



Wheelchair Evaluation Process for a Patient with Spinocerebellar Disorder: A Case Report

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Abstract

This article reports a comprehensive wheelchair evaluation for a 48 year old female with spinocerebellar disorder resulting in complete quadriplegia. A thorough wheelchair evaluation process was conducted by an interdisciplinary rehabilitation team consisted of a physician, an occupational therapist, a physical therapist, and a rehabilitation technology supplier. The WHO guidelines for wheelchair evaluation process and the SOAP note documentation format were followed. This is a 46 year old who is in need of a new power wheelchair. This is needed because the current wheelchair is no longer functional and further modifications are not cost-effective and will not correct the problem. Our wheeled mobility and seating intervention team prescribed a new power wheelchair with multiple power seat functions as the most reasonable and cost effective wheelchair in meeting the patient needs, goals, and priorities.

Keywords: Spinocerebellar; Wheelchair evaluation; Interdisciplinary; Rehabilitation; Occupational therapy

Introduction

Spinocerebellar degeneration is a rare inherited neurological disorder of the central nervous system characterized by the slow degeneration of certain areas of the brain. Symptoms begin during adulthood. It is one of a group of genetic disorders characterized by slowly progressive in coordination of gait and is often associated with poor coordination of hands, speech, and eye movements. Spinocerebellar disorder frequently results in atrophy of the cerebellum, loss of fine coordination of muscle movements leading to unsteady and clumsy motion, and other symptoms. The symptoms vary with the specific type and with the individual patient. In many cases a patient retains full mental capacity but progressively loses physical control [1].

There is no cure for spinocerebellar disease, which is currently considered to be a progressive and irreversible condition, although not all types cause equally severe disability. In general, treatments are directed towards alleviating symptoms, not the disease itself. Medications or other therapies might be appropriate for some of these symptoms, which could include tremor, stiffness, depression, spasticity, and sleep disorders [2]. Rehabilitative therapy can assist patients in maintaining their level of independence through therapeutic exercise programs. Evidence from different high-intensity training studies demonstrate that high-intensity coordinative training programs might lead to a significant benefit in patients with degenerative spinocerebellar disease. This training might be based either on physiotherapy or on whole-body controlled videogames. The retention of the effects seems to depend on the frequency and continuity of such training programs [3]. Wheelchairs, both manual and power, are enablers of community participation and are used to enhance function, to improve independence, and to enable a person to successfully live at home and in the community [4]. A properly fitted and correctly prescribed wheelchair benefits both client and caregiver and clients use their wheelchairs more often if they receive them from an expert clinician who uses a multifactorial assessment-intervention process [5]. Persons with neurodegenerative conditions such as spinocerebellar disorder require rehabilitation and use the wheelchair in their daily life and may completely depend on a wheelchair for their mobility [6]. To aid in provision of the best quality wheelchairs and service delivery programs, Sarsak [5] reported that wheelchair evaluation is a continuous process requiring re-assessment of wheelchair fit as user's age and their functional conditions change. Hoenig et al. [7] described this process as a thorough evaluation that takes into account all the factors and is based on medical record review and self-reported and physical performance measures, individualization and modifications/adjustments of the wheelchair, home modifications as needed, client education, and follow-up. According to the World Health

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Organization (WHO), the provision of wheelchairs includes eight critical steps for appropriate wheelchair services. These steps are:

1. Referral
2. Assessment
3. Prescription,
4. Funding and ordering,
5. Product preparation,
6. Fitting and adjusting,
7. User training, and
8. Follow-up and maintenance/repairs.

The wheelchair provision 8-Steps have a range of positive outcomes including increased satisfaction with the mobility device and better quality of life [8].

This article reports a comprehensive wheelchair evaluation for a clinical case with spinocerebellar atrophy and complete quadriplegia with an emphasis on the WHO guidelines for wheelchair evaluation process. The Subjective-Objective-Assessment-Plan (SOAP) note documentation format was used to create the patient's chart and to document progressive notes in an outpatient clinic. We chose the SOAP method as the information in the SOAP note has proven to be useful for history taking and physical exam and highlight the importance of critical documentation details [9].

Case Presentation

We had the pleasure of seeing XXX for a comprehensive Mobility Assistive Equipment (MAE) evaluation. She is a 48 year old female with spinocerebellar disorder resulting in complete quadriplegia. She came to us using a power wheelchair with tilt in space, recline, and elevating leg rests. She operates this wheelchair using a chin controlled joystick. She has encountered problems with the integrity of the seating system (tilt/recline). The cost of replacing the seat frame is about 50% of the cost of replacing a new wheelchair. The power base is also more than six years old; therefore, it would not be cost effective to provide a new seat frame on a base that has questionable life expectancy.

