Drop Out Casting: Reducing Contractures While Increasing Function

**Author and Co-authors:**
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University of Miami, Jackson Memorial Hospital Burn Center, Miami, FL

**Objectives:**
Upon completion of the lecture, attendees should be better prepared to:
- Describe how to produce and fit a drop out cast
- Discuss how to fabricate, measure outcome, and make adjustments for other needs
- Provide an alternative way of treatment that is not expensive, it is reusable, least time consuming, and durable

The purpose of our ABA verified burn center project, was to create a drop out cast that would eliminate guarding and non-use of a serial casted extremity.

A drop out cast has two components. The first is a full contact circumferential cast on the proximal portion of the joint. This we named the anchor. The second component is called the projection and it stems from the anchor. The projection is created out of the same cast material (plaster or fiberglass) and is connected to the anchor forming one solid structure.

The projection limits only one direction of the joint movement - the direction that moves further into the position of contracture. So it maintains the submaximal stretch of the contracted tissue while encouraging further stretch of the contracted tissue. Both therapist and patient can perform both passive and active ROM out of the direction of contracture.

By freeing up the joint in this way, the patient is able to use the extremity for ADLs or to normalize gait. So, freeing up the joint to move in the desired direction facilitates both stretch for the tissue and function of the patient.

We have mostly used it on the wrist, elbow, ankle, and knee designing each drop out cast differently depending on what we are attempting to achieve. If we are attempting to gain extension the projection is placed anteriorly. This allows the patient to extend actively or passively but does not allow active or passive flexion. If we are attempting to gain flexion the projection is placed posteriorly. This allows the patient to flex actively or passively but does not allow active or passive extension. As the contracted tissue on prolonged stretch lengthens the joint gains movement in the opposite direction.

Not only does this encourage movement, it eliminated the fear and anxiety of movement. The cocoon nature of the cast appears to make the patient feel safe and not threatened by movement even when an external force being applied. Furthermore, the cast is not easily removed which promotes compliance. Patients are unable to simply remove the cast due to discomfort or reports of "I needed a rest" as is often the case with splints.

Unlike standard serial casting, while in a drop out cast, ROM improvement can be documented using goniometry. Drop out cast allow the burned extremity to be continually evaluated for edema. Wound care can be performed. Exposed areas of extremity can be moisturized to protect intact skin and wound borders. Patients can use pressure garments on exposed areas or other means of scar management such as gel pads. Most importantly, the patient can still be active, be mobile and perform their ADLs. Even on ankles, full unlimited activity is tolerated by strength and durability of this type of casting.

Optimal time to leave a drop out cast on is between three and five days. Once removed, it can be reused as a transition to splinting by bivalving it. Drop out casts can also be reused in their original way if needed for further treatment.
From our experience creating and using drop out casts for the last 12 years, they appear to offer durability, comfort, psychological support, patient independence all while stretching contracted tissue as serial casting has always done. We are always looking for better ways to do what we love doing and we think this is one of them.

Disclosure:

Angel D. Alvarez - No Relevant Financial Relationships to Disclose
Sondra Ulbrich - No Relevant Financial Relationships to Disclose
Minimizing Contractures with Burn Hands: One Center’s Experience

**Author and Co-authors:**
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**Objectives:**
Upon completion of the lecture, attendees should be better prepared to:
- Understand the value of early structured burn therapy hand program and how it relates to burn functional outcomes
- Develop an understanding that successful occupational therapy burn rehab program is dependent on team centered approach

**Abstract:**
According to Burn Model System Summary Report from 1993-2015, 65.5% of burns sustained are located on hands and 41.9% of grafts are located on hands. Since more than one third of patients with a major burn injury develop contracture at discharge, it is important for therapists to provide daily passive movement for elongation of soft tissue pre/post skin grafting to prevent contracture. (Schneider et al, 2006) Hand function to preburn hand skill level is a goal of the patient and burn rehabilitation team. Due to its link to functional outcomes and patient’s quality of life after burn injury, hand function can influence ADL skills and ability to return to work. Literature identifies that following burn injury, ROM exercises and burn therapy minimizes development of contractions. However, the literature has not identified the time and type of structured burn hand rehabilitation program to implement to decrease potential of contractures.

