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Title

Objective Measurement of Adherence with Splint Use After Burn Injury

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INTRODUCTION

The prescription of splints (orthoses) to help protect vulnerable structures and maintain range of motion after skin grafting surgery is an integral part of burn recovery. The degree to which a patient adheres to wearing a prescribed orthosis is believed to play a major role in outcome. Oftentimes however, an orthosis is uncomfortable or undesirable to wear thus affecting a patient's adherence. At our burn center, while the patient is in ICU, orthosis application and wear is heavily dependent on staff. During care on the acute ward, the responsibility is shared by family and staff. In outpatient (OP), the patient and caregiver are primarily responsible for orthotic wear adherence. The purpose of our study was to use temperature sensors to objectively determine patient adherence with splints during the three different stages of burn recovery.

MATERIALS & METHODS

INCLUSION: Patients with skin grafting surgery to the hands secondary to burn injury, unilateral or bilateral, who were prescribed a hand splint during recovery were included in the analysis.

MATERIALS: A ThermoChron iButton was implanted into their orthosis when it was fabricated and prescribed for wear. This sensor detected higher temperatures when the orthosis was donned and lower temperature when it was off the patient and left in room air, thus providing an objective means to determine how often the orthosis was being worn. Validation was done for each sensor to ensure this association was objective.

METHODS: Neither patient nor providers were blinded to this study. Data was analyzed using descriptive statistics and one-way ANOVA.



RESULTS

OBJECTIVE: Data was recorded for an average of 44 days for 16 patients using 24 splints during three continuous phases of care: ICU, acute ward, outpatient.

Phase of Care	ICU	Acute Ward	Outpatient
Average Daily Wear (Hours)	10.41	7.49	5.94
Hourly Compliance (Hours Worn/ Hours Prescribed)	102%	87%	71%
Daily Compliance (Days Worn/ Days Prescribed)	97%	92%	80%

Patients in ICU were prescribed to wear splints 10.2 hours and wore them on average 10.4 hours per 24-hour period, resulting in a 102% hourly compliance. During acute ward care, patients were prescribed to wear splints for 8.7 hours and wore them on average splints 7.5 hours for 87% hourly compliance. When the patients were receiving care as outpatients, they were prescribed to wear splints 8.6 hours, and wore them on average of 5.9 hours (71% hourly compliance).

There was a statistically significant difference ($p < .05$) in orthotic adherence (hourly compliance) between the different phases of care.

SUBJECTIVE: Patients or their caregivers were asked to rate their compliance with splinting at 8 weeks after injury using a 1-4 Likert scale. All but one patient reported the highest level of compliance and described use "as instructed by therapist".

CONCLUSIONS

This is the first study to objectively measure patient adherence with orthosis wear over the course of burn recovery after skin grafting surgery. Results show high level of adherence in ICU with a statistically significant decline in adherence as patient and caregiver assume more responsibility. While this study was not blinded, the persistence of declining adherence despite knowledge of supervision further highlights potential areas for improvement in patient education during transition of care. Orthotics may play a role in the long-term recovery of function after injury (i.e. grip strength, range of motion) so ensuring compliance is maintained throughout all stages of care is essential. Burn teams need to work with patients to understand the barriers that exist for long-term orthotic use after skin grafting surgery.



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