

Client: Naomi

PT/OT/Supplier: Becky Breaux, PhD, OTR/L, ATP & Bert Lindholm, ATP

Location: Denver, CO

Naomi is a 15 year old young woman with the diagnosis of cerebral palsy due to a brain malformation. She has increased muscle tone throughout, as well as significant dystonia, and is non-verbal. Naomi has a great sense of humor, enjoys spending time with her family, and loves to do 'donuts' in the backyard with her power wheelchair (PWC). She lives with her family and is followed by the Assistive Technology Clinic at the Center for Inclusive Design and Engineering with Becky Breaux, PhD, OTR/L, ATP and Bert Lindholm, ATP of FWD Mobility.



Large and Forceful Movements

Naomi has large and forceful movements which worsen when she is excited, anxious, or working very hard. She has injured herself and broken equipment in the past. Specifically, Naomi tended to 'stand' in her wheelchair, causing extreme pressure in her feet, at the pelvic belt, and behind her head. As a result, she had developed pressure injuries at the bony prominence of her ankles and on top of her big toe which required wound care. She wears socks, AFOs and shoes and her feet were secured to the footplates with shoeholders and ankle and toe straps. The pelvic positioning belt needed to be snug to control her posture and her hip extension led to pressure (seen as dark pigmentation) where this component contacted her anterior pelvis. Finally, pressure and sheer forces between the posterior head and head support had led to Naomi losing a large area of hair on the occipital area of her head.

Due to her large and forceful movements, Naomi required constant repositioning, and did not remain in alignment with the Head Array, causing difficulty in driving the power wheelchair.

Enter Dynamic Seating

Because of these issues, a Seating Dynamics Dynamic Rocker Back interface (DRBi) and Dynamic Footrests were recommended for both her manual and power wheelchairs. Dynamic Head Support Hardware was not recommended at that time, primarily due to compatibility concerns with the Adaptive Switch Labs (ASL) Head Array she used to drive her power wheelchair.

Naomi's Mom, Stephanie, states that Dynamic Seating really helped, especially at that time because tone management wasn't working well, and Naomi was trying different medications. Dynamic Seating reduced the forces Naomi exerted, improving control the power wheelchair, eliminating injury, reducing equipment breakage, increasing comfort, and maintaining her position within the seating system. Stephanie noted a significant decrease in the need to reposition Naomi, as well as significant improvement in her position throughout the day. Stephanie also noted less required equipment adjustments and repairs.

A New Problem

When a new power wheelchair was indicated, Naomi and her family were interested in a power standing feature. Naomi was growing and it was very difficult to place her in a stationary stander. Unfortunately, a power stander

Quick Notes

Challenges:

- ✓ Client injury
- ✓ Equipment damage
- ✓ Decreased comfort
- ✓ Losing alignment
- ✓ Decreased function: PWC driving

Areas affected:

- ✓ Back
- ✓ Feet
- ✓ Head

Equipment Used:

- ✓ [Dynamic Rocker Back](#)
- ✓ [Dynamic Footrests](#)
- ✓ [Dynamic Head Support](#)
- ✓ [Permobil F5 Power Wheelchair](#)
- ✓ [Adaptive Switch Labs \(ASL\) ATOM Head Array](#)

cannot be used with any Dynamic Back or Dynamic Footrests. Dynamic Seating was an important part of her seating strategies.

A Custom Solution!

After discussing the pros and cons of continued use of Dynamic Seating or pursuing a standing wheelchair, the team moved ahead with the standing feature on a new Permobil F5 power wheelchair. Becky, concerned that Naomi would not be able to drive well without Dynamic Seating, contacted Greg Peek, owner and chief designer of Seating Dynamics. Greg custom made an interface to allow his Dynamic Head Support Hardware to work with an ASL Head Array. A prototype was tried at Becky's clinic and Naomi drove very well. Becky noted that the hardware responded well with posterior movement even when Naomi turned her head to turn the power wheelchair.

Results

The team was concerned that Naomi would have difficulty using the Head Array due to movement of the dynamic hardware, however her head remains stable as she presses against the rear pad, allowing her to drive well. The head support moves when she needs it to move, such as when she is excited or anxious, and this force diffusion has been adequate to keep her hips in position so that she stays aligned with the head array for optimal driving.



Stephanie reports that the medical team finally have the Baclofen pump adjusted well and, while this reduces Naomi's resting muscle tone, dystonia is not impacted. The Dynamic Head Support keeps Naomi from rising out of the seat or pushing into the pelvic belt, though she is pushing into the footplates somewhat. The equipment has not broken and rarely needs tightening (every few months). Very exciting – Naomi's hair is growing back now that sheer forces are diffused!



This custom modification is now available to other clients who would benefit from Dynamic Head Support Hardware and use an ASL Head Array.

[Click here to watch a video of Naomi driving!](#)

Stephanie, Naomi's Mom Denver, CO

"We are super thankful that Greg could custom design a solution for Naomi! She is now more independent, more in control, more comfortable and all of this has a positive impact on her mental health and sense of self."

About the Author

Michelle Lange is an occupational therapist with over 38 years of experience and has been in private practice, Access to Independence, for over 19 years. She is a well-respected lecturer, both nationally and internationally, and has authored numerous texts, chapters, and articles. She is the co-editor of *Seating and Wheeled Mobility*: a clinical resource guide. Michelle is a RESNA Fellow and member of the Clinician Task Force. Michelle is a RESNA certified ATP and SMS.