Here is the detailed clinical case report applying the SOAP note format. All private information has not been reported and kept confidential.

Subjective (diagnoses, functional, social, and environmental history, personal goals)

Pre-assessment screening

- Name: XXX.
- Age: 48 years old.
- Occupation: Retired Business Owner.
- Primary diagnosis: Spinocerebellar atrophy with complete quadriplegia.
- Reason for Referral: New Mobility Assistive Equipment (MAE).
- Type of Current MAE: Power wheelchair with power tilt-in-space, recline, and elevating leg-rests, and mini-joystick operated with her chin.

- Hours per day in MAE: 24 h a day.
- Age of Current MAE: 6 years.
- Problems with current MAE: Issues with components wearing out. There is currently a need to replace entire seat frame due to metal fatigue. Would not be cost-effective to replace seat frame and then have problems with the base in the near future.
- Height: 6'
- Weight: 175 lbs.
- Transportation resources: Accessible and a fully equipped van.
- Education/employment: No longer working.
- Living situation: Lives with her husband and 2 teenaged children.

Personal goals for a new seating & mobility device

- To replicate her existing wheelchair.
- To enhance her functional mobility within the home, independence, safety, and efficiency in conducting with all of her daily activities.
- To improve comfort and reduce risk of skin breakdown while sitting on her wheelchair.
- To be able to go out in the local community.
- To enhance safety, reduce the risk of falling, and increase stability and trunk control while seated.

Objective (physical motor examinations)

Physical motor assessment

- Upper Extremity Function: Full passive Range of Motion (ROM) with (0/5) strength throughout however with some tone noted. Her upper extremities are passively stretched on a daily basis by her attendant.
- Lower Extremity Function: Full passive Range of Motion with (0/5) strength however with tone noted.
- Posture (Sitting & Supine): Keeps legs elevated most of the time with some tilt-in-space and recline primarily to manage edema. Can sit more upright but does have decreased trunk control causing her to fall forward or to the sides. She maintains good head control in a tilted position to operate her chin control.

Physician assessment: XXX is a 46 year old woman with spinocerebellar atrophy who presents with a chief complaint of a need for a mobility device evaluation. She uses a joystick chin control. Her current power wheelchair is over 6 yrs old, and is fatiguing to the point of being non-functional. She is now in need of a replacement chair. She was seen by an interdisciplinary team consisting of wheelchair professionals (a physician, an occupational therapist, a physical therapist, and a rehabilitation technology supplier). She has not fallen (history also obtained from assistant).

- Past Medical/Surgical History: She had surgery to remove kidney stones.
- Functional History: She cannot ambulate and needs assistance with transfers. The patient needs assistance with Activities of Daily Living (ADLs) that could be performed at a more

Table 1: Power wheelchair specific characteristics and justifications.

Specification	Justification
Seat- Corpus Ergonomic seat 19" W x 20" D with the seat tube fixed and along with the seat stabilizer	Provide appropriate base support and pelvic positioning. Stabilizer to further reduce jolting when she drives.
Seat Frame- Power Tilt-in-space and recline seating system	Provide for gravitational postural realignment to reduce further development of collapsing spinal deformities. Allow for weight shifts to reduce the potential for pressure sores. Assist with tone management.
Lap Belt- Auto-style push-button seat belt	Provide safety and stability when operating wheelchair.
Thigh Guides /Abductor Wedge- Long thigh supports with adjustable and removable hardware	Provide appropriate thigh alignment to prevent problems with hip dislocation as well as the development of splaying or windswept deformities.
Leg/Foot Support- Power elevating leg-rests with calf supports	Provide appropriate foot support and assist with her tone management as well as passively stretch and ranger her lower extremities.
Back Support- 18" W x 25.5" H with standard lateral supports and adjustable removable hardware	Provide appropriate back support and trunk stability. Reduce the potential for development of spinal deformities.
Head Support- Universal headrest adaptor and adjustable/removable mounting hardware	Provide head support when tilted back.
Arm Support- Arm trough adaptors for 7/8" pair with height adjustable armrest assembly mounted high	Provide appropriate support for paralyzed arms and additional trunk stability through weight bearing in the upper extremities.
Tires /Casters- standard tires and casters with flat free inserts	Standard options. Flat free inserts are necessary as XXX does not have the physical capability or resources to repair a flat tire and could become stranded.
Wheel-Locks /Anti-tippers- Front anti-tippers	Provide safety and stability of the device.
Tie Downs-Standard transportation anchor points	Provide safety and securement of the device when being transported in a vehicle.
Controller- Mini proportional joystick with harness, multiple seat function control kit, right side mount, buddy button switch	Necessary to operate device. Programmable to configure the driving parameters specific to XXX's needs. The buddy button is used as a select or reset switch to either turn the wheelchair on or off, or to change modes or reset to access other functional integrated into the power wheelchair.
Batteries- Group 24 gel cell batteries and charger	Necessary to power device.
Cushion- Jay2 Viscous Fluid and Foam Base (Skin Protection and Positioning)	XXX is at high risk of developing pressure ulcer (unable to perform weight shift) and has a decreased trunk control. Jay 2 combines stability of solid base & viscous fluid and provides good pressure distribution, support, and stability [18].

