



THE ROLE OF WHEELCHAIR SEATING INTERVENTION IN WOUND HEALING: A CASE STUDY

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Pressure injury prevention and healing requires a team approach. Thorough seating assessment and intervention plays a critical role in the overall wound care plan, including prevention and healing of pressure injuries.

THE CLIENT

The client is a 60-year-old, previously independent male who was admitted to an acute care hospital due to a fall at home, resulting in a cervical spinal cord injury (C4 ASIA A tetraplegia). He is status post anterior cervical discectomy and fusion at C3-C5. He presented to Gaylord Specialty Healthcare, a long-term acute care hospital (LTACH) in Wallingford, Connecticut for rehabilitation with a stage II pressure injury at his coccyx. We anticipated this injury to be associated with prolonged bed rest and decreased repositioning, as well as decreased use of pressure relief strategies.

Other diagnoses include neurogenic bowel, neurogenic bladder, neuropathic pain, spasticity, orthostatic hypotension, staphylococcus aureus pneumonia, acute mechanical respiratory failure due to neurologic deficits, atelectasis, hypoxia, status post tracheostomy, and status post percutaneous endoscopic gastrostomy. Significant past medical history includes alcohol abuse, elevated hemoglobin A1c, diverticulosis and sebhorreic keratosis.

THERAPY ASSESSMENT

Upon initial physical and occupational therapy assessment, the client presented with:

- Bilateral scapular and cervical pain rated 6/10 on the Numeric Pain Rating Scale.
- Upper and lower extremity spasticity.
- Gross 2- to 3-/5 shoulder strength, with decreased strength distally.
- 0-1/5 lower extremity strength.
- Impaired sensation.
- Trunk weakness.
- Poor balance.
- Decreased activity tolerance.

Posture was notable for partially reducible moderate thoracic kyphosis, partially reducible mild to moderate left thoracic scoliosis, partially reducible moderate posterior pelvic tilt, and anterior head position.

The client was non-ambulatory and dependent for all mobility including bed mobility, transfers via mechanical lift and manual wheelchair mobility.

INITIAL WOUND ASSESSMENT

Upon arrival to Gaylord Specialty Healthcare, approximately one and a half months following his injury, the client's stage II pressure injury to his coccyx measured 1.2cm x 0.6cm x 0.1cm. There was a scant amount of serosanguinous drainage. At that point in time, the wound care team placed orders for the client to spend no more than two hours out of bed at a time, on a specialty cushion, no more than three times per day, and for turning and repositioning every one to two hours when in bed. The wound was irrigated with normal saline and then dressed with Nystatin powder and silver antibacterial gelling fiber daily, as well as Venelex ointment at night.

INITIAL SEATING RECOMMENDATIONS

The client's primary physical and occupational therapists at Gaylord first provided him with a manual tilt-in-space wheelchair and an air-filled seat cushion, on loan to him during his inpatient stay. Fair sitting tolerance was noted, with the client able to sit for no more than 30 minutes at a time, no more than two times per day. He reported generalized pain, rated 4/10 on the Numeric Pain Rating Scale, and occasional dizziness when sitting for longer periods than noted above. He did note decreased use of the manual tilt

PRESSURE MAPPING SHOWED MILD AREAS OF INCREASED PRESSURE THROUGH THE BILATERAL ISCHIAL TUBEROSITIES; NO SIGNIFICANT AREAS OF INCREASED PRESSURE WERE NOTED THROUGH THE COCCYX.

