



## CLINICAL CASE STUDY

### Seating to Improve Functional Reach at the Computer: Proximal Stability Allows Distal Mobility

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#### Introduction:

Aging with a disability has unique challenges that must be addressed by both the individual and professionals working in the field of assistive technology. The most common challenge can be progression of disease and disability depending on the diagnosis. Aside from the normal stresses of living with disability, the aging process that affects us all may present new health concerns and degenerative changes that lead to decreased function. This case study is an example of how equipment changes for an aging individual were able to increase his level of participation with functional activities. His existing wheelchair was modified with a new seating system and the goal of providing proximal trunk stability to increase distal mobility of the left upper extremity (LUE) for reaching and other activities.

#### History:

R.B. is a 53 year old male with Cerebral Palsy (C.P.). He has spastic quadriplegia, athetoid motion in bilateral hands, dysarthric speech, and deformities in his hips, knees and ankles. In 2006 R.B. had cervical spinal disk surgery that resulted in weakness and loss of motor control in the LUE. He relies primarily on his LUE for functional activities such as eating, grooming and use of the computer for recreation and communication since his RUE has a severe elbow extension contracture. He has good sensation and no history of skin breakdown.



R.B. in his manual wheelchair with the original seating consisting of standard foam piece without a cover and stretched out vinyl sling style back.



A power chair is the primary chair of record for R.B. but he prefers to use it mostly outside of his living area. He uses an old manual wheelchair inside his living area by foot propelling backwards. When using his manual chair, he is constantly sliding forward due to hamstring tightness. He also leans to the right.

For the past 15 years R.B. has used a custom made wrist rest on a drawer slide mechanism to assist his LUE while typing on the computer. He uses 2 fingers on his left hand to type while resting his wrist on the slide. Due to the poor fit and lack of support with his seating R.B. struggles during typing and use of his computer. He either leans to the right against the sling back or sits up without support. With this extra effort he fatigues easily and wheezes becoming short of breathe with the activity. A few years prior to his spinal surgery, R.B. was employed part time doing data entry.



R.B. working on the computer without back support on the left. He leans significantly to the right when trying to use the sling back.

### Goals:

The goals for improvement to R.B.'s seating system were created to meet his own goals.

R.B.'s goals:

1. Increase endurance while working on the computer
2. Increase reach with LUE for keyboard, mouse, eating and facial grooming
3. Stop sliding in the wheelchair and control the leaning

Our goals:

1. Improve overall positioning to prevent sliding in the wheelchair and to provide stability for UE activities.
2. Provide a cushion for positioning of the pelvis that will accommodate his deformities
3. Provide a solid back to increase trunk control and decrease the seat depth that is too long due to the stretched out sling back
4. Encourage client to consider use of a hip belt and adjustable angle footrests for improved positioning
5. Consider the client's feedback and goals with this new seating system since change can be difficult to accept when aging with a disability



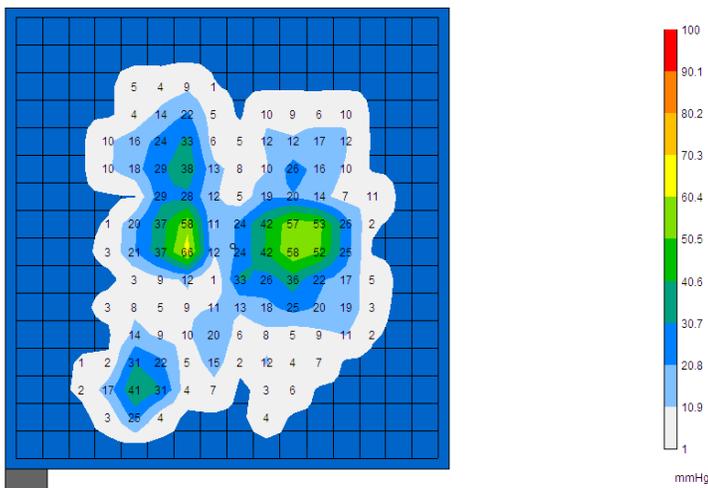
**Interventions:**

Initially R.B. agreed to try a hip belt to assist him from sliding out of his chair and the VARILITE eBack™ system. He was quite pleased with the changes that he saw with this equipment and became open to more changes. To help control the leaning to the right, we mounted a P.A.L. swing away lateral on the right side of the eBack system.

We chose the VARILITE ProForm NX™ cushion to address the positioning requirements of the pelvis. The ProForm NX was dual chambered so that it could be adjusted to accommodate R.B.'s fixed pelvic deformities. Additional modifications were done to accommodate the right hip extension contracture by splitting the front of the base and thigh pad. We used a half wedge to support the left hip which had a less severe contracture. Due to the increased seat height the cushion added to the chair a drop base was also installed to ensure that R.B. could reach the floor with his feet for effective foot propulsion.



The modified dual chamber ProForm NX without a cover.



FSA Pressure map of R.B. on the modified ProForm NX with the eBack. Note that he is getting good weight bearing on the left side.



## Conclusion:

R.B. had greatly improved postural alignment with his new seating system and his feet still can reach the floor for foot propulsion. He was ecstatic with the results and reported, "I sit up better and don't have to work as hard." Lifting his LUE up to the keyboard was much easier. He reported the following functional improvements:

- Breathing is easier and he has less wheezing
- It is easier to swallow when eating and he has less coughing due to food getting stuck
- Back pain is gone
- It is easier to stand up for transfers
- He can reach the WC brakes independently

R.B.'s caregivers even reported that they were not doing as much lifting with transfers because he could scoot to the back of the chair almost independently. Even with a high level of satisfaction with his results from the equipment changes, R.B. had strong feelings against the use of foot rests. He felt that they just get in his way so we honored his opinion and did not pursue the idea of adjustable angle foot rests. In addition to changes for his wheelchair, he was working with an assistive technology computer lab to obtain a track ball and software that would also improve his experience while on the computer.



R.B. in his new seating system. His posture improved dramatically while his feet could still reach the floor and propulsion was unaffected.