Beyond burns: an occupational therapy case study at Shriners Hospitals for Children - Cincinnati

Kristen M. Lohrer

The University of Toledo

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Kristen M. Lohrer

Site Mentor: Patricia A. Sharp, M.S., OTR/L
Faculty Mentor: Alexia E. Metz, Ph.D., OTR/L
Occupational Therapy Doctorate Program
Department of Occupational Therapy
The University of Toledo Health Science Campus
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Abstract

OBJECTIVE. The purpose of this case study was to develop advanced knowledge and skill in the specialized area of pediatric burn care at Shriners Hospitals for Children – Cincinnati (SHC). An intricate synthesis of theory, practice, and evidence was utilized in the development of an occupation-based case study report and presentation, trialing the use of a new modality in burn care and rehabilitation, Kinesio Tape.

METHOD. Three potential case study participants were considered and then one final subject was selected with input from both site and faculty mentors. A four year old female from a Middle Eastern country was evaluated and treated using assessments and intervention techniques novel to the pediatric burn center at SHC, including Kinesio Tape an as adjunct to therapy. Play was suggested as a theoretical model of practice in conjunction with dynamic systems theory and the biomechanical model in order to guide the occupational therapy process. A community outing was used to promote and measure progress in focus areas including volition and range of motion.

OUTCOMES. Progress was made toward specific goals/objectives related to participation in this case study. The participant’s reactions to synthesized occupations and adjunct therapeutic modalities resulted in substantial improvement over the duration of this case study report, which lasted approximately two months, from February 24, 2009 to April 23, 2009.

CONCLUSIONS. A holistic approach to pediatric burn care is not only essential, but possible as demonstrated in this case study report. Occupational therapists must use their professional judgment to trial and assess new modalities, such as Kinesio Tape in a practice area poorly researched. Play as a model of practice in pediatric burn therapy is being proposed to support the development of volition in a population at risk for decreased motivation behaviors.
Introduction

Background Information

At the age of 2.8 years, DK was burned in an explosion from improper ignition of a family barbeque, at her home in a Middle Eastern country. She was diagnosed with 90% total body surface area burns (TBSA), with a mixture of deep partial thickness and full thickness burns. She had a long hospital course and recovery in her country of origin. In fact, she underwent ten different surgeries in an attempt to sustain her life and treat her burn injuries during the initial 18 months she spent in her country of origin. Unfortunately, DK had a plethora of challenges that were not able to be addressed by her overseas medical team. As a result, she developed debilitating contractures in her bilateral upper and lower extremities. Fortunately, a local religious figure facilitated DK’s admission to Shriners Hospitals for Children—Cincinnati (SHC) in July, 2008. She arrived with approximately 5% of her body uncovered by skin, as her physicians reported she had a lack of available donor sites, which also impacted their ability to perform successful reconstructive surgeries. Luckily, SHC is more accustomed to cases of this magnitude and began an intensive reconstructive journey with this child, which made her available as a case study patient for my capstone dissemination, spanning January through May 2009.

DK was approximately 4.5-years-old at the time this case study was emerging. Despite her young age, she has an extensive medical history. In fact, she has had eleven reconstructive surgeries at SHC to increase, facilitate, or restore function since her initial admission in July, 2008. However, more are planned including reconstruction of her trachea due to being on mechanical ventilation for over two months when overseas.
In addition to her complex medical/surgical history, DK also has a complex sociocultural background. Her family left their life overseas to come to the United States for the sole purpose of gaining care at SHC. They left without any preparation for the language, cultural, and religious differences they would encounter. Since the accident, many intrafamilial issues have surfaced, which have disrupted the traditional nuclear family organization they sought to maintain. Currently, DK lives with her mother, maternal grandmother, and two older siblings. DK’s mother is completely responsible for all of her medical care as her grandmother has not been able to demonstrate competency in critical, life saving techniques during repeated “check out” opportunities, such a resuscitation with a tracheostomy. This requires DK’s mother to complete a two to three hour morning routine including a bath, wound care, tracheostomy care, massage, pressure garment and splint application, as well as a regime of important range of motion and strengthening exercises. Furthermore, the routine must be repeated again later in the day. All of this must be completed with a feisty, defiant, and often screaming child, who is trying to assert and maintain her autonomy in a situation that offers her little to no control.

I was first introduced to DK when she was admitted to the rehabilitation unit for a two-stage release and graft procedure of her right wrist and digits near the end of January, 2009. This procedure was necessary as DK’s right hand was essentially non-functional due to intense contractures that had resulted from a lack of appropriate therapeutic management during her overseas treatment. The provision of aggressive range of motion therapy is rare in centers not specifically trained in burn care; thus, severe contractures are common which deviate from normal hand anatomy (see Figure 1). In DK’s case, her metacarpophalangeal and distal interphalangeal joints were contracted into flexion, whereas her proximal interphalangeal joints
were pulled into hyperextension (refer to Figures 2, 3 and 4). The bones were aligned in an accordion-like fashion, folded over on one another.

Figure 1. Normal skeletal alignment of hand.

Figure 2. Diagram of DK’s hands preoperatively.
DK had a similar surgery on her left hand in October, 2008, which gave her some functional movement in her hand, including a pincer grasp. The surgeries required insertion of wires in order to fixate her affected joints into anatomically correct positions. The pins remained in place for approximately one month. DK was then re-admitted in late February, 2009 for pin removal and intensive therapy. It was at this time that formal participation in the present case study began and DK’s mother was approached regarding her daughter’s involvement. While she welcomed the educational experience, she was adamant about protecting her daughter’s identity and
preventing unnecessary exploitation. Both her primary therapist and student therapist addressed her concerns and the case proceeded.

At the onset of this case study, DK was able to ambulate with minimal assistance for balance; however she had a profound kyphotic posture, including neck flexion as is depicted in Figure 6 and Figure 8. Figures 5 and 7 offer a point of comparison as they illustrate normal standing posture.

Figure 5. Typical standing posture at rest: Anterior view.

Figure 6. DK’s standing posture at rest: Anterior view.
This kyphotic posture was also present during static standing occupations. Unlike most children her age, DK was dependent upon her family for most occupations of daily living, including bathing, dressing, and toileting. She could feed herself small finger foods with a left pincer grasp, however she was unable to pick up a cup or use utensils. Overall, she demonstrated general developmental delays in all facets of life including gross and fine motor skills, social-emotional maturity, language skills, and cognition. Collectively, these delays resulted from prolonged and repeated hospitalizations as well as an inability to use her body in a biomechanically-appropriate manner for functional occupations.

*Theories & Models of Practice*

Several occupational therapy models of practice were utilized in the development of this case study (however, if the reader would like to become more familiar with current burn care, theory and practice, Appendix A is available for reference). First, many fundamental burn care
practices are driven by the biomechanical model, which highlights the importance of muscle and joint integrity and the forces by which mobility is supported, maintained, or limited. Furthermore, range of motion is recognized as a critical component in the facilitation of efficient movement patterns (Colangelo, 1999; Schultz-Krohn & McHugh Pendleton, 2006). More specifically, this model was selected due to the fact that it is ideal for patients unable to maintain an upright posture due to neuromuscular or musculoskeletal dysfunction. Furthermore, it supports the use of external supports, temporarily or permanently, to substitute for a lack of postural control (Colangelo, 1999). Thus, it provides the initial foundation upon which the introduction of Kinesio Tape in pediatric burn care is supported. Fundamentally, the model seeks to utilize mechanisms which position the body for function. Finally, the biomechanical model is compatible to combine with other models of practice, which matches well with the depth this case study encompasses (Colangelo, 1999).

Second, principles from dynamic systems theory (Mathiowetz & Bass Haugen, 2008) were also incorporated into this case study. This theory asserts that motor behaviors result from an interaction of many systems, including the person, the task, and the environment. The model applies to DK as it proposes that her current, preferred attractor states can be altered during a phase shift by modifying relevant control parameters (Mathiowetz & Bass Haugen, 2008; Kaplan & Bedell, 1999). The control parameters utilized in this case included: modification of the environment to encourage different body mechanics during occupational performance, Kinesio Tape, adapted utensils, a variety of splints, and a plethora of meaningful and purposeful occupations. Through modification of these parameters, the goal was to facilitate the emergence and/or re-emergence of more efficient, age appropriate movement patterns (Kaplan & Bedell, 1999). Dynamic systems theory also supports the non-hierarchical development of motor
behavior which suggests that shifts in movement patterns are discrete, discontinuous transitions. Thus, this theory allowed for interventions to be both evolutionary and occupation-based, rather than built upon a specific developmental sequence.

Due to the vast and diverse application of the biomechanical model and dynamic systems theory in occupational therapy, the discussion regarding their scientific evidence will focus on the unique incorporation of Kinesio Tape (KT) in burn therapy, as it applies to this case study. Currently, no studies were located regarding the utilization of KT in burn care and rehabilitation. Furthermore, my clinical site, which is one of four Shriners hospitals specializing in pediatric burn care, has never before formally trialed the use of KT as an adjunct treatment modality nor were they aware of any other pediatric burn care facilities utilizing it in therapy. Thus, the incorporation of KT in this case study was ground breaking and may leave a lasting impression on the future of burn care, particularly on the Occupational and Physical Therapy Department at Shriners Hospitals for Children in Cincinnati and within the greater Shrine Burn Care System.

KT was developed in Japan in the 1970s (see Figure 9). Its fundamental premise is to support musculoskeletal structures in order to enhance the body’s natural healing process (Kahanov, 2007). Advocates assert that KT stimulates normal muscle movement, through its elastic properties (it stretches up to 30-40% of its resting length), which creates a condition where collagen alignment is maximized (Kahanov, 2007). Essentially, convolutions are created in the skin, creating increased interstitial space between the skin and underlying connective tissues (Kahanov, 2007). This theoretically provides immediate sensorimotor feedback during functional occupations (Yasukawa, Patel, & Sisung, 2006). KT has a variety of proposed benefits including: improved proprioception, support for weakened muscles, decreased joint instability, facilitation of correct postural alignment, support for over-used muscles, reductions in pain.
symptoms, and enhanced blood and lymph circulation (Kinesio Taping Association, 1996; Kahanov, 2007; Yasukawa, Patel, & Sisung, 2006; Yoshida & Kahanov, 2007). It can be worn for three to five consecutive days without compromising its adhesive qualities (Kinesio Taping Association, 1996) and patients are instructed to bathe according to their usual routine (Kahanov, 2007). There are a variety of techniques regarding the application of KT, each of which targets specific objectives. Therefore, therapists are encouraged to consult KT manuals and resources to best facilitate their specific therapy goals which may included increased active range of motion, pain relief, correcting misalignment, or improved lymph circulation (Yasukawa, Patel, & Sisung, 2006). Please see Appendix B for more information on KT and how it applied to this case study. Figure 9. Kinesio Tex Tape ® (Kinesio Taping Association, n.d.).

The following technique was utilized in taping DK’s dorsal trunk extensors with the intention of strengthening and ultimately gaining active range of motion. Two inch Kinesio Tex Tape was cut in a Y-shape to fit DK’s back from her mid shoulders to the top of her sacrum. The base of the tape, was applied slightly above her tail bone while she standing, but bent forward at the waist. Each arm of the Y was then extended up toward her shoulders on each side of her
spinal column: the tape was not stretched, rather it was supposed to have a wrinkled appearance following application, refer to Figure 10 (Kinesio Taping Association, 1996)

Figure 10. Image of kinesio tape applied to DK’s dorsal trunk extensors.

While the empirical evidence regarding the impact of KT is sparse, studies by Yoshida and Kahanov (2007) and Yasukawa, Patel, and Sisung (2006) were reviewed due to their particular relevance to this case. The former article examined the effect KT had on lower trunk range of motions and the latter investigated the effect of KT in an acute pediatric rehabilitation setting.
Yoshida and Kahanov studied the range of motion of 30 healthy adults with and without KT, in terms of trunk flexion, extension, and lateral flexion. The results indicated that KT produced a statistically significant impact on trunk flexion; however, no statistically significant differences were noted for trunk extension or lateral flexion. Nevertheless, there may have been a false positive (type I) error regarding trunk flexion due to the experimental design selected (pretest-posttest with no control group) or a false negative (type II) error regarding trunk extension and lateral flexion as a result of the small sample size (Nelson, 2006). Furthermore, the subjects were measured before and immediately after the application of the KT, rather than over a span of time. Thus, while the tape was not found to have an instant impact, its long-term effect, which is ultimately more important was not tested.

Yasukawa, Patel, and Sisung (2006) studied the use of KT with 15 children admitted into an acute, inpatient rehabilitation program using the Melbourne Assessment of Unilateral Upper Limb Function. The diagnoses of the children varied, including encephalitis, brain tumors, cerebral vascular accidents, traumatic brain injuries, spinal cord injuries, cerebral palsy, and children with multiple diagnoses including osteomyelitis, arthritis, and sickle cell disease. Each participant wore the tape for a total of 3 consecutive days. Outcome measurements were taken at three points in the study: pre-KT application, immediately post-application, and three days following application. A statistically significant improvement was noted from pre-taping to post-taping (60.5 pre-tape mean, 65.5 post-tape mean, 70.1 three day follow up mean). While this study allowed a three day wearing period, the period of data collection was still rather short, considering the recommended length of wear for one application of KT is three to five days (Kinesio Taping Association, 1996). Therefore, in order to advance knowledge, the current case
study evaluated the impact of KT over a month long period, with an additional follow-up assessment at two months.

The third and final model guiding the development of this case study was the occupation-based model of childhood play (Parham & Fazio, 2008). Play is being suggested as a model of practice because it has all of the fundamental components including theory, assessments, therapeutic modalities, outcome measures, and supporting research. The utilization of play as a model of practice is unique, in and of itself, in the field of pediatric burn care and rehabilitation. While play is considered the primary occupation of children (AOTA & Primeau, 2008; Primeau & Ferguson, 1999) and is one of the seven performance areas identified in our Practice Framework (AOTA, 2006), it is not typically utilized during the initial assessment process or during the measurement of outcomes in burn care where there is a preference to focus on improvements in ROM and scar management. The skin is an important client factor in the acute stages of burn care, as one of its functions is to permit and facilitate movement; however, occupation-based goals and treatment plans should remain a long-term focus in occupational therapy practice.

Play is not only a fundamental aspect of occupational therapy practice in terms of theory, but it is also supported by evidence as a therapeutic medium in burn rehabilitation. In 2000, Melchert-McKearnan, Deitz, Engel, and White examined the influence of play versus rote exercise on pain in children with burn injuries. The results demonstrated that early in the rehabilitation process, play yielded an increase in the amount of active repetitions, a decrease in overt stress behaviors, a decrease in pain intensity, and an increase in overall enjoyment as compared to rote exercise. The utilization of play as a model of practice, particularly in this case
study, supports the foundation upon which occupational therapy practice was built; thus, it is key to who we are and what we do as occupational therapists.

Taken together, incorporation of the above models, theories, and interventions into the realm of a pediatric case study in burn care is quite unique given the current nature of practices related to burn rehabilitation. Used collectively, the models and theories translated into the incorporation of non-routine assessments and novel interventions.

In addition to the planned aspects of this case, the participant selected further underscores the unique nature of this capstone dissemination as she embodies cultural, language, and religious differences. Furthermore, while the interventions were of increased frequency and intensity, several “real life” issues arose which highlight the obstacles and challenges that must be overcome in the development of single case study projects.

Evaluation

As previously mentioned, DK arrived at SHC in July, 2008 with debilitating scar contractures in her bilateral upper and lower extremities (see figure 11).

Figure 11. Initial SHC admission photograph of DK.
In fact, the staff at SHC describe her status at the initial admission as being contracted into a fetal, ball-like position. She had many dislocated joints in her hands, complicated by several partial finger amputations. Her lower extremities were also severely contracted, limiting her ability for functional ambulation upon her initial admission. Several surgeries were necessary in August, 2008 to release scars in her lower extremities in order to permit weight bearing and ambulation. Collectively, the decreased range of motion in the majority of her joints, her extensive hospital course, and her inability to interact with and explore her environment restricted her overall development. In order to build a comprehensive portrait of DK, a wide variety of assessments were utilized including goniometric range of motion measurements (Richard & Staley, 1994), the Ages and Stages Questionnaire (Bricker & Squires, 1999), the Pediatric Volitional Questionnaire (Geist & Kielhofner, 2002), the Self-Identified Goals Assessment (Melville & Nelson, 2001), and the Burn Scar Assessment (commonly referred to in burn care practice as the Vancouver, Sullivan, Smith, Kermode, McIver, & Courtemanche, 1990).

Range of Motion

A standard indicator of progress or regression for a patient with a burn injury is goniometric joint range of motion (Richard & Staley, 1994). As a result, DK’s range of motion was assessed intermittently throughout her rehabilitation course, based upon the protocols required by SHC. However, there were several periods of time that lack sufficient data, due to the fact that DK did not have transportation to the hospital as a result of a family crisis.

The use of goniometric range of motion measurements is consistent with principles from the biomechanical model of practice. In fact, according to Colangelo (1999) movement of body parts through full range of motion is an evaluation technique that should be assessed over an
extended period of time. In addition, the significance of standing with an erect spine, hips extended, and ankles at 90 degrees of dorsiflexion without any pathologic eversion or inversion is recommended and supported by this model to facilitate engagement in occupations. Table 1 depicts relevant range of motion measurements that were taken throughout the duration of this case study.
Table 1
Pertinent Range of Motion Measurements (in degrees).

