Technology Improving Spinal Cord Injured Outlook: Our Experience with the Diaphragmatic Pacing System

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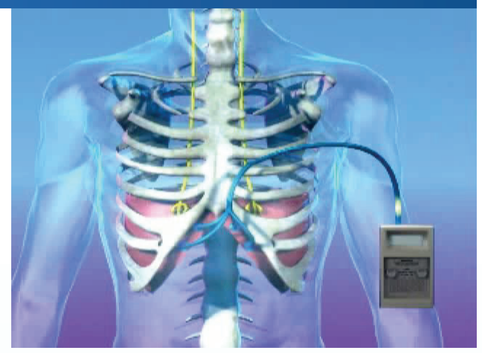
Introduction

Technology is always changing and that is a certainty. Integrating it into a population in a cost effective manner is always a challenge. One of the benefits of technology is the power to improve quality of life for those who are spinal cord injured. Five years ago in 2009, our rehabilitation team had the opportunity to partner with a young spinal cord injured patient with a newly implanted diaphragmatic pacer device (DPS). Since then we have had several patients with chronic spinal cord injury with this technology. The following poster will review the literature related to this device in spinal cord injured patients, explain our experience utilizing this device, and demonstrate how we evolved to make the process incorporate an effective discharge plan. As our experiences have resulted in a discharge destination of return home with family caregivers, it has been paramount that our staff has a breadth of knowledge regarding this device in order to provide comprehensive caregiver training and discharge planning.



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Review of Literature

Over the last couple of decades, the process for electrical stimulation to facilitate the diaphragm has evolved from a delayed open chest procedure to a more immediate post-injury laparoscopic procedure [1-2]. Success rates for weaning from the ventilator for periods of time with the pacing system continue to rise .In the literature, it has been documented that there are several physiological benefits of a pacing system over a ventilator including: decreased rate of infection, increased lung inflation, conversion of fast twitch muscle fibers to slow twitch, and increased survival rates[2-3]. Diaphragmatic pacing has contributed to functional advances including: return of olfaction, decreased caregiver burden, increased speech quality, and increased return to vocation/education. Across the United States, diaphragmatic pacing is resulting in increased quality of life and potential for disposition change as many patients can be removed from the vent for significant periods of time.

Case Studies

- Case #1 was a 56 year old with a 25 year history of quadriplegia. He developed pneumonia with multiple complications which rendered him ventilator dependent. Due to his hemodialysis facility's inability to accept ventilator dependent patients, he was unable to return to his home setting with assistance; he then resided in an LTACH. His goal of ventilator weaning during day hours would allow him to return home and utilize the pacing system during outpatient dialysis treatments.
- Case #2 was a 26 year old with a 10 year history of ventilator dependent quadriplegia. He resided in a long term care center due to his lack of assistance and care needs. It was anticipated that his family would be able to care for him without additional assistance if he could achieve pacing during day hours.
- Ms. C was a 26 year old with a 3 year history of ventilator dependent quadriplegia. Her goal was to attend college and eliminating the need for a ventilator would allow her the caregiver availability and accessibility to attend college.

Interventions

Post-surgical Huddle: As our facility allows for the opportunity to follow our patients from the acute setting to the inpatient rehab setting, a communication huddle was implemented regarding the care of the patient post-operatively prior to inpatient rehab admission. This allows for pertinent medical, functional, and goal oriented information to be discussed to optimize rehab course in a time-effective manner.

Patient Teaching Record: A formal, interdisciplinary teaching record was devised and approved at an administrative level. This delineates all aspect of patient/caregiver knowledge and psychomotor needs for the care of the patient .

Development of Staff Competencies: Competencies were developed based on the DPS manufacturor's manual, the clinical expertise, and prior experiences with the pacing system. A demonstration model was obtained to practice the motor skills of managing the pacer system and to allow return demonstration of above competency items.

Get Well Network video: This in-house educational video was created and placed in a patient's order set in both acute and rehab settings. This comprehensive video is geared toward the patient and caregiver and explains the medical /surgical course and expectations of care of the DPS system post discharge.

Outcomes

Staff educational needs, patient education resources, and delineation of interdisciplinary team roles were identified and developed for patients transitioning from mechanical ventilation to a diaphragmatic pacer system. Resources developed included an interdisciplinary patient teaching record as part of the medical record, a video was developed on hospital-wide patient education network, formal therapist and nursing competencies, and post-surgical DPS huddle to anticipate patient needs and coordination of care based on patient-specific goals. In the first and second case studies, the patient's discharge destination was transitioned from an institutionalized setting to a home setting. In the third case, in which the patient was homebound, the patient achieved community reintegration in a college setting.

Conclusion

Studies have shown the DPS to decrease and or eliminate time spent with mechanical ventilation which decreases caregiver burden and may help to facilitate non institutionalized dispositions. Due to the impact that this technological device can achieve, change in disposition and/or functional potential has resulted in unique goal setting and discharge planning. Significant physiological, functional, and quality of life changes are evident, even in the presence of chronic spinal cord injury. The rehab team improved the educational process for those chronic SCI patients using DPS at our hospital.

References

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