The purpose of this presentation is to describe the Occupational Therapy burn rehab hand program implemented at one burn center to minimize development of contractures in hands with an occurrence rate of less than 1%.

This retrospective chart review of from January 2015 to January 2016 identifies the hand function at time of admission and at time of discharge. Assessment of preburn hand function was performed and used as comparison for motion at discharge. Inclusion criteria included: patients 12 years and older; deep partial and full thickness burns that required surgical intervention; and presence of Occupational Therapy services. Over 90% of Occupational Therapy intervention was initiated within 48 hours of admission to burn center. While the program focused on traditional aspects of burn rehabilitation of edema reduction, range of motion, patient education, the difference was the frequency of Occupational Therapy services with initiation of elongation techniques with ongoing reassessment during treatment. As quickly as medically appropriate, the program focused on upper limb and core movement, endurance and cardiovascular activities, which enhanced preborn hand movement by the time of discharge.

Implementation of this program resulted in no graft loss and active hand function at discharge within functional limits. A discussion of this structured burn hand program will be provided. This program resulted in no graft loss or disruption of dressings and preborn hand movement was obtained at the time of discharge, with less than 1% of the patients exhibiting minimal limitations. While this program facilitates return to activities, it also fosters a committed, knowledgeable Occupational Therapy staff, burn team, team communication, and well identified and communicated guidelines.

**Disclosure:**
- Mamie Clark - No Relevant Financial Relationships to Disclose
- Sandra Fletchall - No Relevant Financial Relationships to Disclose
- William L. Hickerson, MD – Speaker: Medline
Author and Co-authors: Greta M. Rucks, OTR/L; Rachel Gonzalez, DPT
Orlando Regional Medical Burn Center, Orlando, FL

Objectives: Upon completion of the lecture, attendees should be better prepared to:
- Describe the research backing early mobility in the ICU setting
- Discuss Early Mobility Protocol established at ORMC
- Describe education of staff for Early Mobility Initiative
- Explain data collected pre Early Mobility Initiative and post Early Mobility Initiative
- Discuss how Early mobility affected LOS in ICU

Abstract: The purpose of initiating the Early Mobility Protocol in the trauma ICU was to provide a systematic screening to determine if patients are medically appropriate to be mobilized out of bed and to increase the number of patients getting out of bed each day. This protocol was developed based on the existing literature which links early mobility to decreased length of stay in the ICU setting, decreased ventilator days, decreased incidence of ICU psychosis, and improved discharge disposition to home with overall improved functional outcomes. It was also designed to incorporate mobility as a standard of care in the ICU setting.

The process was initiated by taking surveys of the nurses in the burn and trauma ICU to identify perceived barriers to mobility. Next the early mobility screening tool was developed. The tool was then integrated into the critical care order set which showed physician support for the initiative. The nursing staff was educated regarding how to use the screening tool including identifying the appropriate phase for each patient based on a series of critical checks. Both the nursing staff and the physical and occupational therapists working in the burn and trauma ICU phased each patient in the electronic medical record. If the patient met criteria of being medically appropriate to get out of bed that day then the patient was mobilized either by the nurses or therapy staff and documented.

The implementation of the Early Mobility Protocol resulted in improvements in identifying those patients who are medically appropriate for getting out of bed and improving the numbers of patients mobilized in the critical care setting. It also resulted in decreased length of stay in the ICU setting, decreased ventilator days, decreased incidence of ICU psychosis and improved discharge disposition to home as well as improved functional outcomes.

In conclusion the initiation of the use of the Early Mobility protocol was a success in the burn and trauma ICU. It has not only provided positive outcomes for our patients but has also improved multidisciplinary collaboration and increased the autonomy of ancillary staff and nurses to make decisions regarding the progression of mobilizing patients in the critical care setting.