<table>
<thead>
<tr>
<th>Joint Measured</th>
<th>Expected ROM Values</th>
<th>Left</th>
<th>Right</th>
<th>Left</th>
<th>Right</th>
<th>Left</th>
<th>Right</th>
<th>Left</th>
<th>Right</th>
<th>Left</th>
<th>Right</th>
<th>Left</th>
<th>Right</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shoulder flexion</td>
<td>0-180</td>
<td>165</td>
<td>150</td>
<td>165</td>
<td>165</td>
<td>165</td>
<td>165</td>
<td>165</td>
<td>165</td>
<td>165</td>
<td>165</td>
<td>180</td>
<td>165</td>
</tr>
<tr>
<td>Wrist Extension</td>
<td>0-70</td>
<td>Pin remains, no ROM indicated</td>
<td>15</td>
<td>10</td>
<td>Pin removed 2/27/09</td>
<td>5</td>
<td>20</td>
<td>45</td>
<td>20</td>
<td>25</td>
<td>35</td>
<td>25</td>
<td>45</td>
</tr>
<tr>
<td>Digit #2 MCP flexion</td>
<td>0-90</td>
<td>60</td>
<td>40</td>
<td>60</td>
<td>40</td>
<td>60</td>
<td>45</td>
<td>60</td>
<td>40</td>
<td>60</td>
<td>40</td>
<td>60</td>
<td>55</td>
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<tr>
<td>Digit #3 MCP flexion</td>
<td>0-90</td>
<td>30</td>
<td>55</td>
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<td>40</td>
<td>40</td>
<td>75</td>
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<tr>
<td>Digit #4 MCP</td>
<td>0-90</td>
<td>75</td>
<td>65</td>
<td>75</td>
<td>55</td>
<td>75</td>
<td>60</td>
<td>75</td>
<td>60</td>
<td>75</td>
<td>40</td>
<td>75</td>
<td>90</td>
</tr>
<tr>
<td>flexion</td>
<td>Tuesday 2/24/09 Initial admission ranges following right hand pin removal under sedation</td>
<td>Tuesday 3/3/09 Re-admission for family crisis</td>
<td>Monday 3/16/09 Return to Clinic Visit</td>
<td>Tuesday 3/24/09 Outpatient visit</td>
<td>Tuesday 4/2/09 Follow-up outpatient visit</td>
<td>Thursday 4/16/09 Inpatient discharge, Post-Op Day 7, under sedation</td>
<td>Tuesday 4/21/09 Follow-up outpatient visit post-surgery, last official outpatient visit for case study</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Thumb MCP flexion</td>
<td>0-50 50 0 50 0 50 0 50 0 90 0 85 0 85 0 85 0 0</td>
<td>0-50 50 0 50 0 50 0 50 0 90 0 85 0 85 0 85 0 0</td>
<td>0-50 50 0 50 0 50 0 50 0 90 0 85 0 85 0 85 0 0</td>
<td>0-50 50 0 50 0 50 0 50 0 90 0 85 0 85 0 85 0 0</td>
<td>0-50 50 0 50 0 50 0 50 0 90 0 85 0 85 0 85 0 0</td>
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<td>0-50 50 0 50 0 50 0 50 0 90 0 85 0 85 0 85 0 0</td>
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<tr>
<td>Thumb radial abduction</td>
<td>0-45 45 45 45 45 45 45 45 45 45 45 45 45 45 45 45 45 45</td>
<td>0-45 45 45 45 45 45 45 45 45 45 45 45 45 45 45 45 45 45</td>
<td>0-45 45 45 45 45 45 45 45 45 45 45 45 45 45 45 45 45 45</td>
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<tr>
<td>Thumb palmar abduction</td>
<td>0-45 45 55 45 45 30 45 45 45 45 45 45 45 45 45 45 45 45</td>
<td>0-45 45 55 45 45 30 45 45 45 45 45 45 45 45 45 45 45 45</td>
<td>0-45 45 55 45 45 30 45 45 45 45 45 45 45 45 45 45 45 45</td>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thumb adduction</td>
<td>0 indicates thumb touches radial aspect of 2nd finger CMC bone</td>
<td>-30 -30 0 0 0 0 0 0</td>
<td>-30 -30 0 0 0 0 0 0</td>
<td>-30 -30 0 0 0 0 0 0</td>
<td>-30 -30 0 0 0 0 0 0</td>
<td>-30 -30 0 0 0 0 0 0</td>
<td>-30 -30 0 0 0 0 0 0</td>
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</table>
In addition to the regularly scheduled hand and upper extremity range of motion measurements, a major focus of this case study was the introduction and trial usage of KT in burn care. While most standard practice may have been predominately focused on DK’s hand rehabilitation, this case study precipitated a more holistic evaluation and intervention approach. Though observation of DK’s occupational performance, she demonstrated a strong tendency toward kyphotic posturing during ambulation, static standing, and sitting. Originally, her primary therapist hypothesized that her posture was caused by weak dorsal trunk extensors. Thus, her dorsal trunk muscles were taped according to the protocol outlined by the Kinesio Taping Association (1996) as previously detailed, for strengthening her trunk extensors in order to address issues related to poor posture and kyphosis. As a result, DK’s trunk extension range of motion measurements were taken more frequently to track her progress, which is beyond the normal scope of practice at SHC. The fundamental goal was for DK to achieve a more upright, functional posture in order to facilitate her ability to engage in meaningful and purposeful occupations of a developmentally appropriate nature. Again, gaps in data exist due to the family crisis that limited DK’s ability to return to the Shrine for her regularly scheduled therapy appointments. Nevertheless, the crisis also led to a rehabilitation admission of four days, lasting from March 3, 2009 to March 6, 2009 due to the unavailability of a trained family member to provide DK’s tracheostomy care. DK received additional therapy during this hospitalization despite a lack of substantial medical necessity, which is beyond the traditional scope of practice at Shriners and other children’s hospitals. Table 2 details her trunk extension range of motion as measured at the hip during static positioning over the duration of this case study. Fundamentally, the goal in this case study was to achieve zero degrees of trunk extension during static standing;
Beyond Burns 21

however, the expected range of trunk extension as measured at the hip is 0-25 degrees; thus, negative numbers indicate a lack of available range (see Figure 12).

Figure 12. Measurement of trunk extension. (O’Connor, Jr., 1997).

Table 2

Trunk Extension Range of Motion as Measured at the Hip during Static Standing (in degrees).

<table>
<thead>
<tr>
<th>Date AM/PM</th>
<th>Left</th>
<th>Right</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tuesday AM 2/24/09 Initial evaluation for admission. During PROM stretch, not static positioning</td>
<td>5 <em>Under Sedation</em></td>
<td>5 <em>Under Sedation</em></td>
</tr>
<tr>
<td>Thursday AM 2/26/09 Pre-initial Kinesio Taping</td>
<td>-20</td>
<td>-25</td>
</tr>
<tr>
<td>Thursday PM 2/26/09 Pre-afternoon OT</td>
<td>-15</td>
<td>-20</td>
</tr>
<tr>
<td>Thursday PM 2/26/09 Post-afternoon OT</td>
<td>-12</td>
<td>-15</td>
</tr>
<tr>
<td>Friday AM 2/27/09 Pre-OT</td>
<td>-30</td>
<td>-17</td>
</tr>
<tr>
<td>Friday AM 2/27/09 Post-OT/Discharge</td>
<td>-15</td>
<td>-15</td>
</tr>
<tr>
<td>Date</td>
<td>AM/PM</td>
<td>Left</td>
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<td>---------------------</td>
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<td>-------</td>
</tr>
<tr>
<td>Tuesday AM 3/3/09</td>
<td>Re-admission/Pre-OT</td>
<td>-10</td>
</tr>
<tr>
<td>Tuesday PM 3/3/09</td>
<td>Kinesio Tape re-applied Post-OT</td>
<td>-5</td>
</tr>
<tr>
<td>Wednesday AM 3/4/09</td>
<td>During PROM stretch, not static positioning</td>
<td>2</td>
</tr>
<tr>
<td>Wednesday PM 3/4/09</td>
<td>Post-OT</td>
<td>0</td>
</tr>
<tr>
<td>Thursday AM 3/5/09</td>
<td>Pre-OT</td>
<td>-3</td>
</tr>
<tr>
<td>Thursday PM 3/5/09</td>
<td>Post-OT</td>
<td>0</td>
</tr>
<tr>
<td>Friday AM 3/6/09</td>
<td>Pre-OT</td>
<td>-10</td>
</tr>
<tr>
<td>Friday AM 3/6/09</td>
<td>Post-OT</td>
<td>-5</td>
</tr>
<tr>
<td>Monday 3/16/09</td>
<td>Return to Clinic Visit</td>
<td>-5</td>
</tr>
<tr>
<td>Tuesday 3/17/09</td>
<td>Pre-OT</td>
<td>-5</td>
</tr>
<tr>
<td>Tuesday 3/17/09</td>
<td>Post-OT</td>
<td>0</td>
</tr>
<tr>
<td>Tuesday 3/24/09</td>
<td>Pre-OT</td>
<td>0</td>
</tr>
<tr>
<td>Tuesday 3/24/09</td>
<td>Post-OT</td>
<td>0</td>
</tr>
<tr>
<td>Thursday 3/26/09</td>
<td>Pre-OT</td>
<td>0</td>
</tr>
<tr>
<td>Thursday 3/26/09</td>
<td>Post-OT</td>
<td>0</td>
</tr>
<tr>
<td>Tuesday 3/31/09</td>
<td>Pre-OT</td>
<td>0</td>
</tr>
<tr>
<td>Tuesday 3/31/09</td>
<td>Post-OT</td>
<td>0</td>
</tr>
<tr>
<td>Thursday 4/2/09</td>
<td>Pre-OT</td>
<td>0</td>
</tr>
<tr>
<td>Date AM/PM</td>
<td>Left</td>
<td>Right</td>
</tr>
<tr>
<td>------------</td>
<td>------</td>
<td>-------</td>
</tr>
<tr>
<td>Thursday 4/2/09 Post-OT Kinesio Tape re-applied</td>
<td>0</td>
<td>-5</td>
</tr>
<tr>
<td>Tuesday 4/7/09 Pre-OT</td>
<td>0</td>
<td>-5</td>
</tr>
<tr>
<td>Tuesday 4/7/09 Post-OT Kinesio Tape re-applied</td>
<td>0</td>
<td>-5</td>
</tr>
<tr>
<td>Thursday 4/16/09 Post-Op Day 7, First day to stand up right, inpatient discharge</td>
<td>0</td>
<td>0</td>
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<tr>
<td>4/21/09, First outpatient visit post surgery</td>
<td>-10</td>
<td>-15</td>
</tr>
<tr>
<td>4/23/09, Community outing to Duke Energy Children’s Museum, end of therapy session</td>
<td>0</td>
<td>-5</td>
</tr>
</tbody>
</table>

These careful, nonstandard static positioning measurements, along with clinical observations of trunk extension during both active and passive range of motion exercises as well as during a variety of occupations in extra therapy sessions, lead to a significant discovery: DK had a discrete scar band pulling in her right flank creating asymmetries in her trunk and lower extremities. On Wednesday, March 04, 2009 anthropometric measurements were taken demonstrating that DK’s right anterior superior iliac spine (ASIS) was 3.5 inches from the bottom of her last rib while her left ASIS was 4 inches from the bottom of her rib cage. An additional measurement from the anterior superior iliac spine to the lateral malleolus was also taken bilaterally showing a leg length disparity with the right at 20.5 inches and the left at 21.0 (see Figure 13).
The significance of this finding was great. According to Dutcher and Johnson (1994) potential complications for patients with leg length disparities caused by hip and knee flexion contractures include scoliosis and thoracic kyphosis. Essentially, the powerful contractile forces of the scar tissue, which is approximately twelve times stronger than normal, healthy skin is able to pull the bones, joints and muscles into positions of deformity (Shriners Hospitals for Children – Cincinnati, n.d.). Essentially, the scar band was contributing toward her inability to stand upright as it was pulling her into trunk flexion. This was also supported by the data in the Table 2, as the ranges on the right side were more limited. This information was brought to the attention of the surgeons on DK’s case and a subsequent surgery was scheduled to release the scar tissue on April 9, 2009. Without this additional information, the scars would have continued to pull DK into trunk flexion and may have caused permanent damage to her musculoskeletal system.
In order to counteract and manage the scar tissue, Dutcher and Johnson (1994) recommend elongation of the tight structures through stretching of the trunk, strengthening of the trunk musculature responsible for trunk control, aggressive positioning, and splinting—all of which were utilized in this case study. Surgery is often the last resort and must be well substantiated; thus, the data collected in this case study was a key factor in demonstrating that all tools had been exhausted and skeletal deformities were resulting. After a surgical procedure, therapists resume the responsibility of maintaining sufficient tissue length through a variety of therapeutic interventions. In fact, appropriate therapy can delay the need for further surgical interventions. Thus, therapy is essential in both pre- and post-surgical phases.

**Burn Scar Assessment/Vancouver**

The Burn Scar Assessment was used as an adjunct to clinical observations regarding the maturity of DK’s burn scars (Sullivan, Smith, Kermode, McIver, & Courtemanche, 1990). Due to the fact that grafted skin is often more fragile than normal skin during the healing process, which is approximately 6-24 months (Shriners Hospitals for Children – Cincinnati, n.d.), the Vancouver was utilized as an objective indicator of burn scar maturity for the purpose of ascertaining the integrity of the skin in regard to the safe application of Kinesio Tape. The Vancouver was administered on Wednesday, February 25, 2009, which was one day prior to the initial application of KT.

While the skin on the dorsal trunk was of primary interest, other areas were assessed to demonstrate the nature of the instrument. Each location of the body under assessment was scored on the four following categories: pigmentation, pliability, vascularity, and scar height. The areas were assessed independently of one another and given a score of zero, one, two, or three. A score of zero indicates normal skin conditions, whereas increasing scores signify a greater pathological
state (Sullivan, Smith, Kermoda, McIver, & Courtemanche, 1990), which can be seen in the scores of the fresh donor sites or the immature scar on her left forearm as compared to her dorsal trunk (see Table 3). Thus, the results provide evidence that the skin on the dorsal trunk had achieved a state of maturity that could withstand the additional pressures and forces of the KT. Nevertheless, keen clinical observations of skin condition were coupled with this assessment to prevent an adverse impact on the skin. In addition, education was provided to DK’s medical team and her family in order to maintain her skin integrity over the course of KT application.

Table 3

<table>
<thead>
<tr>
<th>Location of Body</th>
<th>Pigmentation</th>
<th>Pliability</th>
<th>Vascularity</th>
<th>Height</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dorsal trunk</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Left forearm (for comparison)</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Left calf (donor site)</td>
<td>3</td>
<td>0</td>
<td>2</td>
<td>0</td>
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<tr>
<td>Left thigh (donor site)</td>
<td>3</td>
<td>0</td>
<td>3</td>
<td>0</td>
</tr>
</tbody>
</table>

*Ages & Stages Questionnaire (ASQ)*

The ASQ is a self-report instrument designed to screen children birth to five years of age in five major categories including: communication, gross motor, fine motor, problem-solving, and personal-social development (Bricker & Squires, 1999; Stewart, 2005). Parents are to respond to the questions/statements regarding their child’s skill level by checking the appropriate box indicating “yes,” “sometimes,” or “not yet.” The questionnaire is then scored according to the parental report on each item with “yes” representing ten points, “sometimes” five points, and “not yet” zero points. The scores for each sub-section are then combined and graphed on a chart. If scores fall within the white area, the child is doing well in this area; however, if the scores fall within a shaded area, the parent is encourage to seek further professional support and evaluation.
DK’s mother was approached regarding completion of the 54 Month ASQ (Bricker & Squires, 1999) on February 24, 2009, the first day of DK’s initial admission for her right hand surgery, as well as the official start of the case study assessment process. DK’s mother expressed confidence in completing the questionnaire independently, despite her inability to demonstrate full mastery of the entire English language; she has sufficient reading, writing, and conversation skills. Therefore, she was instructed to seek assistance if she did not understand any aspect of the assessment. Fortunately, the therapeutic relationship was well established and she completed the questionnaire over a two day period, seeking clarification regarding only one question.

The results of this instrument are summarized in Table 4. For each sub-section, DK’s raw scores were reported. Cutoff scores were derived from analysis of 2,008 completed questionnaires, detailing the results of three groups: children defined as having a medical risk, those with an identified environmental risk, and children who made up the normative group, who were identified as not having any defined developmental risk. The authors utilized the statistical technique called relative operating characteristic (ROC) to determine which cutoff points were most accurate. By using the means and standard deviations, they found that the data from the combined risk and non-risk groups provided the most accurate cutoff points. They then determined which specific cutoff point (1, 1 ½ or 2 standard deviation below the mean) would maximize the conditional probabilities of true positive and false positive proportions. Their statistical analysis using a contingency table and a ROC curve revealed that use of 2 standard deviations below the mean as the cutoff point provided the best balance between true positives and false positives. Therefore it was recommended and used as the cutoff point for the ASQ (Squires, Potter, & Bricker, 1999). It is important to note when reading Table 4, that higher scores denote more independence or mastery of the sub-section.
Table 4

Ages & Stages Score Report

<table>
<thead>
<tr>
<th>Sub-Section</th>
<th>DK’s Score</th>
<th>Cutoff Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communication</td>
<td>50</td>
<td>50.0</td>
</tr>
<tr>
<td>Gross Motor</td>
<td>5</td>
<td>42.5</td>
</tr>
<tr>
<td>Fine Motor</td>
<td>5</td>
<td>26.5</td>
</tr>
<tr>
<td>Problem Solving</td>
<td>35</td>
<td>33.0</td>
</tr>
<tr>
<td>Personal-Social</td>
<td>25</td>
<td>36.5</td>
</tr>
</tbody>
</table>

The results indicate DK is significantly below the cutoff scores in terms of fine and gross motor skills, moderately delayed in terms of personal social constructs, and borderline in her communication and problem-solving skills. The ASQ was utilized as a precursor to the Self-Identified Goals Assessment in order to stimulate conversation and assist with functional, occupation-based goal-setting and intervention planning.

*Self-Identified Goals Assessment (SIGA)*

While the SIGA (Melville & Nelson, 2001) is intended for use with adults in subacute rehabilitation settings or nursing homes, it was modified for application to this case study. Its recommended use is as a direct interview tool to assist patients in the identification of meaningful goals as well as to facilitate adjustments as progress toward goal-achievement is demonstrated. According the SIGA protocol, the interviewer is first directed to gather information regarding the patient’s home, interests, routines and assistance required prior to admission. Second, the interviewer asks the patient to think about all the things they want to be able to do in order to elicit up to five specific therapy goals. Patients are then shown a visual scale and asked to rank their ability to complete each goal on a scale of zero to ten, with ten indicating independence and zero, dependence. Each goal is then to be re-evaluated at regular intervals and at discharge to document progress (Melville & Nelson, 2008, November).
A modified version of the SIGA was utilized with DK’s mother on Tuesday, March 17, 2009 to ascertain her perspective regarding future goal-setting and intervention planning for DK. The SIGA was not utilized with DK, as intended, due to the fact that she has a limited understanding of English and is only able to communicate in one to two word phrases. Furthermore, it is difficult for a four year old to verbalize functional, age appropriate goals, especially given her developmental delays. Consequently, the SIGA was used as an interview tool following the ASQ, in order to capture a more vivid picture of DK’s strengths and weakness from her mother’s vantage point. This is permissible when the patient is unable to identify his or her own goals. In fact, discussions with family members are encouraged when soliciting information in the SIGA protocol. While the original case study assessment plan was to use the SIGA as an immediate follow up to the ASQ, the plan was amended to cope with the family’s unavailability, accounting for the 3-week delay in utilizing the SIGA after completion of the ASQ.

Based upon the results of the SIGA, the five following goals were developed and rated on a scale from zero to ten, with zero indicating an inability to complete the goal at all and ten representing DK’s ability to complete the goal independently. DK’s mother’s ratings of her daughter’s current performance are indicated in parentheses following each goal.

1. Brush hair independently (6)
2. Potty (toileting) independently (4)
3. Dress self independently (3)
4. Pull stickers off of paper with both, right and left, hands (1)
5. Write on lines (1)
In addition to the aforementioned goals, mom also indicated a strong desire for DK to make her own choices regarding her body. For example, she wanted DK to be able to choose her own clothes independently every day; however when asked how well DK could complete this occupation, she indicated she did it very well (10) and could even open her own bureau drawers. Upon clarification, it was discovered that it was the practice of providing choices and giving her daughter control in making independent decisions that she wanted to foster and maintain.

