

# Custom Seating for the Active Wheelchair User

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## Introduction

Recently a farmer with a SCI, T-1 paraplegia, 30 years post trauma was denied custom seating intervention. The reviewer for the funding source ruled that his level of independent activity made him ineligible for custom seating. This farmer presents with severe and progressing postural and skin issues. He has history of flap surgeries for sitting induced pressure ulcers. He sits with a severe pelvic obliquity and associated collapsing scoliosis. His spinal deformity is highly unstable, has minimal flexibility towards a corrected posture, but tremendous flexibility in the path of his destructive postural tendency. What little flexibility he has can only be improved to a reasonable degree of tolerance with highly accurate and specific application of asymmetrical forces in a 3-point configuration. Off the shelf cushions have been ruled out due to their inability to decrease the bias of peak pressures at his low ischial tuberosity, support and stabilize improved pelvic alignment, and match his unique body shape. Modular back supports lack adjustability to accurately support his unique body shape in a fashion that optimizes the flexible component of his posture without limiting function or causing skin breakdown.

## Assessment

Clearly his level of activity and independence has not prevented the deterioration of his condition, so it will certainly not be the solution that stops or retards its progression. Further deterioration of his condition is certain, and the end result will likely have serious implications for this farmer's functional mobility. Immobility/inactivity is one of only two independent risk factors for skin breakdown for the person with SCI, the other being moisture at the sitter-support interface. Any decrease in this farmer's ability to remain mobile and active will result in elevated skin risk. As his postural alignment drifts farther from balanced, the mechanical advantage of gravity increases creating torque at his joints leading to more rapid and severe postural collapse ( $\text{Torque} = \text{Force} [\text{gravity}] \times \text{distance} [\text{from the proximal joint}]$ ). No matter how much he moves, his risk is not sufficiently mitigated if, after moving, he rests back into his collapsed posture. His livelihood is at serious risk.

Several factors are at play in this true scenario. The reviewer has a preconceived notion of where and how custom seating should be applied. He likely envisions and limits custom seating to the adolescent with CP that shows similar postural deterioration, but is essentially immobile and dependent for care. He may also have an image of traditional custom seating that does not pair well with the needs of an active user. These preconceived notions block access to recent innovations in custom seating that broaden the application of custom beyond its traditional boundaries.

In defense of this ruling, custom seating has fallen victim to a narrow band of application due the limitations associated with traditional custom seating. Full contact traditional custom seating has had limited application for the active individual who is at high risk for skin breakdown and postural deterioration, due to its inability to address:

1. Skin protection during movement.
2. Skin protection in the presence of positioning error.
3. Change in condition over time due to weight loss and tissue atrophy.
4. Heat and moisture.
5. Bulk and weight.

These limitations have resulted in custom seating application being relegated more towards users that are functionally dependent, less active, and lower skin risk.

### **Solution**

Recent advancements in custom seating have resulted in interventions that address the limitations listed above. Use of prosthetic and orthotic principles and advances in materials has led to innovative custom solutions that not only have the capacity to support the active user, but also better address the postural control and growth challenges presented by the traditional custom seating user.

The farmer mentioned above can be supported by a custom seating system that can accurately and aggressively control and stabilize his posture, yet promote mobility, off-load at-risk bony prominences, manage heat and moisture, be thin and low enough in profile to optimize his relationship to his manual wheelchair for mobility, and be adjustable to address change over time. To not do so would certainly result in rapid and further deterioration of his condition, further limiting mobility and elevating risk for skin breakdown. His health and livelihood are precariously close to a complete loss.

### **Closing**

Advancements in emergency, medical, and pharmacological care has significantly reduced mortality related to disability. People are living long lives with severe physical limitations. As these people age with their disabilities, their skin becomes less tolerant of the supportive forces of pressure and shear, and heat and moisture at the sitting interface magnifies the risk for pressure ulcers. Additionally, these individuals typically experience postural deterioration leading to asymmetrical postures and related impediment to functional mobility. It is the seating and mobility professional's job to identify these changes and intervene accurately and aggressively. Intervene early and the outcomes will be more meaningful and lasting.

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