilitation Research & Development, 45(1), 53–72. https://doi.org/10.1682/JRRD.2007.01.0015

Simpson, R., LoPresti, E., Hayashi, S., Guo, S., Ding, D., Ammer, W., Sharma, V., & Cooper, R. (2005). A prototype power assist wheelchair that provides for obstacle detection and avoidance for those with visual impairments. Journal of NeuroEngineering and Rehabilitation, 2, 30. https://doi.org/10.1186/1743-0003-2-30

Turton, A. J., Dewar, S. J., Lievesley, A., O’Leary, K., Gabb, J., & Gilchrist, I. D. (2009). Walking and wheelchair navigation in patients with left visual neglect. Neuropsychological Rehabilitation, 19(2), 274–290. https://doi.org/10.1080/09602010802106478

United Nations. (2006). Convention on the Rights of Persons with Disabilities, Article 20 — Personal Mobility. https://www.un.org/disabilities/documents/convention/convoptprot-e.pdf

About the Authors

This position paper was co-authored by Angela Regier, OTD, OTR/L, ATP/SMS and Lindsey Sharpe, PT, DPT, ATP, both serving as Regional Director's of Clinical Education at LUCI. Both authors are employed by LUCI Mobility, the manufacturer of the technology discussed in this paper.

Funding & Regulatory Note

The information outlined in this position paper is intended to assist clinicians, assistive technology professionals (ATPs), and payor groups in understanding the medical necessity of LUCI under HCPCS Code K0108 (wheelchair component or accessory, not otherwise specified). As with many novel CRT technologies, LUCI's classification under a not-otherwise-specified (NOC) code reflects the coding system's well-documented lag behind the pace of technology development in this industry, not an absence of clinical merit or established use. Because NOC status means there is no dedicated fee schedule, individualized medical necessity documentation - grounded in the client's specific functional presentation and goals - is essential to every LUCI funding request; this paper is intended to support that documentation, not substitute for it.

LUCI is an FDA Class 1, exempt medical device that meets the associated requirements of the FDA and FCC. In addition, LUCI meets the applicable requirements of IEC 60601 for home use medical electrical equipment.

Correspondence

For clinical inquiries, trials, or funding assistance, please contact the LUCI Clinical Education Team at education@luci.com.