References and Resources
- Schweickert et al. Early physical and occupational therapy in mechanically ventilated, critically ill patients: a randomized controlled trial
- Whole body rehabilitation: interruption of sedation and PT/OT
- Early mobility safe, improved functional outcomes, shorter duration of delirium, increased ventilator free days
- Morris et al. Receiving Early Mobility During an Intensive Care Unit Admission Is a Predictor of Improved Outcomes in Acute Respiratory Failure
- Reduction in index hospitalization length of stay but also, with this report’s data, may possibly be associated with a reduction in readmissions
- Morris et al. Early intensive care unit mobility therapy in the treatment of acute respiratory failure
- Early mobility feasible, safe, did not increase cost, and was associated with decreased ICU and hospital LOS in survivors
- Engel et al. ICU Early Mobilization: From Recommendation to Implementation at Three Medical Centers
Compared three different centers with early mobility programs
Early mobility and rehabilitation of critically ill patients is associated with significant improvements in both short and long term physical and neurocognitive outcomes in ICU survivors
-Balas et al. Implementing the Awakening and Breathing Coordination, Delirium Monitoring/Management, and Early Exercise/Mobility Bundle into Everyday Care: Opportunities, Challenges, and Lessons Learned for Implementing the ICU Pain, Agitation, and Delirium Guidelines
Successes achieved by support and involvement of a multidisciplinary team, including administration and physicians
Initially focus was on just delirium and early mobility, however found out they needed to significantly revisit SATs and SBTs
-Lord et al. ICU Early Physical Rehabilitation Programs: Financial Modeling of Cost Savings
Found that early rehab can generate substantial net cost savings for hospitals while improving patient outcomes

Disclosure:
Greta M. Rucks - No Relevant Financial Relationships to Disclose
Rachel Gonzalez - No Relevant Financial Relationships to Disclose
Burn Injuries with Pre-existing Mental Disorders: Alternative Treatment Technique

**Author and Co-authors:** Sandra K. Fletchall, OTR, CHT, MPA; William L. Hickerson, MD
Regional One Health, Firefighter's Burn Center, Memphis, TN

**Objectives:**
Upon completion of the lecture, attendees should be better prepared to:

- Increase knowledge of an alternative burn rehabilitation treatment technique to assist with muscle tone reduction
- Understand patient criteria for use of the alternative burn treatment technique

**Abstract:**
Following a burn injury, literature has reported that preexisting symptoms or diagnosis of anxiety, ADHD and/or alcohol/drug dependence has been noted to exhibit: increase BP, HR response; potential of longer wound time; potential for poor compliance with the burn recovery program, and social issues related to placement at discharge. In addition, these types of patients have been noted by burn rehabilitation therapist as exhibiting poor tolerance for movement and/or elongation; frequently describing everything as “pain”.

With the poor tolerance for movement, it was noted by the burn therapists, the patients exhibited increase muscle tone, further limiting ability to resume functional activities and opportunity to be moved through elongation of scar and soft tissue.

Burn therapists, in this center, explored an alternative treatment treatment frequently used with pediatric patients with sensory processing disorder to assist with muscle tone reduction and minimize over response to stimuli. The technique, use of weighed cover, can be implemented in the ICU, acute care, inpatient rehabilitation or outpatient program. This technique does not require additional use of pain or anxiety medication and has been noted to begin to assist the patient to resume control over their environment and therapist improved ability to obtain elongation.

Discussion will be presented of the rational for use of a weighed cover, patient criteria, implementation of the treatment technique and outcomes. This is a treatment technique that can be safely implemented and is presently continued to be used with appropriate patients. This treatment technique can increase the burn therapist’s repertoire of feasible treatment techniques as they provide services to all patients regardless of their preexisting symptoms prior to the burn injury.