Due to the delay in gathering this data, the SIGA goals were used in planning future treatment sessions and were passed on to her long-term therapist upon termination of the case study. Unfortunately, they were not incorporated into the measurable goals of this case study due to timing of all of the assessments. Fortunately, DK’s mother was in support of working towards the long and short term goals that were developed in her absence.

Despite the limitation in application of the results of the SIGA to goal setting within this case study, it appeared that utilization of this instrument did result in a therapeutic outcome as it provided DK’s mother with a sense of control in terms of DK’s therapy plan. She was given the opportunity and forum to be the expert on her daughter while sharing her thoughts, feelings, struggles, and “wishes” for DK. This appeared to be an inspirational process for her as she vocalized her opinions and had her thoughts transcribed onto paper. Moreover, she was able to share milestones that DK had achieved at home, such as using one finger to push a button to turn on the television or DVD player or how DK had expressed interest in using the potty and could almost get on and off of the commode independently. Near the end of the conversation, she indicated that all of the goals she had identified would assist her in helping DK attend school. This had yet to be a viable option due DK’s medical status and the necessity of having a trach-certified caregiver at all times. Nevertheless, DK had also indicated to her mother that she
wanted to attend school “just like her brother and sister.” In fact, she even asked for a book bag as a gift recently, indicating her desire and personal goal-setting ability.

*Pediatric Volitional Questionnaire (PVQ)*

The PVQ (Geist & Kielhofner, 2002) is an observation tool that assesses a child’s motivation through the examination of fourteen behavioral indicators. Each behavior is rated based upon the level of spontaneity and the amount of support, structure, or encouragement required for the child to demonstrate a specific volitional behavior. The four ratings, from most advanced to most basic, include: spontaneous, involved, hesitant, and passive. In addition, there is an Environmental Characteristics Form, which seeks to highlight how different environments enhance or limit a child’s volition.

The PVQ was selected as an assessment instrument as it contributes a key piece to the development of a comprehensive, holistic evaluation plan in this case study. While many instruments are available to address a child’s play, the PVQ was selected as DK’s playfulness was not a concern and her developmental delays were quite obvious. However, her initiation and motivation appeared deficient based upon early observations. For example, she could not make independent play choices in a gym full of novel toys and games or sustain play occupations without direct adult support. She did not explore occupational forms when entering a playful environment, nor did she use occupational forms spontaneously to create new play opportunities. However, when engaged with direct support, she demonstrated task-directedness and engagement. Thus, the PVQ was utilized to assess DK’s volition in order to ascertain the factors that were influencing and limiting her motivation for age-appropriate play. Furthermore, DK had experienced a plethora of debilitating issues since her initial burn injury, which limited her engagement in age appropriate occupations. Initially, it was difficult to ascertain whether her
intrinsic motivation had been adversely impacted due to the fact that her engagement in ordinary occupations had only been assessed from a biomechanical model thus far. In addition, children with burn injuries experience challenges beyond their physical limitations. For example in DK’s situation, she does not have age-appropriate peer relationships, she struggles to complete developmentally appropriate occupations, and she experiences pain on a daily basis. Collectively, these factors can impact her self-image and self-esteem, her persistence and drive, her social skills and relationships, and her overall mental and emotional health. Thus, the PVQ focused on factors related to motivation and volition that were impacting her performance in occupations relating to play.

The PVQ was administered during the week of DK’s initial inpatient admission on February 24 and 25, 2009. On the former date, DK was observed during a private free-play session with her mother in the playroom; on the latter date, she was observed in the same playroom with the Child Life Specialist during a private free-play session. Due to infection control policies at SHC and DK’s status, she was not permitted to interact with other children in the playroom. Therefore, she only had private play sessions during the hospitalizations discussed within this case study, which limited the collection of data regarding her interests and interactions with peers. Furthermore, the two observation periods were unique in terms of the language barrier that existed. During the first assessment, some aspects of the conversation were not understood by the observer, however the child could communicate freely with her mother. While this allowed the observer to focus on non-verbal behaviors, the amount of verbal support and encouragement was not discernable. In the second session, the observer was able to understand the verbal conversations, however, DK’s expression was limited by the language
barrier. Collectively, the two observation sessions extrapolated the unique intricacies that cultural differences project on occupational performance.

In the following summary, each of the PVQ behavioral indicators was italicized to highlight significant observations regarding elements contributing toward DK’s volition. In both sessions, DK selected to play in the kitchen with the pretend food. She sat at the table while each of the two adults brought her play items. She did not demonstrate any initiative in wanting to explore other aspects of the play environment, including standing at the sink or using the oven, stove-top, or grill that was readily available and utilized by both adults. DK would verbalize a desire for certain items indicating preferences; however her willingness to seek challenges was limited in both sessions. For example, DK did not select any other occupations in an environment with a plethora of choices, instead she gravitated toward the child-sized table and chair. The observer attributes this to the fact, that standing erect was both difficult, challenging, and physical exhausting. In both scenarios, DK would initiate playing with items once they were placed on the table in front of her, however she required considerable support to organize or modify the environment, indicated by the fact that objects would readily fall off of the table. Nevertheless, when engaged with an item, DK would persist at practicing a particular skill, such as placing a hot dog in a bun or the lid on a pitcher without any apparent prompting. Often, she required support to pursue an activity through to completion with either physical assistance or verbal suggestions for another approach. Without this external support, DK often proceeded to make another play selection.

DK’s ability to remain engaged in the play occupation selected was minimal. In both situations, DK’s adult playmates provided a considerable amount of support. If either her mother or the child life specialist turned to retrieve another item, DK would cease playing with the toys
available: she did not sustain the play occupation without direct support. DK’s curiosity assessed within the context of the entire playroom was limited; however, she would say “Look” and point with her arm toward kitchen-related items she was interested in exploring; thus, her curiosity appeared to be evolving on a elementary level. In terms of expressing her pleasure regarding mastery, DK had limited facial expressions and would again say “Look” when she wanted attention drawn toward an object. Yet, she did not express pleasure regarding the impact she made on the occupational forms during either session, however language limitations were present. DK required direct adult modeling to try new things and problem-solve when her current method was ineffective. She did however attempt to use her body in a task-directed manner to achieve purposeful goals, such as placing cheese on a sandwich or picking up a plate with her foot when it fell on the ground. DK’s use of imagination was limited, she did pick up the telephone and say “It’s Cinderella,” but only when prompted with the question, “Who is it?” Furthermore, she was unable to continue the interaction. In addition, she still mouthed the majority of the food presented when asked if she wanted a taste. Finally, DK did use her body to produce effects such as pushing the buttons on the phone simply to hear the “beep” noise without any modeling, prompting, or support.

Based upon the overall results of the PVQ, it appeared that DK’s volition was deficient, especially given the full, one-on-one attention of an adult playmate that was present in each situation. In terms of the specific characteristics of the environment during which the PVQ was administered, the playroom was an artificial setting to which DK was well accustomed. The occupational forms selected were familiar and simple in nature; however they allowed for a combination of structured and unstructured play choices. Many items were available for DK to choose and they were dissimilar in terms of shape, color, size, and potential usage. For example,
there were a variety of kitchen utensils such as plates, forks, and blenders; and different food items to choose from such as pieces of fruit, hot dogs, and cardboard boxes of cereal. Essentially, there were unlimited options in terms of the play that could evolve during engagement with the occupational forms. Nevertheless, DK struggled to initiate and sustain age appropriate play without a considerable amount of external support; thus indicating limited volition in terms of her occupational endeavors. Cultural factors cannot be overlooked; however, it is important to note that DK and her mother both appeared comfortable playing and using the kitchen items in appropriate ways.

Typically, occupational therapy evaluation and treatment plans for children with burn injuries focus on their physical limitations. Thus, the PVQ was able to examine a key feature in DK’s limited occupational performance: her volition in play settings. Often burn care is focused on gaining range of motion to increase function; however minimal attention is given to the impact the child’s burn injury has on their motivation and mental and emotional health once they have survived the acute care phase. During the acute care phase, a variety of professionals are concerned with the child’s coping mechanisms and the influence the burn injury has on childhood occupations; however once the child is discharged home, limited attention is given to this sector effecting occupational performance. Nevertheless, children continue to struggle with their ability to engage in normal childhood occupations and have limited support to develop or enhance this aspect of their recovery. Hence, it is fundamental to occupational therapy progress.

In order to facilitate DK’s volition during therapy and monitor her progress over time, a documentation system was created for this case study which was used as an adjunct to SHC’s current system. It is located in Appendix C.

Intervention Goals and Objectives
1. DK will achieve a standing, upright posture while engaged in a variety of standing occupations (including but not limited to painting, playdoh, age-appropriate table-top games/crafts, dancing, etc.) of at least zero degrees bilateral trunk extension as measured by 1) a goniometric measurement post-occupational therapy and 2) observation during occupations with accuracy of zero plus or minus ten degrees for 5 minutes during two consecutive therapy sessions by Thursday, March 26, 2009. – Not met

   a. DK will walk with her head upright for ten consecutive steps with stand by assist with 5 or less verbal prompts during an OT session by Thursday March 12, 2009. - Met

   b. DK will overhand throw bean bags at a target with min verbal cueing 2x during an OT session by Thursday, March 19, 2009. – Not met

This first set of goals was developed based upon the biomechanical model. Fundamentally, the biomechanical model highlights the importance of extensor activity in order to maintain an upright posture and the importance of a solid base of support upon which a child can freely interact with his or her environment. Secondarily, the model seeks to liberate the distal extremities through the provision of a secure postural base to increase engagement in functional activities, which is directly related to goal 1b (Colangelo, 1999). Limitations in range of motion including contractures are defined as dysfunctional in this model and must be addressed to promote successful outcomes. Furthermore, the model specifically mentions that lateral or forward curvature of the spine can lead to a reduction in thoracic space which may ultimately limit respiration. In the end, this could have a detrimental impact on one’s health, energy, and phonation (Colangelo, 1999). As a result, an upright posture was the focus on the first long term goal created for this case study patient.
Dysfunctional mobility is also a concern in this model. For example, if a child’s mobility is too slow or stressful, it may limit his or her effort in goal achievement. Essentially, the goal must possess sufficient meaning and purpose in order to make the energy expenditure and resulting fatigue worth the effort. Otherwise, occupational performance will be obstructed. Having the child move all body parts through full range of motion against gravity has been recommended as a potential evaluation technique that should be assessed over an extended period of time (Colangelo, 1999), which the long term goal specifically addresses. In addition, the significance of standing with an erect spine, hips extended, and ankles at 90 degrees of dorsiflexion is recommended and supported by this model to facilitate engagement in occupations. Results from the gross motor sub-section of the ASQ also aided in the development of the aforementioned goals, specifically 1a and 1b. The ASQ directly inquires about overhand throwing and walking on one’s tiptoes. Due to the fact, that DK could not walk upright, goal 1a was graded down and goal 1b was created as DK could throw underhand, thus, it was graded up to increase the challenge and assist in the development of new skills.

DK met goal 1a, however the verbal prompts were key to her success and were required after approximately two or three steps. Unfortunately, goal 1b was not met. It has been theorized that overhand throwing requires dissociation between trunk and upper extremity movement; thus, the shoulder must have a sufficient base of support from which to move in a complex, functional pattern such as overhand throwing (Exner, 2005). Furthermore, overhand movement challenges one’s dynamic standing balance and coordination throughout the body from head to toe. Due to the fact that the skin is an interconnected organ, limitations in hip and trunk ranges can directly impact upper extremity range and function.
DK was not able to achieve bilateral trunk extension as measured by either condition in long term goal #1. The best she was able to achieve was zero degrees in her left hip and five degrees in her right during the assessment period. While engaged in meaningful play occupations, DK required constant verbal and physical cueing to maintain an upright posture, however her right hip never achieved neutral, until a surgical release was performed on April 9, 2009. Nevertheless, her trunk extension range of motion measurements continued to fluctuate post-operatively, indicating that the healing process was underway. Continued assessment of this long-term goal will be important during the next year, as the scar released in her right flank matures.

2. DK will use her right hand spontaneously when presented with two-handed occupations 3x during an OT session by Thursday, March 26, 2009. –Met
   a. DK will make 2/3 baskets standing directly next to a child-sized basketball hoop with a bumpy ball (with a measured circumference of 23 inches) independently during an OT session by Thursday, March 5, 2009. - Met
   b. DK will pick up a book, puzzle or game with two hands with min verbal cueing during an OT session by Thursday March 12, 2009. – Not met
   c. DK will pull apart three Easter eggs independently with min verbal cueing during an OT session by Thursday March 19, 2009. – Not met

The second set of goals created for this case study were rooted in the play model of practice and principles from dynamic systems theory. Collectively, these two models highlight the important interconnected nature the person, the environment, and the occupation contribute toward changes in occupational performance. In essence, the three short term goals utilized play as a therapeutic medium, whereas in the long term goal, occupation was the desired outcome
(Primeau & Ferguson, 1999). Moreover, the goals emerged due to observation of DK’s limited occupational choices selected during the initial PVQ assessment sessions and her limited ability in using her hands for functional, age-appropriate goals. Thus, the focus was on expanding her play repertoire and increasing the bilateral use of her hands.

While goal 3c may initially appear irrelevant to a non-Christian family, it was clearly the opposite. Its primary focus was two-fold. First, it created an opportunity for two-handed play; second, it sought to facilitate cultural sharing, as was indicated by DK’s mother on Ash Wednesday, when she discovered the reasoning behind all of the eggs, baskets, bunnies and candy she had recently seen on supermarket shelves. In fact, DK’s mother expressed how she could now answer the questions her children were posing regarding this cultural tradition. Furthermore, she had brought the therapists treat-bags for a Jewish holiday and appeared to value the reciprocal interactions regarding cultural similarities and differences that were exchanged on a regular basis during therapy sessions.

In terms of outcomes, DK met goal 2a and even tried using a heavier ball with the therapist’s encouragement. Goals 2b and 2c were not met. DK could carry a small, lightweight book or game if it was set on top of her forearms similar to a tabletop, however her fine motor ability for grasping a book or game with a power grasp was not refined or strong enough when the goals were evaluated for success. Similarly, DK required hand over hand assistance to maintain a right-handed grasp on one half of the egg, while her left hand pulled the egg open. Again, the deficit appeared to be a grasp-strength concern. In order to further explore this issue, Coban (self-adherent elastic wrap) was added to the external portion of the egg to increase the friction and DK was still unable to maintain a grasp strong enough to stabilize the egg and pull it apart.
DK did meet long term goal #2 as indicated by the following occupational performances. During a tea party occupation, she picked up a styrofoam cup with both hands and poured water into two glasses. She also used both of her hands to pick up a plate of cookies off a pretend stove and carry them to the table for her party. Later in the session, she picked up a bowl of beads using her right hand as an assist and dumped them into a bin. DK excelled beyond the scope of her goal and completed a fourth occupation requiring use of her right hand when she removed the lid of a board game. All of these occupations were completed spontaneously without any prompting to incorporate her right hand. It is important to note that DK prefers to use her left hand if the occupation can be completed one-handed, however her occupational performance indicates that she is beginning to problem solve and incorporate her right hand as an assist without prompting.

3. DK will identify and complete three occupations without any choices given when prompted to “Make her schedule,” in an OT session by Thursday, March 26, 2009. - Met
   a. DK will engage in an occupation identified on her schedule for 5 minutes without verbalizing a desire to start another occupation 2x during an OT session by Thursday March 19, 2009. - Met
   b. DK will persist at an occupation that is challenging by completing 3 trials before giving up or seeking assistance 1x during a OT session by Thursday, March 19. – Met

The play model of practice, with a strong focus on volition and persistence in play occupations, was used to guide the development of the third set of goals. In essence, volition is a pre-cursor to self-driven occupational performance, which was determined to be deficient during administration of the PVQ. Furthermore, DK’s mother specifically mentioned a strong desire for
DK to make independent choices and achieve them during completion of the SIGA interview. In addition, play is the occupation of children and DK has not had sufficient practice in this area, therefore, it is important to facilitate her skills in order to prepare her for engagement with peers in the school setting, which mom expressed as an overarching long-term goal for the future.

Initially, DK needed considerable support to choose her occupations for therapy. In fact, she sometimes required up to a minute to select an occupation when given two simple choices such as stringing beads or bike riding. However, near the end of the case study, DK was able to vocalize three preferences when given the simple prompt of “Let’s make our schedule, what should we do?” While they were commonly used interventions, she still made her own selections and one day, she even made a completely new choice that had never been used in a previous therapy session. In order to fully achieve long term goal #3, DK was also required to complete each occupation, which including string five beads to make a necklace, riding a bicycle with minimal assistance approximately fifty feet, and painting a picture for three minutes. Goals 3a and 3b were also met by DK over the duration of the case study. In terms of goal 3a, DK played Connect Four and searched in Thera-Putty for hidden jewels, each for five minutes without verbal support to continue. Goal 3b was accomplished when DK tried to put scissors on her left hand: she attempted to use her right hand and the table as supports to get her finger and thumb in the openings four times during the course of the occupation. Scissor cutting was a novel task to DK and proved to be both challenging and meaningful as she observed her mother and siblings using scissors at home and wanted to try as well. DK also attempted to peel stickers from a sticker book with her right hand three times, before seeking assistance. Thus, her ability to problem solve and persist at an occupation was becoming more evident overtime.
It appeared that the creation of this set of goals was beneficial for the student therapist as well. It highlighted the interaction patterns that the therapist had created that may have kept DK in a passive role, rather than an active participant in her therapy. It challenged the therapist to create opportunities and an environment which fostered her volition, rather than permit maintenance of her current level of functioning. While volition is difficult to measure objectively, the documentation system developed in Appendix C allowed for areas of strength and weakness to be highlighted and assessed overtime.

4. DK will scoop three objects (food or pretend food) onto a deep-bowled spoon with min verbal cueing and bring them to her mouth successfully by Thursday March 26, 2009. – Met
   a. DK will bring two bites of food to her mouth with mod physical assist to secure the food onto the spoon 1x during an OT session by Thursday, March 5, 2008. Met
   b. DK will pick up and hold a spoon independently to stir (any selected materials) with min verbal cueing 1x during an OT session by Thursday, March 19, 2009. - Met

The last set of goals guiding the development of this case study were created using principles from dynamic systems theory and the biomechanical model, in support of occupational performance. Essentially, control parameters including introduction of a modified spoon were altered to encourage the development of a more efficient, age-appropriate habit: eating with utensils. Furthermore, it was biomechanical limitations in range of motion that were limiting DK’s ability to hold, scoop and bring food to her mouth. Thus, the spoon helped to compensate for her lack of range and coordination in her upper extremities, by providing a more
secure space for the food as well as a built-up handle to facilitate DK’s occupational performance as she worked through these challenges.

The development of this set of self-care goals was based upon results from the ASQ, which indicated that DK could sometimes use a spoon or fork; however, the skill was in the emergent phase and not well-refined or well-established. Furthermore, DK’s grandmother was repeatedly observed feeding DK, potentially stifling her volition and progress. The occupation of self-feeding was not only indicated by DK’s mother during a casual conversation as important, but she had also stated that DK expressed pride in her accomplishments at home when eating with her older brother and sister. Thus, it had meaning and purpose for the entire family, but most importantly for DK.