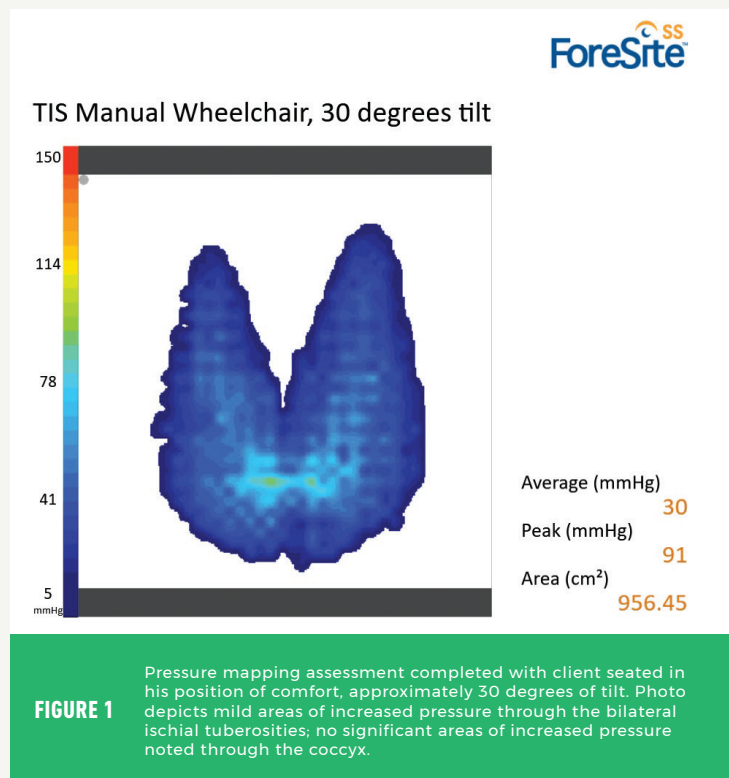
function by caregivers at this facility. Pressure mapping assessment was completed with the client seated in this wheelchair, in approximately 30 degrees of tilt (which was the client's position of comfort) to ensure adequate offloading in the seat system (see Figure 1). Pressure mapping showed mild areas of increased pressure through the bilateral ischial tuberosities; no significant areas of increased pressure were noted through the coccyx.

SEATING CLINIC ASSESSMENT

The client's physical and occupational therapists referred him to the seating clinic for assessment for the most appropriate seating system approximately two weeks following his admission to Gaylord Specialty Healthcare. The client was evaluated, and a mid-wheel drive power wheelchair with power posterior tilt, recline, seat lift, and elevating/articulating legrests was prescribed. The client was able to trial the device using a left-sided proportional joystick with U-shaped joystick handle, with good results noted.

The client was also provided with a loaner mid-wheel drive power wheelchair for the duration of his inpatient stay at the LTACH. He was educated regarding the need for frequent pressure relief and distribution, including use of the power seating functions. A position of comfort and optimal pressure

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relief was programmed into the wheelchair's memory, including a combination of 35 degrees of posterior tilt with 120 degrees of recline. The client was recommended to stay in this position for at least two to three minutes per half hour up in the chair as this is cited best for enhancing skin perfusion.^{1,2} Pressure mapping was completed with the client in this position, with excellent results noted (see Figure 2). No areas of increased pressure noted.

SEATING SYSTEM USAGE

The client's physical and occupational therapists as well as the seating clinic specialist monitored the client daily for carryover of use of the power seat functions, as well as for sitting tolerance and comfort. Within two weeks of using the power wheelchair, the client was regularly sitting up for at least two hours at a time, two to three times a day, with good comfort and sitting tolerance reported. The client did often utilize a pre-programmed position, which provided optimal pressure relief and comfort in the power wheelchair, but he only chose this position one time within a two-hour time span, as opposed to the two to three times recommended to him. At this time, the wound care team re-assessed the client's coccyx wound, which measured 0.8cm x 0.3cm x 0.2cm, showing some healing. A scant amount of serosanguinous drainage continued to be noted; treatment of the wound remained the same. Also of note, the client was turned and repositioned every one to two hours while in bed, as documented by the nursing staff.