**Disclosure:**
Sandra K. Fletchall - No Relevant Financial Relationships to Disclose
William L. Hickerson – Speaker: Medline
### Abstract:

Introduction/Background: Burn injuries can impact an individual’s quality of life and their ability to return to meaningful occupations, including employment and leisure activities. It is recognized in the Occupational Therapy practice and literature that a person’s overall health and wellbeing correlates with the person’s meaningful occupation(s) (Cacciacarro & Kirsh, 2006). For burn survivors, the burn sequela is not only expressed by physical appearance; it can also have a significant impact on their lifestyle and their ability to return to their daily activities. There is limited research on studies that focuses on the impact a burn injury can have on one’s identity in regard to their meaningful occupation. Therefore, the purpose of this study is to identify types of meaningful occupations that were affected following a burn injury, and how it has affected an individual’s identity in society. Additionally, the researcher will be investigating barriers to return to meaningful occupations and if burn survivors are engaging in new meaningful occupation(s) as a result of their burn injury.

Methods/Design: The inclusion criteria included a) participants who sustained a hand burn with or without burns to the wrist, forearm, elbow, and proximal portion of arm after May 1, 2015, b) any depth of burn, c) must be between the ages of 16-65 years old, d) who are currently receiving outpatient Occupational Therapy Services at North Carolina Jaycee Burn Center in Chapel Hill, North Carolina. Participants were excluded if they a) were below the age of 19 years and above 65 years old, b) didn’t receive Occupational Therapy services at NC Jaycee Burn Center, c) sustained burn injuries that did not involve the hand, d) did not speak English, and e) who had open wounds. Participants were asked a series of questions about their meaningful occupations prior to and after their burn injury in either an inperson or telephone interview. Additionally, the researcher measured range of motion (ROM) of the affected joints, grip strength, and conducted a medical chart review to retrieve additional information about the participant’s burn history, prior level of functional status, and basic demographic information.

Results/Findings: Research in progress at time of submission.

### Disclosure:

- **Hayley G. Mata** - No Relevant Financial Relationships to Disclose
- **Ruth Humphry** - No Relevant Financial Relationships to Disclose
- **Sydney J. Thornton** - No Relevant Financial Relationships to Disclose
- **Heather S. Dodd** - No Relevant Financial Relationships to Disclose
- **Shelley Sehorn** - No Relevant Financial Relationships to Disclose
- **Mark Prochazka** - No Relevant Financial Relationships to Disclose
- **Bruce A. Cairns** - No Relevant Financial Relationships to Disclose
A Prospective Study on Pressure Garment Therapy and Scar Outcomes: A Patient Centered Approach

Friday, November 4
11:30 - 11:45 am

Author and Co-authors:
Cassandra Rush, PT; Jill Comstock, OTR; David Roggy, RN; Rajiv Sood, MD
Richard M. Fairbanks Burn Center, Eskenazi Health, Indianapolis, IN

Objectives:
Upon completion of the lecture, attendees should be better prepared to:
- Examine how patient satisfaction with burn scars change over time with the use of custom compression garments
- Recognize how garment wear time impacts patient reported scar outcomes

INTRODUCTION: Pressure therapy has been a long standing treatment tool in the management of burn scars. Patients are often encouraged and educated by rehabilitation professionals to incorporate pressure garments into their daily routine to minimize hypertrophic scars, decrease itch, and improve scar appearance. The majority of studies to date utilize clinician based assessments to determine the effect pressure garments have on scars with minimal studies that include the perspective of the patient and their satisfaction with this treatment method. This study seeks to assess the patient scar experience for the first year following a burn injury and determine the impact pressure therapy has on patient scar satisfaction. This study will also evaluate patient adherence with custom compression garment wear recommendations and the correlation between garment wear time and patient reported scar outcomes.