independent level if mobility status were improved. ADLs include dressing, bathing, and toileting, grooming, and eating. The patient lives with husband and two kids and has attendant.

- **Medications History:** Medications were reviewed and include baclofen, zanaflex, prozac, neurontin, trazodone, actonel, and lactulose (as needed).

- **Social History:** She does not work.

- **Family History:** There is a positive family history of neurodegenerative disease in her father.

- **Review of Systems:** She has back pain, numbness, leg and left thigh pain, no skin issues, bowel/bladder (no incontinence), no vision complaints, signs of depression (low mood and insomnia), weight loss of 44 lbs. (intentionally with diet), with all other systems are negative.

- **Physical Examination:** She is alert, regular heart rate and normal rhythm, lungs clear to auscultation, no abdomen tenderness, musculoskeletal (decreased ROM of both wrists), intact light touch throughout, muscle tone is increased at both wrists but normal otherwise.

- **Overall Assessment:** This is a 46 year old who is in need of a new power wheelchair. This is needed because the current wheelchair is no longer functional and further modifications will not correct the problem.

Therapy assessment (ADLs and instrumental ADLs assessment)

- **ADLs Status:** XXX reports that she is fully dependent with all ADLs.

- **Bath Safety Issues:** Dependent - uses a shower chair and handheld

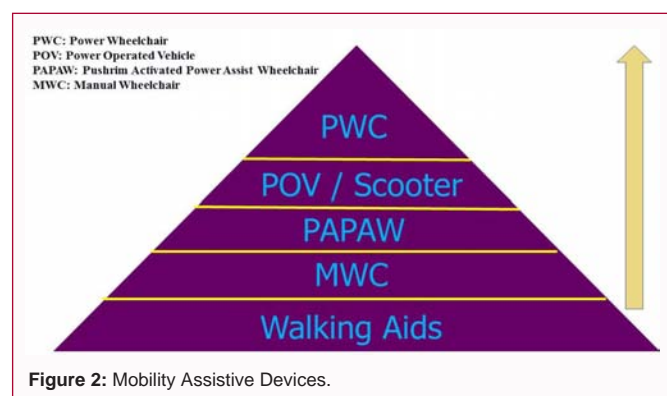
- **Hygiene:** Dependent from wheelchair.

- **Dressing:** Dependent from wheelchair.



Figure 1: Power Wheelchair with Power tilt-in-space, Recline and Elevating Leg-rests.

- **Self-Feeding:** Dependent from wheelchair.
- **Instrumental ADL Status:** XXX reports she is able to go out in the community as well as direct her attendant care independently from her power wheelchair.
- **Meal Preparation:** Does not perform.
- **Housecleaning:** Does not perform.
- **Laundry:** Does not perform.
- **Transfer Status:** Dependent with mechanical lift.
- **Weight Shift:** She is not able to weight shift independently. On her current power wheelchair she is able to independently control her seat functions whereby she can perform proper pressure relief.
- **Functional Mobility:** Completely non-ambulatory but able to independently operate her power wheelchair with a chin-joystick controller.
- **Community Mobility:** Independent with her power wheelchair.
- **Cognition:** Intact.