DK did accomplish long term goal #4, if she was provided a structure with which to scoop against, such as the therapist holding a knife upright or a raised-edge plate was used. Short term goals 4a and 4b were met by DK as specified above.

Collectively, the four aforementioned goals address several major issues around which this case study was centered: range of motion, posture, hand function, and volition. As a whole, improvement of these skills directly facilitated DK’s engagement in meaningful and purposeful occupations such as self-care and play. For example, during a recent therapy session DK’s mother expressed how DK wanted a book bag because she wants to go to school like her older siblings. This demonstrates that DK has some intrinsic motivation and personal goals. In order to achieve this goal, the aforementioned goals were set to improve upon DK’s weaknesses when compared to typically developing children.

During the creation of the aforementioned goals, a plethora of factors were taken into account. For example, the hand surgeon wanted increased range, strength and function in both
hands, nursing wanted ambulation and self-feeding improvements, child life specialists focused on her posture and the use of her hands for play; whereas her mother and therapy took a more holistic approach. DK also had plans of her own. She sought to assert her independence in order to avoid difficult tasks such as range of motion stretches, while also finding new ways to explore and interact with her environment. It is important to recall that DK was unable to walk or use her hands for meaningful and purposeful occupations for over a year and a half; thus, many gross and fine motor skills were and will continue to be in dire need of extensive rehabilitation. Furthermore, all of the obstacles and set-backs that DK and her family have experienced were at the forefront of goal-setting, as motivation and volition are key to occupational performance.

Case Study Interventions

Two specific interventions will be discussed in the following section. The first of which was the introduction and trial usage of Kinesio Tape as a new modality in pediatric burn care. According to a thorough review of the literature and extensive conversations with my site mentor, it was discovered that no formal, published research of KT in burn care currently existed. As a result, inclusion of it as an adjunct to therapy would not only be innovative, but it would provide an additional avenue to pursue in an attempt to improve DK’s trunk range and strength.

Principles from the biomechanical model and dynamic systems theory support the utilization of KT in burn care practice as previously outlined. The biomechanical model supports the use of external supports in facilitating posture and positioning the body for function; while dynamic systems theory suggests that existing movement patterns can be modified when control parameters are altered. Essentially, this translates into modification of subsystems, which
includes the musculoskeletal system (Kaplan & Bedell, 1999)—the system targeted by KT in this case study.

It is important to note that KT is not for every patient, nor does this student therapist advocate for its usage with every patient following a burn injury. However, in DK’s case traditional burn care treatments were not proving effective as is noted in the following discussion. First, ace wrapping DK’s shoulders in a figure eight position was utilized in an attempt to correct her shoulders from assuming a kyphotic position. This proved ineffective, thus the patient was progressed to use of an clavicle splint which again produced minimal results. Prior to the start of the case study, her therapist had also trialed a hip extension splint to target her tight hip flexors, however this was cumbersome and compliance was limited. Unfortunately, pressure areas developed on DK’s anterior superior iliac spines, on her knees, and in her axillae; as a result, they were limited in their effectiveness. In addition, the aforementioned treatments all restricted her active movement in some fashion, thus reducing her ability for strength-building opportunities. In combination with this splinting program, active strengthening and ROM stretching exercises were prescribed; however no improvements in posture and range of motion were reported by DK’s mother or observed in the clinic. Thus, a new modality in burn care intervention planning was employed as an adjunct to facilitating and supporting engagement in meaningful and purposeful occupations.

DK’s dorsal trunk muscles were taped according to the protocol outlined by the Kinesio Taping Association (1996) to strengthen her dorsal trunk extensors. She was initially taped on 2/26/09 and repeated tape applications occurred on 3/3/09, 3/6/09, 3/17/09, 3/24/09, 4/2/09, and 4/7/09. DK’s mother was instructed to leave each tape application on for three to five days and then remove it during a bath; their compliance was reported verbally. In order to measure
progress or regression, DK’s trunk extension range of motion was repeatedly measured over the span of approximately two months. When applied properly, KT can theoretically improve: weakened muscles, active range of motion, control joint instability, assist with postural alignment, relax over-used muscles, assist with pain management, and facilitate blood and lymph circulation (Kinesio Taping Association, 1996; Yasukawa, Patel, & Sisung, 2006; Yoshida & Kahanov, 2007). Thus, its proposed objectives match many of the issues present in DK’s case.

DK responded well to the repeated application of KT to her dorsal trunk extensors. No adverse skin reactions were noted, nor did DK report any discomfort from the tape initially or over time. Following each application, she participated in her typical therapy routine and daily living tasks without any issues or concerns reported or noted regarding the application of KT. Her trunk extension ranges were tracked overtime and presented in Table 2. While it is difficult to separate the impact of all the interventions contributing toward DK’s improvements, progress was evident over time.

The second intervention plan emerged based upon DK’s interest in communicating about her mother’s hospitalization, which necessitated DK’s additional admission the first week in March. During the weekend prior to DK’s hospitalization, her mother had become ill and had to be hospitalized with appendicitis. It was during her passive range of motion routine, that is standard at the Shrine, that DK vocalized her current situation in one-word phrases: “Mommy…hospital…belly (.touches belly)…hurt…doctors…medicine.” The student therapist confirmed DK’s story by reflecting back what she had stated in concrete phrases and DK told her story once more, repeating the same one word statements. Due to the fact that this series of events was socially and emotionally significant to DK, the therapist asked if she would like to make a card for her mommy. While she affirmed the choice, the meaning and purpose of the
occupation appeared considerable as DK remained engaged for almost six minutes, while working on a variety of her goals. The therapist set the occupational forms up to encourage trunk strengthening by arranging three tables at staggering heights in a U-shape and positioning DK to stand in the middle. Supplies were arranged on each table, which encouraged trunk flexion, extension and rotation. Furthermore, DK was given choices of large markers and standard-sized crayons to facilitate different grasping patterns/ranges and strength requirements. In addition, a sticker book was provided for her to not only grasp and peel stickers from, but also encourage volition in making independent choices. She also attempted to use her right forearm (not her hand) to hold the book open, while her left hand grasped for the stickers. DK adapted to the demands of the sticker pulling sub-occupation, by using her index and middle fingers as a pincer grasp, rather than her thumb and index finger. She made this adaptation as a result of weaken thumb adduction and opposition. Despite these challenges, DK achieved goal 3b as a result of this occupation, as she tried this process three times before saying the student therapist’s name aloud, which is how she often indicated a desire for assistance.

While this occupation was not planned for the session, the child demonstrated strong volitional characteristics in completing the occupation, however there are always improvements that can be made. For example, DK’s occupational performance may have continued if more items were available for use such as glitter, glue, and/or scissors. Furthermore, the inclusion of such items would have facilitated more active movement and the glitter and glue bottles would have encourage different grasp patterns that would have provided opportunities for active strengthening and prolonged practice. Furthermore, the student therapist would have preferred one of the tables be of at least chest height in order to encourage the patient to lift her upper extremities beyond shoulder height and encourage more extreme trunk extension. While a
surface of this height would have obstructed use of her hands for fine motor tasks, she could have placed her finished product on the table, or retrieved supplies from it as well.

Other occupational forms used to address her goals included the use of prone positioning for occupations and during naps to improve her dorsal trunk extensors and stretch her hip flexors, which has been endorsed and supported by the biomechanical model (Colangelo, 1999). Scooter boards were also used to enhance DK’s self-initiated movement, which she appeared to find meaning and purpose in, particularly when prompted to pretend to be a turtle or snake.

Additional two-handed occupations beyond the ones specifically mentioned in her goals included plastic canvas sewing occupations, painting on an upright easel, hanging and removing decorations on the OT/PT office door, cutting with scissors while stabilizing the paper with her other hand, dancing like Bella Dancerella or princesses, finding buried jewels in putty, and playing on a jungle gym in the hospital lobby.

General Outcomes

Together, DK’s ongoing standard care in addition to her progress toward specific goals/objectives related to participation in this case study lead to positive outcomes. Her reactions to synthesized occupations and her subsequent occupational performances, resulted in substantial improvement over the duration of this case study report, which lasted approximately two months, from February 24, 2009 to April 23, 2009.

In terms of range of motion, DK’s left hand and digit ranges have remained constant as this hand was operated on in October, 2008. Her right hand ranges have fluctuated due to the fact that this surgery was in late January, 2009 and some lapses in care were present during the family emergency, which hospitalized DK’s mother for a week. This difference is attributed to the process of scar maturation. Typically, scars mature 12 to 18 months post-grafting and are
classified as mature when they become less vascular in color, flatter and more pliable (Reeves, 2006). However, the active scarring process peaks between three and six months post-grafting, which can impact range of motion if not monitored and addressed correctly. Furthermore, normal healing and changes in splinting and pressure programs surely impacted the variations noted. Burn care is complex due to the fact that the skin is an interconnected organ; thus when changing her wrist extension splints from 24 hours per day to nights only, DK lost range in her wrists, however she was observed using her fingers more for fine motor tasks when the splints were removed. Thus, the pros and cons of each decision must be carefully evaluated and assessed over time. Burn care is complex, as the skin is dynamic and ever-changing during the healing process.

With regard to DK’s trunk extension ranges, the measurements illustrate that positive changes did evolve. However, it is difficult to separate what the precipitating agents were: engagement in occupations, creation of occupational forms to facilitate strength and range in DK’s trunk, passive range of motion exercises, natural healing, increased motivation and volition, the Kinesio Tape, etc. Nevertheless, positive changes were observed and the careful analysis of her occupational performance and anthropometrics contributed evidence toward an important surgery: release of her right flank.

In terms of DK’s volition and motivation, great strides were observed. For example, when provided with a novel occupation, DK’s curiosity appeared to be evolving, such as when she wanted to know what was creating the noise inside an Easter egg. Furthermore, she would try to solve her own problems when the occupation provided the “just right challenge.” This was demonstrated during a game of Connect Four, when she used her stronger left hand to secure a checker in a position that her weaker right hand could grasp it. While she needed directives to use her right hand to pick up the checker, she solved the problem of how to position it
independently. However, if the occupation or environment is overly challenging, DK still tends to need a considerable amount of outside support or will simply avoid or redirect her focus toward a more manageable task. For example, when presented with a coloring book page, DK quickly scribbled with her marker and then pointed across the table at toy car that she wanted to roll up and down the table, which was a simple task for her. Due to the fact that she is developmentally delayed, age appropriate occupations are often quite challenging, thus, she is rarely observed modifying the environment to increase the demands on her performance without outside prompting and encouragement. For example, she will not try to open containers of Thera-Putty without adult prompting, instead she appears to wait for assistance; thus, self-initiation is still in need of development.

DK’s ability to sustain her attention and see an occupation through to completion is improving, particularly when she finds the occupation meaningful and purposeful, such as when setting up a tea party for her aunt, who was visiting from overseas. Another major area of improvement was DK’s use of imagination. While she still requires intermittent adult support, she is able to play along and complete a reciprocal social interaction, whereas minimal imaginative play was observed prior to the start of this case study. For example, DK was observed picking up a pretend telephone and saying “hello” as well as saying “yummy” when bring spoonfuls of beads to her mouth. While it is not of age appropriate quality or quantity, it is demonstrative of progress. With all of these new skills, DK is also beginning to express pleasure with her accomplishments and readily seeks adult praise and interest by either grabbing the therapist’s cheek or saying “Look, Kristen,” when she makes an impact on her environment. While the length of time DK is able to remain engaged in an occupation is increasing, she quickly retreats when a new option is offered, rarely indicating a desire to remain with the
current task. Most significantly, DK is expressing her preferences, in fact, she has even begun incorporating the therapist’s words into her own play. For example, she asked the therapist when painting, “Which do you like, red or blue?” Thus, the concept of choices is becoming more cemented in her repertoire of skills.

Another area of noted improvement is the quality and quantity of language DK has begun to use during therapy over the course of this case study. While she predominantly speaks Hebrew when her mother is present, her use of 3+ word English sentences has increased during her mother’s absence. For example, she tries to tell stories about things that are important to her, such as iCarly and Sam, who are characters on a television show. In addition, she has expressed that she wants a small, white dog, which her mom has indicated they can get when her tracheostomy is removed. Moreover, her ability to independently name three occupations she wants to complete during therapy is a considerable success, especially as her mother indicated that she wants her daughter involved in age appropriate decision-making opportunities.

Finally, DK’s mother has also benefited from the goal-setting aspect of this case study as is demonstrated by the following example. During a follow-up outpatient visit on April 7, 2009, she came to therapy and said, “Kristen, we have new goals. DK wants to be able to run and jump!” This was the first time she had ever indicated a specific goal that she and her daughter had collaborated in developing. Empowering both mother and daughter to set and meet goals will be a key factor in maintaining success with home therapy programs both now and into the future.

In order to bring closure to this case study and facilitate the transfer of DK’s emerging skills to more naturalistic settings, a community outing to the Duke Energy Children’s Museum was approved and scheduled on the official day of case study termination, April 23, 2009. The
implications of this opportunity were vast and varied. For example, DK demonstrated a plethora of increased volitional indicators. In an environment full of novel, enticing childhood occupations, DK was able to indicate her preference for “driving.” While there were a variety of child-sized cars, tractors, buses, etc in different areas of the museum, DK both verbalized and physically gravitated toward these occupational forms. What is even more exciting about expressing this personal interest, was the challenging nature of boarding and exiting the pretend vehicles. DK had to climb stairs and balance on one leg while simultaneously lifting her other leg into the vehicle. Furthermore, the occupational forms demanded occupational performances including repeated sitting and standing. In addition, DK grasped the steering wheels with both hands, thus she was beginning to show mastery of incorporating her bilateral upper extremities into two handed tasks appropriately without constant prompting (see Figure 14).Figure 14. DK with student therapist in a child-sized car at the museum.

DK also demonstrated more advancements in the area of pretend play at the museum. For instance, she was very excited and proud of donning an apron when in the play kitchen area. She readily placed items in her child-sized shopping cart and prepared meals for her mother, therapist, and grandmother with play food (see Figure 15).
Expressions of mastery were profound as well, which were readily observed in a ball-play area, when she kept going over to the door and shouting her grandmother’s name who was resting on a bench. Her mother indicated that she was also re-telling the events of her play to her grandmother with great expression and voice inflection, which was not commonly seen in the hospital setting.

One of the most profound occurrences during the outing was the way in which bystanders responded to DK’s physical appearance, which were unplanned, but therapeutic events. One boy, approximately six years in age, who was unaccompanied by an adult at the time, was quite aggressive in his assessment. He said words such as “You are scary…you look messed up…what happened to you?” which he repeated several times. DK’s mother handled the situation exactly as the Shrine coaches by saying, “DK, would you like to tell him what happened to you?” to which she responded “Nope.” Her mother honored her request and simply responded, “DK doesn’t want to tell you right now, so you should go play now.” While this was not an ideal situation, her mother responded perfectly. On the other hand, another mother sat down on one of the restaurant stools when DK was preparing and serving food to her “customers” and
immediately engaged in pretend play with DK asking, “Can I have something to eat too?” While she did ask what happened to DK and if she would get better, it was a positive and polite conversation. Again, DK’s mother responded appropriately to the questions and encouragement provided by the woman.

The community outing to the museum provided a wide array of therapeutic benefits. For example, there were a variety of opportunities for DK to work on extension and strengthening of her trunk (see Figure 16), which she did for a longer duration and with what appeared like more enjoyment. She did not sit down for almost two hours, which is important to prevent shrinkage of her right flank release and graft. She climbed more stairs and did more independent squatting than had been observed in previous therapy sessions. Furthermore, the outing allowed the opportunity to educate DK’s mother about how community environments can be both fun and therapeutic, which will hopefully promote more carry over on a regular basis. Finally, it provided closure to the therapeutic relationships that had developed between the student therapist and DK and her family, which is important to acknowledge, as children deserve honest communication regarding the process of people coming into and out of their lives.

Figure 16. DK engaged in a ball activity to encourage trunk extension at the museum.
Conclusions

Discharge Recommendations

At the termination of this case study, DK’s care was resumed by her original therapist at SHC, who will continue to address her needs on both an inpatient and outpatient basis, depending upon her future needs. DK will require continued surgical management and ongoing therapy as scar tissue does not grow with a child. However, several major steps were taken to bring closure to this case study. First, DK’s mother was provided with Appendix D, which lists suggestions for functional occupations DK can complete at home to promote carry over outside of therapy. Second, Appendix E was created and elaborated upon with DK’s mother in order to assist in her recognition of the outcomes that were observed over the duration of this case study. Third, Appendix F was created to facilitate a smooth transition back to her primary occupational therapist. While DK will remain within the Shrine system it could be given to a community-based therapist as well, to promote DK’s continued success. It outlines major areas in need of continued attention. Fourth and finally, Appendix G was created to communicate DK’s needs if her care was to be hypothetically transferred to an outpatient therapist in the greater community, not to a therapist within the Shrine system. It was developed as a tool for new burn therapists in preparation for the support that is often necessary for therapists unfamiliar and uncomfortable with treating children with burn injuries.

In addition to all of these appendices, several additional discharge recommendations are warranted. For example, all assessments utilized in this case study should be repeated in six months including the PVQ, SIGA, and ASQ. If additional body areas are in need of KT, the Vancouver should be used to assess the maturity of DK’s scars prior to application. Furthermore, DK’s range of motion measurements should be assessed every week to monitor progress or...
regression and ensure proper passive range of motion techniques utilized at home are sufficient as well as if a splinting program is necessary. Please refer to Appendix H, as it details in PowerPoint format, the major tenets of this case study from start to finish.

*Implications*

This case exemplified several major areas of innovation and significant implications for the future of occupational therapy. First, it proposed play as a model of practice within a pediatric burn case study. Additionally, the PVQ was utilized within the play model of practice to evaluate the impact volition and motivation may have on children with burn injuries in regards to their fundamental desire for play. Second, it incorporated and evaluated the use of KT as an adjunct to burn care and rehabilitation, which has yet to be formally documented in the literature. The results and findings from this study have assisted in the potential development of future research to be conducted at SHC. Without the information gathered, a large scale study may not have been warranted. Third, this case demonstrates that even when small joints, such as those in the hand, are the focus of therapy, all aspects of the patient must be considered and evaluated to promote successful occupational performance. Without a holistic approach, other areas of potential growth may be hindered, such a volition. Fourth, the addition of a community outing demonstrates the importance of transferring skills to new environments as well as the significance of the environment on volition and occupational performance. Finally, this case supports the development of an occupation-based support program for families of children with burn injuries. The program would support and encourage community-outings to age appropriate social settings such as museums, shopping malls, and parks, which would not only support the engagement of children in functional occupations, but also offer parental support. Essentially, the fundamental goal of the program would be to promote therapeutic benefits outside of the hospital
in naturalistic settings. More specifically, the program would solicit a group of five to six families with children of preschool age and assist them in planning community outings once a month. The benefits of such a program are endless including: creation of a support system beyond the staff at the hospital, provision of a sense of belonging for the children as other participants will look similar, establishment of a voice in the community as there is always strength in numbers, and an opportunity for children often isolated to socialize beyond their family unit prior to starting school. In addition, the families could create a toy lending library, which would allow participants to trial new toys without purchasing as many and determine their child’s interests and appropriate skill level. In addition, the families would be encouraged to develop play dates beyond the scheduled outings, which could provide more respite for the parents and age appropriate peer interactions for the children. The supervising therapist could offer suggestions for outings, develop a checklist for the children to try while on the outing, and send out information regarding potential toys to trial to promote age appropriate skills.