METHODS: This ongoing IRB approved prospective study collecting scar outcome data from adult patients treated at the Richard M. Fairbanks Burn Center who underwent excision and autografting beginning in December 2014. All patients received two sets of custom compression garments (CPG) every 3 months. These were measured and fit by Burn Therapists and exert approximately 22-28 mmHg. Patients were instructed to wear CPG 23 hours daily. These CPG were issued free of charge to all patients treated at this facility regardless of participation in the study. The average time between the last grafting surgery and fitting was 29 days. Patient and observer scar assessment tool (POSAS v.2) was administered prior to initiation of CPG, then reassessed at 6 weeks, 3 months, 6 months, 9 months and 12 months following initiation of CPG. The participants were asked to track and self-report their average weekly wear time of their CPG.

RESULTS/FINDINGS: To date, the study has enrolled 75 patients (male = 52; female = 23) with 84 measured sites. In the evaluation of early data, a correlation was noted with garment wear of fifteen hours or greater per day was a variable that appeared to impact outcomes. The participants were divided into two groups, those that wore their CPGs less than fifteen hours per day (Group A) and those that wore their CPGs 15 hours per day or more (Group B). The POSAS scores were assessed at each time frame, along with garment compliance. As seen in Table 1, all participants demonstrated improvements of their scar satisfaction over time, with Group B consistently reporting better scores than Group A in all categories except pain in the later time frames. Both groups showed an increased average score for the 6 week measure, then a steady decrease in the score with the most drastic decrease from 6 weeks to 6 months (p=.001, Group A=14.2 point decrease, Group B=10.4 point decrease). The patient’s overall opinion of their scar improved the most from the 6 week to 6 month period (p=.0014), with a greater plateau in Group B after 6 months. Itch showed a worse score from baseline to 6 weeks and then decreased until the 9 month report, where group A had an increase in itching. Pain is the only category where Group A reported better outcomes than Group B at the 6 and 9 month time frames. Compliance with garment wear played a large role in the outcomes and overall participant numbers. As the participants became more satisfied with their scars, they began to not show for their appointments. There was a decrease of nearly half from the baseline measures and the 6 week time frame, with continued steady decreases throughout.

CONCLUSION/IMPLICATIONS: In this preliminary report of our early findings we see significant
improvement in self-rating measures of scars, itch, and pain over time with patients who wear custom compression garments. The self-reported scar rating begins to plateau after the 6 month mark with an increase in pain and itch from 69 months. The 12 month period was not analyzed due to a low number of participants. It is apparent from the data that those who wore their garments for a larger part of the day reported more satisfaction with their scar than those who chose to wear their garments for less time.

Table 1: POSAS Scores

<table>
<thead>
<tr>
<th>Time</th>
<th>Group A</th>
<th>Group B</th>
<th>Difference Between Groups</th>
<th>Group A</th>
<th>Group B</th>
<th>Difference Between Groups</th>
<th>Group A</th>
<th>Group B</th>
<th>Difference Between Groups</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline (n=79)</td>
<td>35.6</td>
<td>36.1</td>
<td>-0.5</td>
<td>7</td>
<td>6.9</td>
<td>0.1</td>
<td>5.4</td>
<td>5.4</td>
<td></td>
</tr>
<tr>
<td>6 Weeks (n=41)</td>
<td>41.5</td>
<td>36.4</td>
<td>5.1</td>
<td>7.9</td>
<td>6.9</td>
<td>1</td>
<td>6.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 Months (n=44)</td>
<td>35.4</td>
<td>30</td>
<td>5.4</td>
<td>6.7</td>
<td>5.5</td>
<td>1.2</td>
<td>6.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 Months (n=29)</td>
<td>27.3</td>
<td>26</td>
<td>1.3</td>
<td>5.5</td>
<td>4.9</td>
<td>0.6</td>
<td>4.3</td>
<td></td>
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</tr>
<tr>
<td>9 Months (n=15)</td>
<td>26.1</td>
<td>24.4</td>
<td>1.7</td>
<td>5.6</td>
<td>4.2</td>
<td>1.4</td>
<td>4.6</td>
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The patient assessment is a 60 point scale with the highest number implying the “worst scar imaginable” and the lower number signifying the participant feeling their scar is more like their normal skin. The patient overall opinion, itch, and pain are

