Preservation of Upper Limb Function and the Wijit

The Consortium for Spinal Cord Medicine published a report titled Preservation of Upper Limb Function Following Spinal Cord Injury: A Clinical Practice Guideline for Health-Care Professionals in 2005. This study outlined 35 recommendations that are generally applicable to all wheelchair users, not just SCI patients. The following table summarizes the recommendations of the study and how the Wijit relates to the recommendations.

Recommendations	Relevance of Wijit
Initial Assessment of Acute SCI	
1. Educate health-care providers and persons with SCI about the risk of upper limb pain and injury, the means of prevention, treatment options, and the need to maintain fitness.	Wijit, Inc. is providing "in service" training to health-care providers and recruiting key opinions leaders to assist in this effort.
2. Routinely assess the patient's function, ergonomics, equipment, and level of pain as part of a periodic health review. This review should include evaluation of: • Transfer and wheelchair propulsion techniques. • Equipment (wheelchair and transfer device). • Current health status.	For most patients the health care professionals that made recommendations regarding their wheelchair were not familiar with the Wijit. All patients should be reevaluated for applicability of the Wijit to their condition.
Ergonomics	
3. Minimize the frequency of repetitive upper limb tasks.	The typical wheelchair user makes 2000 – 5000 "pushes" per day. The Wijit's 1:2 gear ration reduces the number of pushes by 2 – 3 X. While a power assist may wheel reduce the force to propel a MWC it does not substantially reduce the number of pushes. A manual push-rim with a gear-reduction drive actually increases the number of pushes by 2X when engaged.

4. Minimize the force required to complete upper limb tasks.	The Wijit requires approximately 50% less force than a push-rim wheelchair for each "push" due in part to the mechanical advantage provided by the levers. It also eliminates the repetitive stresses to the wrist and hand caused by the gripping and releasing of and gripping of the push-rim during each "push"
5. Minimize extreme or potentially injurious positions at all joints. • Avoid extreme positions of the wrist. • Avoid positioning the hand above the shoulder. • Avoid potentially injurious or extreme positions at the shoulder, including extreme internal rotation and abduction.	Unlike a push-rim wheelchair, using the Wijit places the hand and forearm in a natural position during the entire "push" phase with no extreme position of the wrist exhibited. During Wijit use, the "natural" position of the upper extremities has been shown to reduce internal rotation and abduction of the shoulder.
Equipment Selection, Training, and Environmental Adaptation	
6. With high-risk patients, evaluate and discuss the pros and cons of changing to a power wheelchair system as a way to prevent repetitive injuries.	The Wijit supports keeping a patient in a manual wheelchair longer with the associated benefits of maintaining physical activity. Many patients have been able to successfully transition from a power wheelchair to a manual wheelchair with a Wijit, with resulting improvement in cardiovascular condition and core strength, and weight loss.
7. Provide manual wheelchair users with SCI a high- strength, fully customizable manual wheelchair made of the lightest possible material.	The Wijit adds approximately 10 pounds to the weight of the chair. This is substantially less than alternative products.
8. Adjust the rear axle as far forward as possible without compromising the stability of the user.	
9. Position the rear axle so that when the hand is placed at the top dead-center position on the push-rim, the angle between the upper arm and forearm is between 100 and 120 degrees.	The Wijit allows the angle between the upper arm and forearm to stay in the desirable 100 – 120 degree range for the majority of the "push."

10. Educate the patient to: • Use long, smooth strokes that limit high impacts on the push-rim. • Allow the hand to drift down naturally, keeping it below the push-rim when not in actual contact with that part of the wheelchair.	The Wijit stroke is a long, smooth, natural stroke. High impacts on the wrist and upper extremity are totally eliminated as the stress of contacting, releasing and regripping the push-rim is eliminated.
11. Promote an appropriate seated posture and stabilization relative to balance and stability needs.	The Wijit allows the patient to maintain an upright posture while propelling the wheelchair.
12. For individuals with upper limb paralysis and/or pain, appropriately position the upper limb in bed and in a mobility device. The following principles should be followed: • Avoid direct pressure on the shoulder. • Provide support to the upper limb at all points. • When the individual is supine, position the upper limb in abduction and external rotation on a regular basis. • Avoid pulling on the arm when positioning individuals. • Remember that preventing pain is a primary goal of positioning.	
13. Provide seat elevation or possibly a standing position to individuals with SCI who use power wheel- chairs and have arm function.	
14. Complete a thorough assessment of the patient's environment, obtain the appropriate equipment, and complete modifications to the home, ideally to Americans with Disabilities Act (ADA) standards.	
15. Instruct individuals with SCI who complete independent transfers to: • Perform level transfers when possible. • Avoid positions of impingement when possible. • Avoid placing either hand on a flat surface when a handgrip is possible during transfers. • Vary the technique used and the arm that leads. Push-rim, the angle	