FURTHER RECOMMENDATIONS

The client's physical and occupational therapists, in collaboration with the seating specialist, recommended the use of a timer or alarm to encourage pressure relief at the recommended frequency. The client was trained and proficient with the use of voice activation on his tablet, so this was used to begin a timer when he was seated in his wheelchair. The nursing staff was also educated regarding the recommendation for use of the timer when the client was seated in his wheelchair to facilitate reinforcement from caregivers when the therapists were not present. The client was monitored



Power Wheelchair - 35 Degrees Tilt, 120 Degrees Recline

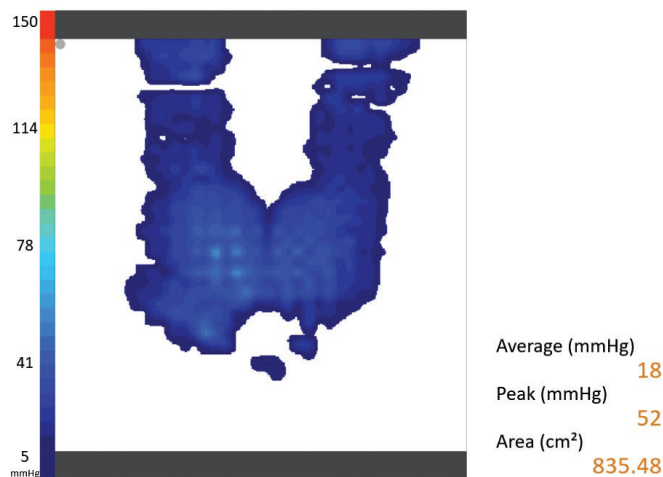


FIGURE 2

Pressure mapping assessment completed with client seated in a loaner mid-wheel drive power wheelchair, in the recommended position of offloading consisting of 35 degrees of posterior tilt with 120 degrees of recline. Photo depicts good pressure relief throughout, with no areas of increased pressure.

APPROXIMATELY ONE MONTH FOLLOWING THE PREVIOUS RECOMMENDATIONS TO UTILIZE THE TIMER, THE WOUND WAS HEALED. THE WOUND ALSO REMAINED HEALED UPON A TWO WEEK FOLLOW-UP.

over a two-week span and, on average, he performed his weight shifts at least two times within the two-hour time span that he was out of bed. He continued to get out of bed two to three times per day.

WOUND RE-ASSESSMENT

The client received weekly wound care follow ups during his LTACH stay. Approximately one month following the previous recommendations to utilize the timer, the wound was healed. The wound also remained healed upon a two week follow-up. The client continued to follow the recommendations for optimal pressure relief and demonstrated excellent tolerance for sitting in his mid-wheel drive loaner power wheelchair. Per the client's report during the two-week follow-up, his pain was improved when out of bed, rated 1/10 on the Numeric Pain Rating Scale.

DISCUSSION

The client had favorable results with regard to wound healing with a collaborative team approach. During his inpatient stay at Gaylord Specialty Healthcare, he received frequent wound care follow-ups, daily nursing care, and ongoing physical and occupational therapy treatment as well as visits to the seating clinic, as appropriate. Not only did the client's stage II pressure injury fully heal during his inpatient stay at the LTACH, but there was no report of recurrence during his stay. Moreover, with the assistance and occasional prompting of caregivers in the hospital setting, as well as use of a timer or alarm as a reminder, the client was able to carryover the recommended strategies for optimal pressure relief. The power seating was programmed to assume a preset position of 35 degrees of posterior tilt and 120 degrees of recline, which allowed the client to achieve this position without difficulty and with increased comfort. Along with the healing of his stage II pressure injury to his coccyx, the client had decreased generalized pain, was able to tolerate getting out of bed for a duration of two hours, two to three times per day, and thus was able to increase his participation in his daily activities, including his physical and occupational therapy programs.

Pressure injuries can be difficult to heal, and there are many intrinsic and extrinsic factors that can contribute to healing or lack thereof. Other intrinsic factors that may have contributed, but were not a primary focus in the study of this specific client, include age, nutrition, chronic illnesses, skin conditions and oxygen delivery.³ In the case of this client, a collaborative approach where extrinsic factors including shearing forces, pressure, and friction were controlled, allowed the patient to experience increased comfort,

increased out of bed tolerance and pressure injury healing. Follow up of the client in the home setting upon receiving his custom mid-wheel drive power wheelchair would be recommended in order to ensure carryover of the recommended strategies as well as prevent further occurrence of pressure injury given his many risk factors.

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