Table 2: Participant Garment Wear Time

<table>
<thead>
<tr>
<th>Time</th>
<th># Participants Returned (n=75 total)</th>
<th># Returned Reporting &gt;15 Hour Wear Time (n=40)</th>
<th># Returned Reporting &lt;15 Hour Wear Time (n=35)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 Weeks</td>
<td>44</td>
<td>29 (65.9%)</td>
<td>15 (34.0%)</td>
</tr>
<tr>
<td>3 Month</td>
<td>44</td>
<td>28 (63.6%)</td>
<td>16 (36.3%)</td>
</tr>
<tr>
<td>6 Month</td>
<td>29</td>
<td>17 (58.6%)</td>
<td>12 (41.3%)</td>
</tr>
<tr>
<td>9 Month</td>
<td>14</td>
<td>7 (50.0%)</td>
<td>7 (50.0%)</td>
</tr>
</tbody>
</table>

Disclosure:

Cassandra D. Rush - No Relevant Financial Relationships to Disclose
Jill Comstock - No Relevant Financial Relationships to Disclose
David Roggy - No Relevant Financial Relationships to Disclose
Rajiv Sood - No Relevant Financial Relationships to Disclose
### Author and Co-authors:

<table>
<thead>
<tr>
<th>Teresa A. Geib, OTR/L</th>
<th>Sandra Fletchall, OTR/L, CHT, MPA</th>
<th>William L. Hickerson, MD</th>
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</thead>
<tbody>
<tr>
<td>Regional One Health, Firefighter’s Burn Center, Memphis, TN</td>
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### Objectives:

Upon completion of the lecture, attendees should be better prepared to:

- Discuss and describe the efficacy and importance of burn inpatient rehabilitation as it relates to functional outcomes and discharge to independent living status.

To examine the efficacy of inpatient burn rehabilitation in terms of functional outcomes for patients with admission to inpatient burn rehabilitation. It is proposed that treatment provided in a specialized burn inpatient rehabilitation program will result in greater than or equal to 90% discharge to independent living environment.

This burn center provides a continuum of care from the burn team for individuals with burn injuries including acute care, inpatient rehabilitation and outpatient rehabilitation. According to Pham et al., 15.7% of all burn patients’ are discharged to an inpatient rehabilitation facility. Of those in inpatient rehabilitation, 80% of patients are discharged to independent living. Contributing factors to requiring an inpatient rehabilitation stay included a burn >20% TBSA, mechanical ventilation, older age, range of motion deficits at acute care discharge.

This burn center’s inpatient rehabilitation program will be analyzed by a retrospective chart review from 04/01/15 to 04/01/16 to determine functional status at discharge including discharge placement. Criteria for inclusion in the study: all patients age 12 years of age or greater admitted to the burn inpatient rehabilitation program with a diagnosis of a burn.

Of the 36 admissions to burn inpatient rehabilitation, 32 patients met criteria for inclusion. There were, on average, more males than females; average age of 56; average TBSA of 18%; average length of stay was 24 days. The results indicate 91% discharge rate to independent living environments, with a FIM score of 6 or higher. Other factors analyzed include: time of admission to burn inpatient rehabilitation program, number of surgeries performed and location of burn.

While literature indicates 80% discharge to independent living from general inpatient rehabilitation facilities, a specialized burn inpatient rehabilitation program resulted in a 91% discharge rate to independent living. Limitations of this study: it is a one center review; however it does appear that a continuum of specialized burn rehabilitation care can increase the potential for discharge to independent living.

Discussion will focus on the results of this retrospective chart review, however further work is being obtained from this continuum of burn care team approach.

### Disclosure:

- **Teresa A. Geib** - No Relevant Financial Relationships to Disclose
- **Sandra Fletchall** - No Relevant Financial Relationships to Disclose
- **William L. Hickerson** – Speaker: Medline