- Leisure Interests: Watching movies, crossword, computer, family, outings
- Home Accessibility: House is fully accessible on the first floor.
- Functioning Everyday with a Wheelchair (FEW): The FEW Beta Version 2.0 is a 10 item structured self-report outcome measurement tool. Items 2-10 of the FEW measure perceived functional independence of individuals who use a wheelchair as their primary mobility and seating device. For example, the OPERATE item is "The size, fit, postural support and functional features of my wheelchair allow me to operate it as independently... as possible: (e.g., do what I want it to do when and where I want to do it)". The items are scored using a 6 point scale of 6= completely agree to 1= completely disagree, and a score of 0= does not apply. The FEW enables clients to identify the degree of problems they have performing 9 functional tasks in their daily lives while using their wheelchairs. The FEW tools have been used in research and have proven to be effective and useful clinical tool [10]. Our patient's FEW score reported was 32 indicating a relatively low score and hence low self-perceived satisfaction and independence using her current wheelchair [11-13].

Implementation plan (evaluation procedures, mobility device trials, user training, patient education and follow-up visits, recommendations)

Clinical trials/simulation

- Devices Tried: XXX was provided with an opportunity to try a power wheelchair with power seat functions. She was able to drive the system in a safe and effective manner within the clinic, corridors as well as maneuver in tight spaces such as the bathroom and elevator.
- Patient Impressions: XXX reported that she was satisfied with the performance of the power wheelchair and wishes to pursue it as a reasonable alternative for safe and effective mobility within the home and community.
- Home Assessment: A visit to the home was deferred as this is going to be a replacement of her current power wheelchair and she resides in an accessible home.

Recommendations

Per devices tried, the Mobility Assistive Equipment "Group 4 power wheelchairs with power tilt-in-space, recline and elevating leg-rests" was recommended (Figure 1).

Table 1 reports the power wheelchair specific characteristics and their justifications. The specifications of this prescription were

submitted to XXX's primary care physician and insurance carrier for authorization. Upon approval the specifications were provided and delivered to the clinic for fitting and delivery. Upon delivery, XXX was trained in the use of the mobility device and demonstrated safe and effective use. In addition, she was given information about its maintenance. Follow-up appointments were scheduled as needed to modify the equipment as well as to verify that it continues to meet her needs.

Discussion

Our interdisciplinary team assessment of XXX's seating and mobility needs determined that the Group 4 power wheelchair with power space, recline, and elevating leg-rests is the most reasonable and cost effective alternative in meeting her needs. This equipment was chosen over other alternatives (Figure 2) because it is equivalent to her current power wheelchair which has met her needs well and anything less than a Group 4 power wheelchair would be a lesser level of intervention [14].

This equipment is needed for the following reasons:

- She is no longer able to ambulate even with an assistive device and propel any type of manual wheelchair due to the progression of her spinocerebellar disease resulting in complete quadriplegia.
- She is not a candidate for a scooter as she would not be able to safely transfer to and from a scooter, operate the tiller system nor maintain postural stability and position in a scooter seating system.
- The use of a powered mobility device has and will significantly improve her ability to participate in mobility related ADLs.
- She is not a candidate for a Group 1 power wheelchair (basic power wheelchair with no power seat functions) as she will use the device continuously throughout the day as well as on surfaces that a Group 1 power wheelchair is not designed for. A Group 1 power wheelchair will also not accommodate the multiple seat functions that she requires.
- She is not a candidate for a Group 2 or 3 power wheelchair as she has been using a Group 4 style power wheelchair for the last 6 years and it has met her needs well. She drives with a chin controlled mini-joystick therefore needs a power base equipped with good suspension to avoid jolts that would hinder access to the joystick as she traverses various surfaces.
- A group 4 power wheelchair is also necessary as she is very active in her community with her family therefore needs to have a safe means of driving on multiple surfaces both indoors and outdoors [15,16].
- Power tilt-in-space and recline are necessary as she is at high risk for development of pressure ulcer and is unable to perform any type of weight shift. It is also necessary to assist with managing her tone and spasticity [17].
- Elevating leg-rests are necessary to manage her lower extremity edema by raising her feet above heart level in combination with the tilt and recline. She also requires elevating leg-rests to assist in management of lower extremity tone [17].

Without this device, XXX will have no safe, effective, or independent means of mobility or function either within her home

or in the community. She would therefore be at risk for decreased ability to participate in any meaningful mobility related ADLs such as getting to the bathroom for hygiene and bathing activities or kitchen for meals. Also without the use of this device, XXX will be at significant risk for pressure sores, discomfort, and pain resulting in a decreased quality of life.

Conclusion

The prescribed power wheelchair by the wheeled mobility and seating intervention interdisciplinary team was the most reasonable and cost effective wheelchair for the clinical case presented. It has improved our patient's functional performance in terms of independence, safety, and quality, and has met her needs, goals, and priorities.

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