This case study has raised a plethora of implications for occupational therapy practice, both within this specific setting and for the profession at large. It documents many large steps forward for one little girl and, at the same time, the first step in the process of advancing knowledge and research for the future.

Acknowledgements

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participation of DK and her family. Thanks for welcoming me into your world in order to aid in my understanding of pediatric burn care and rehabilitation.
References


Objectives

At the conclusion of this presentation, participants will be able to:

1. Describe the basic functions of the skin, including basic anatomy and physiology.
2. Describe different types of skin grafting and the appropriate protocols used in treatment of various grafts.
3. Explain the primary focus of burn rehabilitation.
4. Identify common interventions utilized in burn care and rehabilitation.

**Please note: The contents of this presentation contain images that may be considered graphic in nature. Please feel free to look away or take a break if necessary**
Pediatric Burn Statistics

- Burns and fires are the leading cause of accidental death in the home for children 14 and under and the third leading cause of accidental death for adults.
  - Scalds are the leading cause of burn injuries for children
  - Kitchen is #1 area for children birth to 4; bathroom is #2

- Burns are one of the most expensive catastrophic injuries to treat
  - 30% TBSA burn, can cost as much as $200,000 for an initial hospitalization and physician fees; must also consider extensive rehabilitation and future reconstructions $$$

  (Burn Survivor, 2002)

Basic Skin Facts

- Skin is the largest of the body
  - Comprises ~15% of total body weight
  - Over 2 m² in surface area
  - Less than 2 mm thick in most places
  - Thickest skin on palms, soles of feet, back, and scalp; thinnest on eyelids

  (Falkel, 1994; SHC, n.d.)
Functions of the Skin

- Protection
- Conservation of body fluids
- Temperature regulation
- Excretion/secretion
- Physical appearance
- Vitamin D reproduction
- Sensation
- Immunologic function
- Permits function

(Philips, 2007; Saladin, 2001; SHC, n.d.)

Composition of Healthy Skin

- Collagen
  - Long, un-branched, coiled individual fibers
  - Wavy appearance with ample interstitial space
  - Provides skin with its strength; resists stress
- Elastin
  - Short, branched, interconnected fibers
  - Recoils skin when it is stretched to bring it back to its resting length.
- Ground Substance
  - Gel-like material surrounding the network of collagen and elastin
  - Purpose is to keep collagen fibers separate, lubricate, and protect the fibers

(Richard & Staley, 1994a; SHC, n.d.)
Anatomy & Physiology of Skin

- Skin is composed of 2 layers
  - Epidermis
  - Dermis
- Below the dermis, is the Hypodermis (adipose & areolar tissues)
- Underlying muscle and bone

(Saladin, 2001)

Hypodermis binds skin to underlying tissue. Purpose: energy reserve, padding, thermal insulation. 8% thicker in women.
Anatomy & Physiology of Skin

Epidermis
- Outer most layer
- .07-1.2mm thick
- Avascular
- Composed of Keratinocytes
- Purpose = Protection

5 Layers
1. Stratum basale (deep)
2. Stratum spinosum
3. Stratum granulosum
4. Stratum lucidum
5. Stratum corneum (superficial)

(Reeves, 2006; SHC, n.d.)

1. Stratum Basale - regenerates keratinocytes and melanocytes; lines the appendages (hair, nails, sweat glands, sebaceous glands)

2. Stratum Spinosum - protect the basal layer; thicker in areas where there is a lot of trauma or shear (soles of feet, palms); cells don't divide here but do change shape

3. Stratum Granulosum - keratin is formed here; keratin is fibrous protein made by keratinocytes; what gives us our water-proofing characteristics

4. Stratum Lucidum - purpose is unclear; increased thickness of skin to help protect the basal layer

5. Stratum Corneum - multiple layers of dried, dead cells of keratin; brushes off with trauma; protects us against bacteria/toxins; if this layer is lost, would lose -50% of water-proofing characteristics

Takes approximately 45-72 days for a newly formed keratinocyte to pass from deepest layer to the surface to be shed.

(Reeves, 2006; SHC, n.d.)
Anatomy & Physiology of Skin

Dermis
- 20-30 times thicker
- Vascular
- Composed of Fibroblasts
- Purpose = Structure & Movement
- Consists of collagen, elastin, blood, lymphatics, nerves
- Houses hair follicles & their smooth muscle and sebaceous & sweat glands and their ducts

- 2 Layers
  - Papillary Dermis (superficial)
  - Reticular Dermis (deep)

(Saladin, 2001; SHC, n.d.)

1. Papillary Dermis (more superficial) – 1/5 thickness of dermis; attaches to the epidermis; have papillae that rise into the epidermis; papillae have a capillary loop in them which is how the epidermis gets its nourishment

2. Reticular Dermis – 4/5 of dermis; more densely packed, consists of collagen, merges with the subcutaneous tissue
Anatomy & Physiology of Skin

- **Epidermal Appendages**
  - Pockets of epidermis that extend into dermis
  - They do not regenerate
  - Examples:
    - Hair
    - Nails
    - Sweat glands
    - Sebaceous glands

- **Nerves**
  - Located primarily in dermis; however some free endings in epidermis (may be associated with itching)
  - Papillary dermis = sensations of touch and temperature, more commonly altered
  - Reticular dermis = sensations of pressure and vibration

(Reeves, 2006; SHC, n.d.)

Consequences of Skin Damage

<table>
<thead>
<tr>
<th>Structure Damaged</th>
<th>Implications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stratum basal</td>
<td>No cell proliferation</td>
</tr>
<tr>
<td>Stratum spinosum</td>
<td>Lose immunologic function &amp; protection of basal layer</td>
</tr>
<tr>
<td>Stratum granulosum</td>
<td>Lose water</td>
</tr>
<tr>
<td>Stratum lucidum</td>
<td>Unclear; possible protection of basal layer</td>
</tr>
<tr>
<td>Stratum corneum</td>
<td>Toxins/bacteria able to enter</td>
</tr>
</tbody>
</table>
### Structure Damaged

<table>
<thead>
<tr>
<th>Structure Damaged</th>
<th>Implications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Melanocytes</td>
<td>Lose pigmentation and protection from sun</td>
</tr>
<tr>
<td>Collagen</td>
<td>Lose tensile strength and durability</td>
</tr>
<tr>
<td>Nerves</td>
<td>Lose sensation</td>
</tr>
<tr>
<td>Vascular system</td>
<td>Loss of nutrition, slowed healing, and edema</td>
</tr>
<tr>
<td>Sebaceous glands</td>
<td>Lack of lubrication</td>
</tr>
<tr>
<td>Hair</td>
<td>Cosmetics, protection from environment, impaired thermoregulation</td>
</tr>
</tbody>
</table>

### Tools to Classify Burn Wounds

- **Rule of Nines**
  - Rapid and convenient method to estimate the extent of burns
  - Divides the body surface into areas comprising 9% or multiples of 9.
  - Limited accuracy when used with children

(Philips, 2007)
Tools to Classify Burn Wounds

- **Lund & Browder Scale**
  - Modifies percentages of areas based upon age
  - More accurate in calculating burn injuries in children
  - Refer to Modified Lund & Browder Chart Handout

- For a quick estimate, the surface area of the palm (minus the digits) is roughly 1%

(Philips, 2007)

Classification of Burn Depth

<table>
<thead>
<tr>
<th>Depth</th>
<th>Appearance</th>
<th>Area Damaged</th>
<th>Sensation</th>
<th>Blanching</th>
<th>Wound Closure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Superficial 1(^{st}) degree</td>
<td>Pink/red, dry or moist</td>
<td>Epidermis</td>
<td>Intact</td>
<td>Present</td>
<td>3-5 days, no scarring</td>
</tr>
<tr>
<td>Superficial Partial Thickness 2(^{nd}) degree</td>
<td>Bright pink/red, wet, blisters</td>
<td>Epidermis &amp; portion of papillary dermis</td>
<td>Intact, painful, sensitive to temp &amp; air currents</td>
<td>Present</td>
<td>Heals by re-epithelialization in 10-14 days without scarring</td>
</tr>
<tr>
<td>Deep Partial Thickness 2(^{nd}) &amp; 3(^{rd}) degree</td>
<td>Mottled red, waxy white, wet</td>
<td>Epidermis &amp; portions of reticular dermis</td>
<td>Intact for pressure only</td>
<td>Diminished</td>
<td>Re-epithelializes in 12-21+ days with scarring</td>
</tr>
</tbody>
</table>
Classification of Burn Depth

<table>
<thead>
<tr>
<th>Depth</th>
<th>Appearance</th>
<th>Area Damaged</th>
<th>Sensation</th>
<th>Blanching</th>
<th>Wound Closure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full Thickness 3rd degree</td>
<td>White, tan, dry, leathery</td>
<td>Epidermis, entire dermis, &amp; epidermal appendages</td>
<td>May be intact for deep pressure only or absent</td>
<td>Absent</td>
<td>Skin graft required</td>
</tr>
<tr>
<td>Subdermal 4th degree</td>
<td>Charred, dry, may have deep structures exposed</td>
<td>Deep soft tissue, fat, muscle, &amp; bone</td>
<td>Absent</td>
<td>Absent</td>
<td>Extensive excision with grafting, flap, or amputation</td>
</tr>
</tbody>
</table>

(SHC, n.d.)
Classification of Burn Depth

I) Superficial (1st degree)
(1) Involves the epidermis only
(2) Wound is very erythematous (red); no blisters; dry; some pain; minimal swelling
(3) Healing is spontaneous (generally 3-5 days)
(4) Typically no scarring

II) Superficial Partial Thickness (2nd degree)
(1) Involves epidermis and papillary dermis
(2) Wound is bright red, pink, or mottled; dermis is inflamed; wound blanches when pressure is applied with rapid capillary refill; blisters remain intact - when removed wounds are wet and weepy; very painful to superficial touch, temperature changes, and air currents; moderate swelling
(3) Healing is spontaneous (generally 7-14 days)
(4) May have some scarring, but this generally occurs in the form of mild discoloration (Melanocytes are in the epidermis, which has been destroyed, therefore the skin tone won't return to normal); may be hypo or hyper pigmented

III) Deep Partial Thickness (2nd - 3rd degree)
(1) Involves epidermis, papillary dermis, and reticular dermis
(2) Wound id mixed red/waxy white; have marked edema; wet; no blisters; blanches but capillary refill is very sluggish; will retain sensation but only to deep pressure
(3) Healing is spontaneous but takes 2-3 weeks
(4) Have excessive or hypertrophic scar and contracture formation

IV) Full Thickness (3rd degree)
(1) Involves epidermis, papillary dermis and reticular dermis; may include some areas of subcutaneous tissue
(2) Wound may have a variety of colors - black, white, cherry red; may see vein thrombosis of superficial blood vessels; eschar is dry, leathery, inelastic; no sensation; no swelling
(3) Skin will only heal by grafting

V) Subdermal (4th degree)
(1) Involves epidermis, papillary dermis, reticular dermis, and subcutaneous tissue
(2) Wound is totally charred; anesthetic; often muscular and neurological involvement; minimal swelling
(3) Healed only by grafting; may require muscle transplantation (flaps)

(SHC, n.d.)
Phases of Wound Healing

- Inflammatory Phase
  - Vascular & cellular response
  - Wound is warm, red, painful, & edematous
  - Lasts 3-10 days

- Proliferative Phase
  - Begins by 3rd day post-burn
  - Revasculization, re-epithelialization & contraction of wound
  - Fibroblasts deposit disorganized collagen fibers and pull edges together
  - Wound is red, raised, rigid, and scarred
  - Lasts until wound heals

- Maturation Phase
  - Begins by 3rd week after initial healing
  - Disappearance of fibroblasts, spontaneous collagen remodeling
  - Goal: soft, flat, pliable, and avascular (faded) scars
  - May last 2 or more years

(Reeves, 2006; SHC, n.d.)

Inflammatory
- Neutrophils & monocytes migrate to wound to attack bacteria, debride the wound, and initiate healing process. Leads to edema.

Proliferative
- New tissue is not created
Types of Wound Healing

- **Primary**
  - Wound re-approximated by suture or tape

- **Secondary**
  - Wound heals through granulation & re-epithelialization
  - Increased healing time & increased scarring
  - Allow when wound is contaminated

- **Tertiary**
  - Wound is allowed to “try” to heal, then surgically closed

(Reeves, 2006; SHC, n.d.)

Types of Skin Grafts

- **Auto Grafts**
  - Permanent surgical transplantation of the upper layers of a patient’s own skin taken from an unburned donor site

- **Split Thickness Auto Graft = STAG**
  - Epidermis and top layer of dermis harvested from unburned donor site & placed on excised burn wound

- **Full Thickness Auto Graft = FTAG**
  - All of the epidermis and dermis are harvested
  - Minimal contraction and more durable
  - Used for small areas and reconstructive procedures
  - Donor site is sutured closed and does not hurt

(Reeves, 2006; SHC, n.d.)
Types of Skin Grafts

- **Tanner Meshed Auto Graft = TMAG**
  - Donor skin fed through Tanner Mesher
  - Can expand the skin 1.5 to 9 times its original size
  - Increased scarring & permanent meshed pattern on mature skin

- **Sheet Graft**
  - Superior cosmetic appearance
  - Decreased contraction & scarring
  - Increased durability
  - Drawback: can only cover small areas

(Reeves, 2006; Sharp, n.d.; SHC, n.d.)

Sheet vs. Mesh Grafting
Healing: Skin Graft vs. Donor Site

- **Skin Graft**
  - Initially held in place by staples/sutures and dressings
  - Within 48 hours, blood supply is established
  - POD #5 graft is considered “taken” or well established

- **Donor Site**
  - Heals spontaneously
    - If within 7-10 days = minimal scarring
    - If 10-14+ days = increased scarring
  - Similar to partial thickness burn
  - Re-epithelialization is required

(SHC, n.d.)
Alternative Skin Closure Methods

- **Temporary Grafts**
  - Allograft = Processed human cadaver skin
  - Xenograft = Processed pigskin
  - Rejected by body 2-3 weeks after application
  - “Biological wound dressing” until donor sites or cultured skin is available

- **Skin Substitutes**
  - Various brands available
  - High cost & sub-optimal outcomes
  - Ongoing research

- **Flaps**
  - Transfer of tissue with own blood supply to cover an avascular area (e.g. over bone or tendon)
  - Used when traditional skin grafting is ineffective

(Greenhalgh & Staley, 1994; Philips, 2007; Reeves, 2006; SHC, n.d.)

Cultured Skin (only grown at SHC-Cincinnati)
Biopsy from unburned skin taken, cells grown in lab, transplanted to wound
Used in high TBSA burns with limited donor sites
Usually takes 3-4 weeks for skin to be available for grafting
Reasons for Graft Failure

- Collection of blood or serum under graft
- Infection
- Mobility of graft on wound bed (shearing)
- Inadequate wound bed preparation/ excision

(SHC, n.d.)

Factors impacting Wound Healing

- Age (worse for < 2 and > 65 years of age)
- Body structure
- Stress
- Significant medical history
- Nutrition
- Radiation
- Drugs
- Smoking

(SHC, n.d.)
SHC – Cincinnati
Suggested Burn Service Protocol

<table>
<thead>
<tr>
<th>Type of Graft</th>
<th>1st Dressing</th>
<th>Staples Out</th>
<th>ROM Initiated</th>
<th>Ambulate (below knee graft)</th>
<th>Weight Bearing (plantar graft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mesh</td>
<td>2</td>
<td>5</td>
<td>5</td>
<td>7</td>
<td>10</td>
</tr>
<tr>
<td>Split</td>
<td></td>
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</tr>
<tr>
<td>Thickness</td>
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</tr>
<tr>
<td>Sheet</td>
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<td>5</td>
<td>5</td>
<td>7</td>
<td>10</td>
</tr>
<tr>
<td>Split</td>
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</tr>
<tr>
<td>Thickness</td>
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<td></td>
</tr>
<tr>
<td>Sheet</td>
<td>1</td>
<td>7</td>
<td>7</td>
<td>7</td>
<td>10</td>
</tr>
<tr>
<td>Full Thickness</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(SHC, n.d.)

Primary Purpose of Burn Rehab

- **Prevention and treatment of burn scar contracture deformities and hypertrophic scarring.**
- **Scars never go away completely, however they can be minimized!**
- 7 Major Focus Areas
  1. Positioning
  2. Splinting
  3. Functional Ambulation
  4. Range of Motion (ROM)
  5. Scar Control: Pressure & Massage
  6. Occupations

(SHC, n.d.)
The Burn Scar: Why is it our enemy?

- Primarily composed of collagen
- Elastic fibers do not regenerate once times destroyed
- Wavy, disorganized, whorl-like appearance
- Scar tissue is ~12 times stronger than skin
- Can lead to contractures and deformity = loss of independence

(SHC, n.d.)

OT Toolbox: Positioning

- Begins upon Admission
  - Locate & evaluate areas burned
  - Check for edema
  - Consider the posture the pt. prefers to assume
    - Position of Comfort vs. Anti-deformity Position
  - Be creative!
    - Pillows, slings, Z-flow, bedside tables, towels, & gravity
- Skin will contract until it meets an equal and opposite force
- Scars work 24 hours/day; thus positioning must counteract scarring 24 hours/day
- Refer to OT/PT Protocols for Positioning Handout

(Reeves, 2006; Sharp, n.d.)
Positioning

- Position of Comfort
  - Adduction & flexion of UEs
  - Flexion of hips & knees
  - Planter flexion of ankles

- Anti-Deformity Position
  - Major joints extended
  - Consider prone for sleeping for a prolonged stretch.

(Reeves, 2006; Sharp, n.d.)

Positioning:
Anterior Neck Burn/Graft

- Anti-Deformity Position: Neck Hyper-Extension
  - NO pillow
  - Shoulder roll
  - Short mattress
  - Foam wedge

(Sharp, n.d.)
Positioning: Axilla Burn/Graft

- Anti-Deformity
  Position: Abduct shoulders to 90 degrees 24 hours/day
  - Use slings (lambs-wool), splints, pillows, z-flows

(Sharp, n.d.)

Positioning: Palmar Burn/Graft

- Anti-Deformity
  Position: Extend palmar surface
  - Wrap gauze roll to back of hand to extend digits
  - Palmar extension splint

(Sharp, n.d.)
Positioning: Perineum Burn/Graft

- Anti-Deformity
  Position: Abduct legs, keep in neutral rotation
  - Pillow, bolster, or foam abduction wedge between legs

(Sharp, n.d.)