between the upper arm and forearm is between 100 and 120 degrees.	
16. Consider the use of a transfer-assist device for all individuals with SCI. Strongly encourage individuals with arm pain and/or upper limb weakness to use a transfer-assist device.	
Exercise	
17. Incorporate flexibility exercises into an overall fitness program sufficient to maintain normal gleno-humeral motion and pectoral muscle mobility.	The Wijit helps maintain flexibility and transforms every day use of the wheelchair into an exercise program.
18. Incorporate resistance training as an integral part of an adult fitness program. The training should be individualized and progressive, should be of sufficient intensity to enhance strength and muscular endurance, and should provide stimulus to exercise all the major muscle groups to pain-free fatigue.	The Wijit naturally provides resistance training to upper body major muscle groups. "Road time" in a Wijit equipped wheelchair is a great way for users to get exercise. Many Wijit users report significant increases in core and arm strength.
Management of Acute and Subacute Upper Limb Injuries and Pain	
19. In general, manage musculoskeletal upper limb injuries in the SCI population in a similar fashion as in the unimpaired population.	The Wijit reduces shoulder joint load by decreasing the superior glenohumoral force.
20. Plan and provide intervention for acute pain as early as possible in order to prevent the development of chronic pain.	Anecdotally, many patients comment that since utilizing the Wijit their use of pain medication has been reduced and in some cases eliminated.
21. Consider a medical and rehabilitative approach to initial treatment in most instances of nontraumatic upper limb injury among individuals with SCI.	
22. Because relative rest of an injured or postsurgical upper limb in SCI is difficult to	

achieve, strongly consider the following measures: • Use of resting night splints in carpal tunnel syndrome. • Home modifications or additional assistance. • Admission to a medical facility if pain cannot be relieved or if complete rest is indicated.	
23. Place special emphasis on maintaining optimal range of motion during rehabilitation from upper limb injury.	Use of a push-rim wheelchair requires non-optimal hand and arm motion. Normal operation of the Wijit keeps the arm in an optimal range of motion.
24. Consider alternative techniques for activities when upper limb pain or injury is present.	The Wijit offers an alternative technique for wheelchair self propulsion.
25. Emphasize that the patient's return to normal activity after an injury or surgery must occur gradually.	The Wijit allows the patient to self-propel with less stress on the injury than a push-rim wheelchair.
26. Closely monitor the results of treatment, and if the pain is not relieved, continued work-ups and treatment are appropriate.	
27. Consider surgery if the patient has chronic neuromusculoskeletal pain and has failed to regain functional capacity with medical and rehabilitative treatment and if the likelihood of a successful surgical and functional outcome outweighs the likelihood of an unsuccessful procedure.	Anecdotally, many patients comment that since utilizing the Wijit their use of pain medication has been reduced and in some cases eliminated. Some report that they have been able to avoid surgery through the use of the Wijit.
28. Operate on upper limb fractures if indicated and when medically feasible.	
29. Be aware of and plan for the recovery time needed after surgical procedures.	
30. Assess the patient's use of complementary and alternative medicine techniques and beware of possible negative interactions.	
Treatment of Chronic Musculoskeletal Pain to Maintain Function	

31. Because chronic pain related to musculoskeletal disorders is a complex, multidimensional clinical problem, consider the use of an interdisciplinary approach to assessment and treatment planning. Begin treatment with a careful assessment of the following: • Etiology. • Pain intensity. • Functional capacities. • Psychosocial distress associated with the condition.	Anecdotally, many patients comment that since utilizing the Wijit their use of pain medication has been reduced and in some cases eliminated. Some report that they have been able to avoid surgery through the use of the Wijit.
32. Treat chronic pain and associated symptomatology in an interdisciplinary fashion and incorporate multiple modalities based on the constellation of symptoms revealed by the comprehensive assessment.	
33. Monitor outcomes regularly to maximize the likelihood of providing effective treatment.	
34. Encourage manual wheelchair users with chronic upper limb pain to seriously consider use of a power wheelchair.	The Wijit has been shown to significantly reduce chronic upper limb pain allowing patients who would otherwise have needed to go into a power chair to stay in their manual chair and in some cases avoid rotator cuff surgery.
35. Monitor psychosocial adjustment to secondary upper limb injuries and provide treatment if necessary.	