Positioning: Posterior Leg Burn/Graft

- Anti-Deformity
  Position: Extend knees
  - Knee immobilizers
  - Keep bed flat or in reverse trendelenburg

(Sharp, n.d.)
Positioning: Ankle Burn/Graft

- Anti-Deformity
  - Position: Neutral ankle
    - Ankle dorsiflexion with a footboard, multipodus boot, fabricated foot splint, pillows, or velfoam strapping
    - Heels off bed to prevent pressure areas

(Sharp, n.d.)

OT Toolbox: Splinting

- Indications
  - Protection of anatomic structures
  - Prevention of deformity
  - Preservation of skin graft integrity
  - Restoration of function

- Begin when positioning is not adequate
- Monitor to prevent pressure areas on fragile skin
- Be creative and consider different materials

(Daugherty & Carr-Collins, 1994; Sharp, n.d.)

Materials: Thermoplast, plaster/casting, foam, etc
Common Burn Splints

- Resting hand splint
- Axilla splint
- Hip Spica/Extension Splint
- Posterior Foot Drop Splint

OT Toolbox: Functional Ambulation

- Ambulate ASAP to prevent de-conditioning also assists with stretching tight muscles
- Grafted areas have decreased vessel tone; thus, extra external pressure is needed to prevent engorgement & graft loss during out-of-bed activities
  - Ace wrapping
- Pre-Ambulation Workout
  - Calf pumps, straight leg raises, gluteal tightening, sitting edge of bed

(SHC, n.d.)
Ace Wrapping for Ambulation

Figure 8: foot to knee
Spiral: knee to groin
OT Toolbox: ROM/Stretching

- Rule: If it’s white, it’s tight!
- 2x/day
- Try to see/stretch skin open during dressing changes 1x/day

- Types of ROM
  - PROM
  - AAROM
  - AROM

(Richard & Staley, 1994b; SHC, n.d.)

Try to see/stretch skin open 1x/day: movement restricted by aces/dressing, visualize wound, prevent unnecessary auto-releases

PROM Contraindications:
Heterotrophic ossification
Exposed tendon

AAROM
Pt. cannot achieve full range independently

AROM
Often coupled with PROM to encourage strengthening
OT Toolbox: ROM/Stretching

- Theories
  - Successive Length Induction
    - Increase in tissue length with repeated stretching to the same amount of terminal force
  - Tissue Creep
    - Progressive elongation of the tissue when it is stretched with the force maintained at a constant
  - Stress Relaxation Curve
    - Progressive reduction in force required to keep tissue at a given length
  - Strain Rate
    - How quickly the load used to elongate a tissue is applied
    - A faster application of the stretch has less appreciable effect on tissue elongation; a slow stretch allows the tissue to adapt and elongate

(Richard & Staley, 1994a; SHC, n.d.)

OT Toolbox: Massage

- Perform 3-6x/day for 5-10 minutes
- Initiate when scars can tolerate shearing forces
- Press hard enough to make scar blanch
- Do not perform over open wounds
- Use Eucerin or Aquaphor

- Positive Effects
  - Scar desensitization
  - Reduction in edema
  - Loosens adherent tissues
  - Minimizes itching
  - May incorporate with stretching to assist in tissue elongation

(SHC, n.d.)
OT Toolbox: Pressure

- Guidelines
  - Skin that heals in less than 10 days = no pressure necessary
  - Skin with increased pigment (African American, Hispanic, etc) that takes 10-14 days to heal = pressure recommended
  - Skin of any pigmentation that takes 14-21 days to heal = pressure recommended
  - Any skin that takes over 21 days to heal = pressure mandatory!

(SHC, n.d.)

Typical Progression of Pressure

- Digits
  - Kerlix/Burn dressing
  - Fingernet
  - Stat wrap
  - Coban
  - Pressure garment glove

- Body
  - Kerlix/Burn dressing
  - Aces
  - Tubigrip
  - Pressure garment

(SHC, n.d.)
Hypothetical Benefits of Pressure

- Acceleration of the scar maturation process
- Superficial blanching
- Flattening of the scar
- Increasing pliability
- Decreasing edema
- Decreasing rate of collagen synthesis
- Encouraging collagen bundles to realign parallel to epidermal surface
- Absent or less prominent nodules
- Decreased cohesiveness of intercollagen fibers
- Increased collagenase-mediated collagen breakdown
- Better cosmetic outcome

*Ongoing research regarding effect and benefit*

(Richard & Staley, 1994b)

Pressure Garment Protocol

- Optimally, provided with 3 sets: wear, wash, dry
  - Wash daily
  - Change 2x/day
- Worn 23 hours per day
  - Removed for bath, massage and exercises only
  - Rest break should not exceed 30-60 minutes
- Replace every 3 months
- Typically worn 18-24 months or until scar mature

(Richard & Staley, 1994b; SHC, n.d.)

Insurance will often only pay for 1 set!
Pressure decreases in garments by 50% after 3 months, not as effective if not replaced
Scar Maturity

- Occurs between 6-24 months post-injury/grafting
- Characteristics of a Mature Scar:
  - Avascular/faded
  - Flat
  - Soft & Pliable

Vancouver Burn Scar Assessment
- 0 to 3 scale
- Pigmentation
- Pliability
- Vascularity
- Height

Let’s try some of these techniques out!

Get with a partner!

1. Ace wrapping lower extremity
2. Coban application to hand
Occupation: Coban Application

1. Begin wrapping the digit with the Coban at the fingernail level pointing towards the hand. The first full loop around should form a little “V” at the fingernail.

2. Wrap down and around the finger for the first turn. Leave the fingertip exposed unless stump wrapping an amputated digit.

3. Continue wrapping the digit in a spiral fashion toward the hand, overlapping the previous turn by half the width of the coban. Wrap all the way to the base of each digit.

* Apply web spacer inserts now if preferred *

SHC, OT/PT Dept, 2006
Occupation: Coban Application

4. Wrap the hand by starting at the knuckles. The first turn must be enough to overlap the Coban at the base of the fingers. Finish wrapping the hand by overlapping each layer by half. Cover all the skin and extend 1-2 full wraps beyond the wrist.

* Apply web spacer inserts now if preferred *

5. Cut small strips and place between each finger and thumb web space. These are used over additional web spacer inserts as indicated by the therapist. Secure around the hand if needed.

Correct Application:
Every space of skin is covered by coban, if not cut another piece it is okay or else edema will set in!

The fingertips are visible and pink.
Web spacers are firmly in place between the fingers and are anchored down by coban.
The wrap extends 1 to 2 full wraps past the wrist
Do not pull, will cause pressure area
Application of Web Spacers

• Velfoam web spacers can be applied directly on the skin, or over coban after the hand has been wrapped. There is no difference in outcome, as long as there is good pressure downward into the webs.

• Be sure the insert is all the way down in the web, and apply moderate downward pressure.

• Secure with thin strips of coban over top of the web spacers and by wrapping around the hand if needed.

SHC, OT/PT Dept, 2006
OT Toolbox: Occupation

- ROM → Function → Occupational Performance
- Major limitations will be caused by contractures or potential amputations.
- Work on performance areas including:
  - ADLs, IADLs, educational issues, return to work and/or play, leisure & social participation
- May need adaptive equipment
- Finding meaningful and purposeful occupations may increase performance!

Skin is one of our main clients in the early acute phases.

May need adaptive equipment: build up handles for limited grip or long handled utensils for limited ROM

Rote exercises may be seen as an adjunct to achieving a functional goal.
Contractures

- Occur during the scarring phase
- Commonly caused by non compliance with home program
- Also may develop as child grows and burned skin cannot grow or stretch with child
- Develop due to pulling forces in the scar
- If left untreated can lead to permanent shortening of the skin or scar
- Severe deformities can result – joints can be subluxed or pulled out of place
- May need multiple surgeries to correct

(Sharp, n.d.)
Potential Complications

- **Pruritus = Persistent Itching**
  - Garments, massage, moisturizers, & medications

- **Microstomia**
  - Tightening of skin around the lips that limits mouth opening

- **Heterotrophic Ossification**
  - Development of bone in tissue; occurs in 13% burn injuries
  - PROM contraindicated

- **Heat Intolerance**
  - Split thickness grafts do not contain sweat & sebaceous glands

- **Amputation**
  - Burn to deep to salvage/graft

- **Reconstructive Surgery**
  - Cosmetic and functional purposes
  - Growth, contractures, deformities, etc.

(Pessina & Orroth, 2008)
Psychosocial Adjustment

- School & Community Re-entry Programs
- Phoenix Society for Burn Survivors
  - SOAR = Survivors Offering Assistance in Recovery
- Burn Survivor Camp

Phoenix Society Mission Statement
To empower anyone affected by a burn injury through peer support, education, and advocacy.

SOAR provides training to burn survivors or their family members who want to volunteer as peer support for those with burn injuries. It is a hospital based program that has grown from 6 pilot hospitals to over 30 since its formation in 2001.

Burn Survivor Camps provides children recovering from a severe burn the opportunity to experience all the activities of a regular camp — such as swimming, horseback riding, canoeing, games and cook-outs with children coping with similar issues — essentially no one is different because of their scars.
Pain Management

- Nerve endings partially intact in partial thickness burns = significant pain
- Pharmacological Management
  - Morphine, Versed, Fentanyl (short acting/procedural)
- Non pharmacological Management
  - Guided imagery, controlled breathing, hypnosis, distraction (music, cartoons, video games)
- Monitor Vitals: BP, heart rate, respiratory rate

(Esselman, Thombs, Magyar-Russell, & Fauerback, 2006)

Nerve endings are severely destroyed in full thickness burns = less pain

Long-term Outcome Study

- Sheridan et al. (2000)
  - Investigated the long-term outcomes of 60 patients who has sustained a ≥70% TBSA burn when they were 18 y/o or younger
    - SF-36 was used with patients 14+ years of age; if younger than 14, parental report on SF-36
  - Scores compared to age and sex matched national norms
Sheridan et al. (2000) Results

- SF-36 domain scores from subjects with burn injuries did not significantly differ from those of the normal population, except for Mental Health domain.
- However, 15% and 20% of subjects reported more than 2 standard deviations below the norm on the domains of physical functioning and physical roles, respectively.
- Three variables appeared to correlate with domain scores for subjects with burn injuries:
  1. Better functional status of family
  2. Early reintegration
  3. Consistent multidisciplinary follow up clinic visits

Better functional status of family predicted higher physical role
Early reintegration to pre-burn activities at 4 months post-d/c predicted higher scores on general health, physical functioning, and physical role
Children with a consistent follow up in a multidisciplinary clinic for 2 years had higher physical function
References


Good afternoon and welcome to my presentation entitled Beyond Burns an Occupational Therapy Case Study at SHC.
Imagine life as DK, a burn survivor who sustained a 90% Total Body Surface Area burn in May, 2007 as a result of her father adding paint thinner to ignite a family barbeque.

The photo on the left is of her several months prior to the accident and the photo on the right is how she arrived at Shriners, in July 2008, approximately 9 months ago.

Her case study was utilized in the development of my Capstone Dissemination. While there were many unique evaluations and interventions utilized with DK and her family during my time here, I have highlighted a few major areas to share with you in this abbreviated presentation.

However, I’d first like to share a little background on DK, to remind you were she has been and where she is going!
When she arrived at SHC, 5% of her body remained open, however the areas that had been covered had contracted drastically, rendering all four of her extremities completely non-functional. She had not ambulated in over 18 months and would not do so until nearly 2 years post-injury. Furthermore, there were a plethora of culture and language differences that required adaptation of both her medical team and her family.
Unique Evaluations Utilized

- Pediatric Volitional Questionnaire (PVQ)
  - Geist & Kielhofner, 2001
- Ages & Stages Questionnaire (ASQ)
  - Bricker & Squires, 1999
- Self-Identified Goals Assessment (SIGA)
  - Melville & Nelson, 2001
- Burn Scar Assessment/Vancouver
  - Novel purpose: evaluation of scar maturity for Kinesio Taping

In order to build a comprehensive evaluation for my case study I used the following assessments, which would just like to briefly review, to remind you of their availability and use in the pediatric setting. I will also pass a copy of each around for you to see, if you are interested.

The PVQ (Geist & Kielhofner, 2002) is an observation tool that assesses a child’s volition, or motivation through the examination of fourteen behavioral indicators. Each behavior is rated based upon the level of spontaneity and the amount of support, structure, or encouragement required for the child to demonstrate a specific volitional behavior. The four ratings, from most advanced to most basic, include: spontaneous, involved, hesitant, and passive. In addition, there is an Environmental Characteristics Form, which seeks to highlight how different environments enhance or limit a child’s volition as well as a Summary Form.

The ASQ is a self-report instrument designed to screen children birth to five years of age in five major categories including: communication, gross motor, fine motor, problem-solving, and personal-social development (Bricker & Squires, 1999; Stewart, 2005). Parents are to respond to the questions/statements regarding their child’s skill level by checking the appropriate box indicating “yes,” “sometimes,” or “not yet.” Scores help assess age appropriate skills that are nonexistent, emerging, or already present. In this case study, it was used to develop interventions and set appropriate goals.

While the SIGA (Melville & Nelson, 2001) is intended for use with adults in sub-acute rehabilitation settings, it was modified for application to this case study. It was used with DK’s mother instead of with DK directly, which deviates from the protocol but is acceptable per the authors. Essentially, DK’s mother was asked to think about all the things she wants DK to be able to do in order to elicit up to five specific therapy goals. A visual scale was then shown and she was asked to rank her daughter's ability to complete each goal on a scale of zero to ten, with
ten indicating independence and zero, dependence. According the protocol, the goals are then to be re-evaluated at regular intervals and at discharge to document progress.

Finally, the Vancouver was utilized with a novel purpose in mind: to provide data that the scars on DK’s dorsal trunk were mature and could withstand the forces of the Kinesio Tape, which brings us to the major focus of interest in this case.
Overview of Kinesio Tape

- Developed in 1973 by Dr. Kenzo Kase in Japan
- Thin, cotton, porous fabric with acrylic adhesive
- Worn 3-5 consecutive days, can bath with it on
- Different from other athletic tapes: Elastic in nature
  - Stretches up to 30-40% of resting length

Kinesio Tape (which I will refer to as KT) was developed in 1973 by Dr. Kenzo Kase in Japan, who is a chiropractor by training. The basic theory of KT is grounded in principles of eastern medicine, which relies heavily on facilitating the body’s own natural healing process.

In terms of its characteristics, KT is a thin, cotton, porous fabric with an acrylic adhesive that is both non-medicated and latex free.

KT can be worn 3-5 consecutive days without compromising its adhesive quality. You can bath with it on; however, it is recommended that you carefully pat it dry if it gets wet.

It can be stretched up to 30-40% of resting length and will contract back following application. Its elastic quality is essential as it creates convolutions that are theorized to lift the skin and take pressure off of the underlying interstitial fluid in order to assist with the normal healing process.
Theoretical Background

- Injury or fatigue $\rightarrow$ decreased interstitial space between skin and underlying connective tissues.
- Connective tissues are compressed $\rightarrow$ stimulation of pain receptors
- Elasticity $\rightarrow$ convolutions in the skin $\rightarrow$ increased interstitial space

As I started to explain in the previous slide, KT advocates believe that when a muscle is inflamed, swollen or stiff due to injury or fatigue, the interstitial space between the skin and the underlying connective tissues is compressed, thus restricting the flow of blood and lymph. Furthermore, this tissue compression stimulates pain receptors. Thus, when KT is applied according to Kase’s protocol, which I will outline in a moment, the elasticity in the tape creates convolutions in the skin, thus increasing the interstitial space leading to a variety of proposed benefits, which include the following.
Theoretical Benefits

- Improve proprioception
- Support for weak or overused muscles
- Enhance range of motion during times of muscle weakness
- Decreases joint instability/re-positions subluxed joints
- Facilitation of correct postural alignment
- Reduce pain symptoms
- Enhanced blood and lymph circulation

(Kinesio Taping Association, 1996; Kahanov, 2007; Yasukawa, Patel, & Sisung, 2006; Yoshida & Kahanov, 2007)

Improved proprioception, support for weakened muscles, enhancement of ROM during times of muscle weakness, decreasing joint instability or re-positioning of subluxed joints, facilitation of correct postural alignment, reduction in pain symptoms, and enhanced blood and lymph circulation. Again, these are proposed and many still need to be formally tested through the research process.
How are convolutions created?  
KT Un-stretched Taping Protocol

- Muscles/skin of the affected area are put on a stretch *prior* to the application of KT
- KT is applied while the stretch is held, without stretching the tape
- Following application, muscles/skin return to relaxed position
- Tape should be wrinkled
- Convolutions occur during normal movement, which increases interstitial space

So you may be wondering, how are these convolutions created. Essentially there are two methods. In the un-stretched taping protocol, the muscles and skin in the affected area are put on stretch prior to the application of the tape. While the stretch is held, KT is applied without adding any stretch to the tape, rather is it is laid on the body. When the skin and muscles contract back to their normal position, following application, the tape will be wrinkled. During normal, active movement, the tape creates convolutions on the skin, which theoretically promotes more interstitial space.
KT Stretched Taping Protocol

- Indicated when joints and ligaments are injured
- Tape stretched prior to skin application
- Structures being taped are maintained in a functional position; they are not stretched
- Damaged areas are incapable of normal function and rely on stretched tape for correction
- Tape offers sensorimotor feedback

On the other hand, if joints or ligaments are injured, the tape should be STRETCHED before application to the skin (the most I had read was stretching the tape approximately 15% of its resting length). It is important to note that when using this procedure, the structures being taped are maintained in a functional position; they are not stretched. Essentially, the damaged joints or ligaments are incapable of functioning normally and rely on the stretched tape for correction. Essentially, the tape provided immediate sensorimotor feedback.
Caution

- Do not over stretch
  - May cause shearing, blisters, and micro-trauma → increased edema and hemorrhaging
  - Can also lead to over stimulation of nocioceptors in the skin causing increased pain and/or itching
- Taping individuals with delicate or fragile skins
  - Elderly, systemic illness, sensitive/traumatized skin
- Do a test patch!

There are several major points of caution that need to be considered when using KT. First, caution should be exercised to prevent overstretching the tape. This can lead to lateral shearing forces as well as blistering or micro trauma; thus increasing edema and hemorrhaging. Furthermore, increased unidirectional pull on the skin can cause over stimulation of nocioceptors causing increased pain or possibly itching.

Caution should also be exercised when taping individuals with delicate or fragile skin, such as the elderly, individuals who have a systemic illness, or those with sensitive and/or traumatized tissue, which includes the population here. Thus, extra caution needs to be taken to monitor the skin.

In addition, a small test patch is recommended for 24 hours prior to a full application to ensure adverse reactions do not occur. These can include:
Possible Abnormal Reactions

- Redness
- Itching
- Burning
- Swelling
Postural Considerations with DK

- Trialed all available tools to improve DK’s kyphotic posture:
  - Wrapping shoulders in figure 8 position
  - Clavicle splint
  - Hip extension splint
- Limitations
  - Pressure areas
  - Decreased opportunities for active movement

Prior to the start of this case study, Patti had tried all available tools in an attempt to improve DK’s kyphotic posture. First, she trialed ace wrapping her shoulders in a figure eight position and then progressed to a clavicle splint which again produced poor results; therefore, she trialed a hip extension splint, which again proved ineffective. In addition to these adjuncts, a HEP including passive range and active strengthening were both prescribed. Yet, the results were still mediocre at best. In addition, the aces and splints had caused pressure areas as well as restricted DK’s active movement in some fashion, thus they were limiting her ability for strength-building opportunities. As a result, KT was trialed according to the protocol for strengthening dorsal trunk extensors, which I will outline next.
KT Method: Strengthening Doral Trunk Muscles

1) Have pt bend forward, apply base of tape slightly above tailbone

2) Extend each arm of the Y parallel to the spine

3) Have pt return to upright position: tape should be wrinkled

In order to start the process, Katrina ordered us 2” KT. I then measured a piece to fit DK’s back from the top of her tailbone to her mid scapular region. The tape was then cut into a Y-shape by cutting down the center to create two arms while leaving space at the bottom for the base.
Kinesio Tape at Work on DK!
DK’s static standing trunk range of motion measurements were tracked over approximately one month. Her initial static standing trunk extension ROM pre-KT as measured at the hip was -20 degrees on the left and -25 on the right. Remember that negative numbers indicate a lack of range, thus she is stuck in flexion and cannot achieve zero, which was the goal.

KT was applied 7 times over the course of this case and her ranges were taken every time she was seen for therapy. While progress was made, as indicated at a follow up visit on 4/7/09 which demonstrated that she had gained 20 of trunk extension range bilaterally. We were still concerned, as she could not achieve zero on her right side. Due to the intense nature of this case study and the keen observations made regarding DK’s posture during play occupations and passive range of motion exercises, an additional set of anthropometric measurements were taken on 3/4/09, which indicated that she had a discrete scar band pulling in her right flank that was causing a half inch discrepancy between the bottom of her last rib and right ASIS and in the length between her ASIS and lateral malleolus.

While progress was documented, we still advocated for a release and grafting surgery as the literature documents that the potential complications for patients with leg length disparities caused by hip flexion contractures can have serious results including scoliosis and thoracic kyphosis. Due to the fact that the signs and symptoms of these complications had been documented over an extended period of time, a more aggressive approach was warranted, particularly as DK’s growth could be negatively impacted without a surgical intervention. Thus, the data collected through this case study, provided the evidence necessary to present our case to the chief of staff.
Outcomes

- Improvement was documented overtime, however we cannot correlate this with the use of KT
  - Other factors: PROM, active strengthening, etc.
- Intense measurement and assessment of her trunk lead to additional anthropometric measurements
- A release and grafting of RS’s right flank occurred on 4/9/09
- Post-op day 7 check on 4/16/09
  - Left = 0; Right = 0

While improvement was documented overtime, we cannot correlate this with the use of KT as other factors were concurrently utilized to promote range and function including passive range and active strengthening exercises.

However, it was through our intense measurement and assessment of her trunk that lead to the additional anthropometric measurements and a release and grafting of DK’s right flank on 4/9/09

I’m excited to report then when her trunk extension measurement was taken POD#7, when she was permitted to stand upright after being supine for 7 days, both her right and left trunk extension ranges were zero degrees during static standing.
Research on KT

  - Investigated the effect of KT on upper extremity functional motor skills with 14 children with disabilities
  - Measured: Pre-KT, post-KT, 3 days post-KT
  - Statistically significant improvements overtime (p < .001)

  - Investigated the effect of kinesio taping on lower trunk range of motions with 30 healthy adults
  - Measured: Pre-KT and immediately post-KT application
  - Statistically significant improvement was noted in trunk flexion, no statistically significant differences in measurements of trunk lateral flexion and extension

So you may be wondering at this point, what does the research indicate on KT. Unfortunately, I have to report that it is limited in both quantity and quality; however I do want to share two studies with you.

Yasukawa, Patel, and Sisung conducted a pilot study investigating the effects of kinesio taping on upper extremity functional motor skills as measured by the Melbourne Assessment of Unilateral Upper Limb Function. They used 15 children with a variety of rehab diagnoses. They measured outcomes pre-KT, post-KT application and after 3 days of wearing the tape. Statistically significant improvements were noted from pre-KT to 3 days post intervention, with p less than .001.

Purpose of the second study by Yoshida and Kahanov was to investigate the effect of kinesio taping on lower trunk range of motions. 30 healthy adults with no history of trunk or back issues participated in the study. Trunk range of motion was recorded before and immediately following the application of KT. Statistically significant improvement was noted in trunk flexion, however no statistically significant differences in measurements of trunk lateral flexion and extension were noted. While this research does not support the use of KT in increasing trunk extension ROM, the design had several major flaws: they used healthy adults, so no improvements were really warranted, there was no control or experimental group, they did not blind the assessors—essentially, it was of very poor quality all around. However, I brought it to your attention as this is the sort of research that is mostly available on the topic, as KT it is relatively new to western culture, so beware and be skeptical. It is an unproven modality, so be sure to use your professional judgment to determine when it is warranted and if it is working with your client.
Kinesio Tape Resources

- Books
  - Kinesio Taping for Pediatrics: Fundamentals & Whole Body Taping
  - Illustrated Kinesio Taping
  - Kinesio Taping Perfect Manual
  - Kinesio Taping for Lymphoedema and Chronic Swelling

KT Association Website, which includes
- Directions for taping other areas
- Information on how to become certified kinesio taping practitioner and other resources
- Cincinnati CKTPs: Michael Hekler & Whitney Quiambao
References


### Appendix C

**Case Study Documentation Form based upon the Pediatric Volitional Questionnaire**

<table>
<thead>
<tr>
<th>Item</th>
<th>Definition</th>
<th>Example</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Shows Curiosity</td>
<td>Notices, attends to, explores, objects, events or people in the environment for the purpose of exploration</td>
<td>A child looks at a set of building blocks, upon entering a play area.</td>
<td>3/5/09 DK said “Look” and pointed across the street when she was outside on the patio of the hospital. When asked if she wanted to stand on the bench to see better, she nodded her head and said “Yes.” She was very alert and interested in the outdoor setting. 3/9/09 DK reached out and grabbed my name tag with both hands as we were completing her AM stretches and then carefully examined it. 3/26/09 DK was curious about what was inside the Easter eggs presented because they made noise when shaken. She tried to open one, however she required hand over hand assistance to stabilize one side with her right hand. 4/23/09 DK was interested in exploring how a tube blowing air was making a ball appear to float in thin air at the museum.</td>
</tr>
<tr>
<td>2) Initiates Actions</td>
<td>Initiates interactions with the environment at the simplest level</td>
<td>A child reaches for a set of building blocks.</td>
<td>3/4/09 DK attempted to pick up a small diameter Princess pen while the therapist retrieved the paper in order to make mom a Get Well card for her mom. Pt was very motivated by the occupation. Pt usually uses a thicker marker or a crayon wrapped in coban due to her decreased ROM and grip strength. 3/24/09 DK said “look” and reached for a pair of scissors in the beads bin. She attempted to put them on her right hand, however she needed assistance as they were spring-loaded. 4/21/09 DK picked up a bean bag and choose which opening to place it in without any encouragement or prompting.</td>
</tr>
<tr>
<td>3) Task-directed</td>
<td>Uses or tries to use objects or his/her body to purposefully achieve a goal</td>
<td>A child lines up building blocks side-by-side.</td>
<td>3/5/09 When on the jungle gym in the lobby of the hospital, DK was shown the steering wheel and gear shifter. She persisted at using her hands (even with the splints on) to move the gear shifter into different</td>
</tr>
<tr>
<td>4) Shows Preferences</td>
<td>Chooses or demonstrates an inclination toward certain objects, events, or people</td>
<td>A child chooses to construct only with blue blocks.</td>
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<tr>
<td>3/3/09 DK was taken into the lobby of the hospital with a scooter board. After demonstrating to her how to fly on her belly, DK appeared interested in trying this novel occupation. While she needed help mounting the board, she persisted in using her arms to propel herself, despite the fact that it was a physically difficult and demanding task.</td>
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</table>

<table>
<thead>
<tr>
<th>5) Tries New Things</th>
<th>Engages in new activities or incorporates something new within a familiar activity</th>
<th>A child attempts to create a new block design.</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/5/09 DK was taken into the lobby of the hospital with a scooter board. After demonstrating to her how to fly on her belly, DK appeared interested in trying this novel occupation. While she needed help mounting the board, she persisted in using her arms to propel herself, despite the fact that it was a physically difficult and demanding task.</td>
<td></td>
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<tr>
<td>Date</td>
<td>Comments</td>
<td></td>
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<td>------------</td>
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</tr>
<tr>
<td>4/7/09</td>
<td>When pulling items out of a bin to get to the beads below, DK pulled a toy car out of the bin and started moving it up and down the length of the table. She had never appeared interested in the other objects in the bin during previous sessions.</td>
<td></td>
</tr>
<tr>
<td>4/14/09</td>
<td>DK was willing to try to participate in therapy despite the fact that she had to remain supine in a stretcher due to her most recent surgery. She tried everything presented and was very agreeable to the modifications that were necessary, even to familiar occupations.</td>
<td></td>
</tr>
<tr>
<td>4/23/09</td>
<td>DK willingly went in a forest, which was dimly light and may have perceived as scary or spooky to some children her age. She climbed up a spiral staircase to get to a bridge, which she crossed with the student therapist at the museum.</td>
<td></td>
</tr>
<tr>
<td>3/3/09</td>
<td>DK required a considerable amount of verbal encouragement to stay engaged with the painting occupation she selected. She had to be cued to paint an airplane and a sunshine, otherwise she would not actively participated in the occupation she selected.</td>
<td></td>
</tr>
<tr>
<td>3/5/09</td>
<td>DK was engaged in using the steering wheel on the jungle gym in the lobby and did not tune into my playing with the gear shifter until she had played with the steering wheel sufficiently. She steered while she watched me play, she stopped on her own accord.</td>
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</tr>
<tr>
<td>4/2/09</td>
<td>DK was very interested in setting up a tea party to show her aunt at the end of therapy. Her aunt had arrived the evening prior and DK was very excited to share our tea party goodies with her. She spent almost 4 minutes setting out a placemat and pretend cookies for her aunt to enjoy when she returned near the end of therapy.</td>
<td></td>
</tr>
<tr>
<td>4/23/09</td>
<td>DK was very engaged with the pretend grocery store at the museum. She maintain engaged with the occupational forms, even when her mother, primary therapist and student therapist were engaged in a conversation.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rule</th>
<th>Description</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>6) Stays Engaged</td>
<td>Shows ongoing emotional affective connection -with the activity currently pursued</td>
<td>A child continues to play with building blocks, declining requests made by peers to join in another game.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rule</th>
<th>Description</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>7) Expresses</td>
<td>Demonstrates satisfaction with the success of efforts</td>
<td>A child announces, &quot;I did it!&quot; upon</td>
</tr>
<tr>
<td>Mastery Pleasure</td>
<td>and/or quality of performance</td>
<td>completing a construction task with building blocks.</td>
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</table>

with child life, DK had ribbons in her hair, however, she was given a hat by my supervisor while I was measuring her ROM. Once it was on her head, she stopped me by saying, “Kristen, look” and then smiling brightly. DK has yet to do something independently and express pride in her accomplishment.

3/31/09 DK reported, “I sleep good,” as the student therapist had made a pact with her that she needed to sleep all the way through the night during the previous session. Mom was giving an update about the improvement when DK voiced her pleasure.

4/14/09 Upon returning DK to her inpatient room, where her mother remained during therapy, DK grasped the pictures she drew with the stickers and instantly starting talking to her mother in Hebrew. When asked what she was saying, her mother indicated that she was telling her about the pictures and how they had flower stickers on them and that she had made them for her.

4/23/09 In the ball area at the museum, DK was very excited with her ability to pick up balls and kick them. She kept trying to run over to the entrance of the exhibit where her grandmother was sitting on a bench to ensure she was watching her performance by calling her name.

<table>
<thead>
<tr>
<th>8) Tries to Solve Problems</th>
<th>Attempts to correct mistakes or find solutions when problems are encountered in a task</th>
<th>A child redesigns his block structure by placing larger blocks at its base to keep it from tipping over.</th>
</tr>
</thead>
</table>

2/26/09 DK required hand over hand assistance to incorporate both hands in reaching for a bottle of water. It appears she has not found her right hand functional yet. When provided with a modified cup to compensate for the limited grasp in her left hand, she did attempt to use it with mod to max verbal cueing and physical demonstration.

3/24/09 When prompted to pick up a checker with her right hand, DK tried 3 times, then she used her left hand to pick up the checker and place it between her right thumb and second finger to assist her evolving pincer grasp without any prompting or assistance. Mom was very excited and even clapped.

4/14/09 When trying to grasp small letter magnets off of a magnetic board, DK incorporated both hands without any prompting as they were difficult to remove and replace.
<table>
<thead>
<tr>
<th>9) Tries to Produce Effects</th>
<th>Involves him/herself in order to generate a response within the environment without the risk of failure</th>
<th>A child bangs a building block against a table to hear the sound produced.</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/4/09 DK retrieved the bubbles off the shelf, carried them with both hands, pulled the wand out and brought it to her mouth repeatedly without any prompting. Despite her inability to produce any bubbles, she continued at this task until prompted to “check her schedule.”</td>
<td></td>
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<tr>
<td>4/7/09 DK pushed a toy car off of the table and onto the floor, while the therapist was searching for a string to thread beads.</td>
<td></td>
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<tr>
<td>4/21/09 DK pushed a therapy ball larger than she is to her mom.</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>10) Practices Skill</th>
<th>Invests effort in developing his/her abilities to a desired level of competency</th>
<th>A child repeatedly tries to balance one block on top of another.</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/6/09 DK continues to require max verbal cueing to stand upright when ambulating. When prompted, she will practice standing up tall like a princess, for one to two steps before returning to a kyphotic position.</td>
<td></td>
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<tr>
<td>3/31/09 DK repeated tries to grasp plastic letters with her right pincer grasp to place them on a plate as cookies for our tea party.</td>
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<tr>
<td>4/7/09 During a basketball shooting occupation, DK retrieved the ball from the floor after each shoot, which had not been demonstrated previously.</td>
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<tr>
<td>4/23/09 DK repeated picked up balls off of the floor by squatting down, in order to place them in a chute. She practiced this skill over and over while at the museum.</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>11) Seeks Challenges</th>
<th>Accepts the opportunity to achieve more, or perform under conditions of greater demand</th>
<th>A child attempts to build the tallest building possible by using all available blocks.</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/5/09 DK was practicing steps with assistance, when we challenged her to walk backwards. While she needed max assist, she did not withdraw or tantrum to avoid the challenge.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3/24/09 When a checker fell on the floor, DK started to squat down to pick it up and then reached out for assistance when she got to mid squat, rather than expect the therapist to pick it up initially.</td>
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<tr>
<td>4/7/09 DK filled her entire cherry tree with small cherries during the Hi Ho Cheerio board game with only one prompt to place some cherries on her tree. She even</td>
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<tr>
<td></td>
<td>A child decides to incorporate the use of extraneous items in order to enhance his block structure.</td>
<td>A child pursues building with blocks until he duplicates a design pictured on the cover of the block container.</td>
</tr>
<tr>
<td>12) Organizes/Modifies Environment</td>
<td>Alters aspect of the environment to place greater demands on performance</td>
<td></td>
</tr>
<tr>
<td>4/23/09 DK repeated asked to “drive” which was a challenging task as she had to both climb into and out of the cars, which required her to stand on one leg, while swinging the other one into the vehicle.</td>
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</tr>
<tr>
<td>2/26/09 DK picked up the modified, deep-bowled spoon placed on her tray while the therapists talked to her mom. It would have been easier for her to use her fingers, however she appear interested in using the new spoon and trialed it 3 times without any prompting.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4/7/09 This skill has not seen much progress in the last couple of sessions. DK tends to take the path of least resistance and requires adult support to incorporate more difficult aspects into her environment. She does not spontaneously add objects to place greater demands on her occupational performance.</td>
<td></td>
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</tr>
<tr>
<td>4/23/09 DK after placing the baby doll in her high chair, she asked the baby if she wanted “food?” She then brought a dish of fruit and picked up each piece bringing them to the baby’s mouth, which required more fine motor coordination and endurance.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13) Pursues Activity to Completion</td>
<td>Persists, or sustains effort until the desired goal or objective is reached</td>
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</tr>
<tr>
<td>3/4/09 DK persisted at removing pegs with her right hand despite the challenge that it presented; may have been because it was a novel occupation. Pt had to be treated in her room on the inpatient unit today as no trach-certified therapists were available for support. Pt appeared more focused on task at hand, possibly because there were not as many distractions in the environment.</td>
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</tr>
<tr>
<td>3/5/08 DK made two swipes with a paint brush and then stated she was finished. In order to increase her attention and success with the task, she was asked if there was anything else she wanted to draw, to which she said “mommy,” pt then was assisted in drawing a stick figure and then asked, “What else do we need?” to which she responded, “eyes…nose…mouth.” The patient then said we should draw a dog, and responded again that the dog needed eyes, a nose, and a mouth. Thus, she would have ceased engagement in the activity, however when it was</td>
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</tbody>
</table>
| Uses | Incorporates the use of imagination to impose greater demands on his/her performance. | A child pretends to build a skyscraper, hurrying to complete it before "King Kong" reaches it. | 3/5/09 DK had to be prompted to be a turtle when crawling across the floor prone on a scooter board. She still tries to put fake food completely in her mouth, despite repeated demonstration of pretend eating.  
3/24/09 DK still requires adult prompting to create pretend situations during therapy.  
3/26/09 DK brought a spoon full of crystal beads up to her mouth and said “yum” indicating that she was following the therapist’s lead to make and eat soup.  
4/7/09 DK selected a bear-shaped bean bag during a bean bag toss occupation and said “cute” and then held it up to the therapist’s lips and said “kiss.” After the bear was given a kiss, she said “hug” as well.  
4/23/09 When using the pretend microwave in the kitchen at the museum. The student therapist began making a buzzing sound like a microwave and then went “beep, beep, beep” to which DK responded by opening the door and saying “hot!” thus acknowledging we were pretending to use the microwave. |
Appendix D

What can DK do at home?

- Have DK set the table for dinner by setting the plates, forks, spoons and napkins on the table. She may need help using her right hand.
- Have DK hold a hair brush in her right hand and let her help to brush her hair.
- Let her try using a washcloth or sponge when washing in the bathtub.
- Let her help pour water for meals, help water plants, or use a cup in the bathtub and let her help to rinse the soap off of her chest, legs or arms.
- Have DK take clothes out of closet and drawers and have her help to put them on.
- Encourage her to try zippers and buttons with help. You will have to start the zipper, but let her try and pull it up or down.
- Let her climb stairs with help, do not carry her. She will need lots of help. Be careful.
- Let her walk everywhere, do not use the stroller.
- Let her play with sticker books. Have her try to pull stickers with right and left hands using her “pinchers”
- Trace simple shapes with crayons, markers, or pencils including big circles, squares, and triangles.
- Turn on fun music and dance with DK. Twirling, bend up and down and pointing toes are all good exercises.
- Have DK stand on one foot for 10 seconds each. You will have to hold her hands. See if she can do it with only holding one hand!
- Have DK play with playdoh or putty. Encourage her to make snakes, snowmen, pizza, or hide small objects to find in putty such as buttons, coins, and paper clips.
Let DK help you sort money/coins, buttons, or paper clips. Be careful with small items to ensure safety.

When reading DK a story, have her turn the book pages with her right hand.

Play board games with DK that have small pieces, such as checkers.

Have her stack small blocks to make a tower or castle for a Princess.

Allow her to open, tear, and crumble junk mail. It will make her hands stronger.

Get a shoe lace or wrap a piece of tape around the end of a piece of yarn and have her string beads, small pieces of pasta, or Cheerios to make necklaces.

If she has a baby doll, have her pretend to feed the baby with a spoon.

If outside, have her color with chalk on the sidewalk. Help her bend down and squat, she may need help with her balance.
Appendix E

Discharge Summary for DK’s Mother: “What can DK do now?”

- Her posture is better, she stands taller. Make sure she stands tall all day.
- She is able to make choices when offered options.
- She has started asking the thoughts and opinions of others, such as “Which do you like, red or blue?”
- She is not able to bend down to pick up objects off the floor by herself.
- She has started using her right hand during play activities. Encourage her to continue to use it!
- She can carry a game with two hands while walking to place it on the table.
- She can push down on bike pedals with her feet. We are working on steering too!
- She can pouring water into cups with a little bit of spilling.
- She can tell me when she needs to go to the bathroom.
- She can name the first 3 letters of her name.
- She can throw small bean bangs underhand.
- She can make baskets in the basketball hoop all by herself.
- She can scoop food onto a spoon and feed herself.
- She is starting to run and jump with help.
- She can pick up larger objects with her right hand “pincher”
- She is starting to cut with scissors. She needs your help, but is getting better.
Appendix F

General Goals for Outpatient Therapist

- Increase fine motor skills in right hand
  - Pick up small objects (circumference less than ½ inch)
  - String small macaroni noodles or beads

- Increase gross motor skills
  - Emerging skills include: running, jumping, getting up off of the floor, riding a tricycle, standing on one foot, and ascending and descending stairs

- Developing and refining handwriting skills
  - Emerging skills include: tracing simple shapes and lines (limited accuracy and large size). Start letter writing and recognition in the future.

- Develop scissor skills
  - Use scissors on left hand and stabilize paper with right hand. Can make snips with hand over hand assistance to stabilize paper in right hand.

- Refine bimanual hand skills
  - Pouring water, opening small containers, carrying objects with two hands

- Promote volition and motivation in age appropriate occupations
  - Allow age appropriate choices
  - Encourage self-initiated actions and task-directed behaviors
Appendix G

Script for Initial Communication with Outpatient Therapist

“Hi, my name is Kristen Lohrer, and I am the occupational therapy student that has been working with DK for the past four months. I know that you will be seeing DK two times per week for outpatient services and wanted to fill you in on her background and current level of functioning. She is four and a half years old and sustained a 90% flame burn almost two years ago in Israel. She has undergone approximately twenty surgeries since her initial injury, with approximately half completed overseas and half here at Shriners in Cincinnati. Her most recent surgeries have included reconstruction of her right hand and digits near the end of January and a release and grafting procedure to release scar contractures in her right flank at the beginning of April. Essentially, as burn therapist we are fighting DK’s skin in order to prevent additional contractures by completing passive range of motion exercises and facilitating her engagement in age appropriate activities. I’m not sure how familiar or comfortable you are with treating burn injuries, but I want you to know I am here to support you and answer any questions or concerns you have. I know when I was in school we only had one lecture regarding the care and treatment of children with burn injuries and I know I was overwhelmed when I first started to treat DK, so please do not hesitate to call or email me. The best way to reach me is either to page me at 513-230-1513 and I should usually be able to return your page within 10 minutes or to email me at klohrer@shrinenet.org, I usually check my email once per day.

In terms of specifics, DK will be wearing pressure garments on her immature scars in order to prevent hypertrophic scarring. Currently, she is wearing one-legged custom pressure garment pants and a Tubigrip sleeve on her left arm to reduce scarring. In addition, her right hand and digits are wrapped in Coban (self-adherent elastic wrap). All of these are to be worn 23
hours per day, off for baths only. She is also wearing bilateral wrist extension splints at night and during the majority of the day. Mom has been instructed to remove them during her passive range of motion exercises and during eating and play time to encourage increased use of hands and fingers. I have also been trialing Kinesio Taping her dorsal trunk extensors to strengthen her back extensors and increase trunk extension, as per instructions provided by Kinesio Tape Association (1996). She struggles to achieve neutral extension, particularly on the right side and needs moderate cues to stand and walk with her trunk upright. However, she can walk independently. As far as her pressure program, we will monitor and adjust those here at the Shrine during follow-up appointments as we have a garment team who makes them here on site and custom fits them to each child. If you do a lot of splinting where you are and you are comfortable to make small adjustments, please feel free if a problem arises; however if there is a major issues, lets chat and devise a plan together to best fit DK’s needs.

I will be sending general goals that we have been working on to your fax number. I have also given mom a progress summary and some suggestions for home activities that I can send you as well, so you have an idea of her current skill level. Please feel free to add to it as you see fit. However, I want mom to continue her current PROM routine two times per day until we see DK again in clinic.

A big focus in therapy recently has been strengthening her trunk extension muscles and increasing the fine motor skills in her right hand. I have been starting each session with passive range of motion to her bilateral hips, bilateral wrists, and right hand and digits. Then we do meaningful occupations to work on her functional skills and start each session by making a schedule. She enjoys princesses, dancing, stringing beads to make necklaces, peeling stickers to make cards, craft projects, putty/playdoh, playing with kitchen items and having tea-parties. She
has some separation anxiety when mom leaves at the start of therapy, but is easily distracted. I’m really trying to facilitate her independence, so I let her make as many choices as possible, within reason of course!

Her mother is very involved and follows through on home programs well. DK’s English is limited, however she does appear to have better a better receptive than expressive skills. She mostly speaks in one to three word phrases. Mom’s English is good and she understand complex ideas well. However, she is a single parent with 2 other children, so I try not to bombard her as she has many other responsibilities. Their therapy attendance record is impeccable and they call when they have issues.

DK will follow up at the Shriner’s clinic approximately every two to three months or when specific issues arise to address her garments, major range of motion issues, and splinting program. Throughout her life she will require different surgeries as scars do not grow as a child grows: scars will only stretch so far, so surgery is often required intermittently. The Shrine will continue to follow her through the age of 22.

Again, please do not hesitate to contact me for anything related to her care. Do you have any questions for me now, I know that was a lot of information? Call me prior to her first appointment with you. If I don’t hear from you, I will be contacting you immediately following her first return to clinic visit in Cincinnati to update you on any changes. Thanks!”
Good afternoon and welcome to my Capstone Dissemination Presentation, entitled Beyond Burns: An Occupational Therapy Case Study at Shriners Hospitals for Children – Cincinnati. I’d like to warn you that some of the images in this presentation are graphic. However, coping with their nature is one of the skills that a burn therapist must develop and work on to exercise compassion and empathy.
Imagine yourself gathered with your family outside on a warm day in May, when instantly your family’s barbeque explodes in flames due to your father adding paint thinner, after both kerosene and oil failed to ignite the grill. Your whole body is on fire and unfortunately, you have never heard the words Stop, Drop and Roll as you are only 2 ½ years old. You are rushed off to the hospital—separated from both your mother and father as they sustained burn injuries as well.

When you finally come out of sedation, this is your new life.
90% of your body was burned and you are on a ventilator. After 18 months in an Israeli hospital and over 10 surgical procedures later your medical team is faced with a challenging situation. They do not have enough of your own skin to cover your burned body parts. Fortunately, a local Rabbi is aware of and assists in transferring your care from Israel to Shriners Hospitals in Cincinnati, where they specialize in pediatric burn care and rehabilitation.

The photo on the left is of my case study participant, DK pre-burn whereas the photo on the right is how she arrived at Shriners 18 months post-injury, in July 2008.
When DK and her family arrived in Cincinnati everything was different once again. 5% of her body remained open, however the areas that have been covered had contracted drastically, rendering all four of her extremities completely non-functional as the photos depict. She had not ambulated in over 18 months and would not do so until nearly 2 years post-injury. Furthermore, there were a plethora of culture and language differences that required adaptation of both her medical team and her family.
The Burn Scar: Why is it our enemy?

- Healthy skin is composed of an intricate balance of collagen and elastin
- Elastic fibers do not regenerate once destroyed
- Collagen is laid down in a wavy, disorganized, whorl-like appearance
- Scar tissue is ~12 times stronger than skin
- Can lead to contractures and deformity = loss of independence

(SHC, n.d.)

So, you may be asking yourself, why does this child look the way she does. Essentially, countries and centers not specifically trained in pediatric burn care underestimate the importance of early and aggressive scar management.

You see, normal, healthy skin is composed of a intricate combination of collagen and elastin, which provides skin with its strength and flexibility respectively. However, when skin is burned and scar tissue develops several major physiological changes occur. First, elastic fibers do no regenerate once destroyed. Consequently, scar tissue lacks normal elasticity and flexibility. Second, collagen which is typically oriented in a parallel fashion, is laid down in a wavy, whorl-like manner during the scarring process. Collectively, these two changes, render scar tissue 12 times stronger then normal skin. Essentially, if scars are not properly managed they will pull on the skin and underlying structures; thus, creating debilitating contractures. Unfortunately, this occurred while DK was in her country of origin.

This lack of management led to DK undergoing 21 surgeries in less than 2 years, 10 overseas and 11 at Shriners.
Models of Practice & Theories

- Biomechanical Model of Practice
- Dynamic Systems Theory
  - Supports skin and musculoskeletal concerns
- Play as a Model of Practice
  - Unique to pediatric burn care
  - Play is the occupation of children
  - Engagement in age appropriate occupation is essential to our professional identity

In order to guide the development of this case study, the following models and theories were utilized. Principles from the biomechanical model and dynamic systems theory were employed to address issues related to DK’s skin and musculoskeletal concerns.

Furthermore, play was also suggested and utilized as a model of practice in the development of this case study. Play has all the fundamental components of a model including theory, assessments, therapeutic modalities, outcome measures, and supporting research. It is also the primary occupation of children and engagement in age appropriate occupations is fundamental to who we are and what we do as occupational therapists.
Comprehensive Evaluation Plan

- Pediatric Volitional Questionnaire (PVQ)
- Ages & Stages Questionnaire (ASQ)
- Self-Identified Goals Assessment (SIGA)
- Goniometric Measurement of Range of Motion
- Burn Scar Assessment/Vancouver
  - Novel purpose: evaluation of scar maturity for Kinesio Taping

Due to the fact that the burn scar is such a complex phenomenon capable of impact all facets of life, a comprehensive evaluation plan was developed, which is unique to Shriners, as they typically use goniometric range of motion as their only formal evaluation tool. Thus, the incorporation of the following assessments created a holistic portrait of the issues DK was experiencing.

The Pediatric Volitional Questionnaire was used to gather data regarding DK’s volition or motivation to engage in age appropriate play occupations. Children with burn injuries face a considerable array of challenges and obstacles, which can impact their physical, mental, and emotional motivation. Collectively, these challenges can negatively impact their occupational performance. The initial results of the PVQ did reveal considerable volitional concerns in my case study client. As a result, a special documentation system was developed based upon the 14 behavioral indicators assessed on the PVQ to track DK’s progress over time. This is available in the handout I passed around.

The use of the Ages and Stages Questionnaire was 2 fold. First, it allowed the opportunity to see how realistically DK’s mother assessed her daughter’s abilities and limitations. Second, it provided insight into areas that were difficult for DK’s therapists to evaluate such as Communication and Personal-Social Development due to cultural barriers.

A modified version of the SIGA was used following the ASQ to elicit DK’s mother’s goals for her daughter. The hope was that the ASQ would assist in illustrating DK’s strengths and weaknesses and the SIGA would capture the occupation-based goals for therapy. However, it appeared much more effective, which I will discuss shortly.
As the aforeseen photos illustrate, monitoring and assessing ROM is critical for the biomechanical movements necessary to engage in meaningful occupations. Thus, it’s importance was not mitigated. Instead, adjunct therapeutic modalities were instituted during additional time allocated to DK’s case.

Finally, the Vancouver, which is a common tool in burn care to measure scar maturity, was used with a novel purpose in mind. It was used to determine the maturity of scars for the placement of Kinesio Tape, which I would like to discuss now!
Evaluation: Postural Considerations

DK's standing posture at rest: Lateral view

- Exhausted all options
  - Ace wrapping shoulders in a figure eight position
  - Clavicle splint
  - Hip extension splint
  - Passive range of motion and active strengthening home exercise program

- Complications
  - Pressure areas
  - Restricted movement

At the start of the this case study, DK had just underwent a major surgery to restore function to her right hand. Thus, her kyphotic postural issues had become a secondary concern. Furthermore, her primary therapist had exhausted all tools currently utilized in burn care in an attempt to combat the complex problem. For example, she ace wrapped her shoulders in a figure eight position as well as used of an clavicle splint and hip extension splint to target her shoulder and hip positioning more aggressively. Furthermore, a passive range of motion and active strengthening home program were developed. Still no progress was observed and a plethora of complications resulted. For instance the aces and splints created pressure areas as well as restricted DK’s active movement in some fashion. This ultimately limited her ability for active strength-building. The outcome appeared grim as failure to address DK’s postural issues would eventually impact her ability to use her newly found hands in age appropriate play occupations.
Unique Intervention: Kinesio Tape

- No empirical research or formal documentation exists detailing the use of KT in burn care
- New and novel!
- Supported by the biomechanical model and dynamic systems theory
- Prepares the body for play

According to a formal review of the literature and extensive discussions with my site mentor, no empirical research or formal documentation existed at the time of this case study detailing the use of KT in burn care. Thus, it was a novel, innovative intervention modality. Principles from the biomechanical model and dynamic systems theory support the utilization of KT in burn care. The biomechanical model advocates for the use of external supports in facilitating posture and positioning the body for function; while dynamic systems theory suggests that existing movement patterns can be modified when control parameters are altered to encourage more efficient, age appropriate movement patterns. Furthermore, KT indirectly facilitates engagement in play occupations, by positioning the body for function.
DK’s dorsal trunk extensors were taped according to the protocol outlined by the Kinesio Taping Association, which called for a two inch wide, Y-shaped piece of KT. The base of the tape was applied just above her tailbone while DK was bent forward at the waist. Each arm of the Y was extended up parallel to her spine, ending at her mid scapular region. When finished taping, DK returned to an upright position and the tape was wrinkled. During normal, active movement, the wrinkles in the tape create convolutions on the skin, which theoretically promotes more interstitial space and improved circulation of blood and lymph. Ultimately this promotes the body’s own natural healing process. Other proposed benefits of KT include: improved proprioception, support for weakened muscles, immediate sensorimotor feedback, and facilitation of correct postural alignment.

(Kinesio Taping Association, 1996; Kahanov, 2007; Yasukawa, Patel, & Sisung, 2006; Yoshida & Kahanov, 2007).
DK’s initial static standing trunk extension ROM as measured at the hip was -20 on the left and -25 on the right. Remember that negative numbers indicate a lack of range, thus she is stuck in flexion and cannot achieve zero, which was the goal.

DK’s dorsal trunk was taped 7 times over the course of this case study and her ranges were taken every time she was seen for therapy. While progress was made, as indicated at a follow up visit on 4/7/09 which demonstrated that she had gained 20 of trunk extension range bilaterally. We were still concerned. Due to the intense nature of this case study and the keen observations made regarding DK’s posture during play occupations, an additional set of anthropometric measurements were taken on 3/4/09. These indicated that DK had a discrete scar band pulling in her right flank that was causing a half inch discrepancy between the bottom of her last rib and right ASIS and in the length between her ASIS and lateral malleolus.

Given the results of these measurements, we advocated for a release and grafting surgery. The literature documents that the potential complications for patients with leg length disparities caused by flexion contractures are serious including scoliosis and thoracic kyphosis. Thus, the data collected through this case study, provided the evidence necessary to present our concerns to the chief of staff and a release and grafting of DK’s right flank was performed on 4/9. While DK had to remain positioned flat in supine for 7 days, when she was cleared to stand up, her bilateral static standing ranges were both 0 degrees.
Follow-Up Opportunity

- On 4/23/09, a community outing to Duke Energy Children’s Museum was scheduled 2 weeks post-op
- Outing illustrated the interconnectedness of the biomechanical and play models of practice
- Educated and encouraged mother and daughter to engage in age-appropriate occupations
- Promotion of volition
- Provided closure to therapeutic relationship

A unique follow up opportunity to the Duke Energy Children Museum was approved and planned for DK 2 weeks post-release of her right flank. The outing was used to educate and encourage DK and her mother to engage in age appropriate occupations beyond the Shrine. Often with the rigorous home exercise program families must maintain, they sometimes overlook all of the everyday opportunities to promote therapeutic outcomes. Furthermore, the setting demonstrated how important occupational forms are in the promotion and development of volition. Finally, the outing provided closure to the therapeutic relationship that had developed between myself and this family, which is sometimes forgotten.
Additional Outcomes

- Variety of long and short term goals were established and evaluated for progress according to measurable standards
- Positive Impact of SIGA
  - Mother and daughter as active participants in therapy process
- Development of the PVQ Documentation System
  - Increased opportunities to develop volition
  - Documented small improvements, which demonstrated great strides over time

While a variety of long and short term goals were established and evaluated for progress throughout the duration of this case study, which you have available as a handout, I’d like to highlight the most notable outcomes.

First, the impact of the SIGA appeared to do more than simply aid in the establishment of occupation-based goals. It opened the door for DK and her mother to become more active participants in the therapy process. You see, several sessions following the administration of the SIGA, DK’s mother specifically indicated that DK had two new goals for therapy, she wanted to run and jump. This was the first time in my interactions with them, that they had every specifically used the word “goal” and verbalized a collaborative effort in creating these goals.

Second, through the development of a specific documentation system to track DK’s progress, subtle changes regarding increased volition were noted.
One of the most commonly seen improvements in terms of volitional development was DK’s ability to vocalize preferences. For example, she started indicating preferences for certain colors, occupations, and TV shows or characters.

Following the initial PVQ evaluation, it was discovered that DK had difficulty seeking out and creating challenges without intense support. She gravitated toward easy tasks when in the therapy gym. However, when at the museum, she repeatedly sought out the challenging occupation of climbing into and out of play vehicles. This was difficult as she had to climb up stairs and balance on one leg while simultaneously lifting her other leg into the vehicle.

DK’s ability to seek out task-directed occupations and engage in pretend play also made dramatic improvements. For example, she wanted to put on an apron and prepare food for a baby doll she had placed in a high chair.

DK also made significant improvements on other volitional indicators on the PVQ such as practicing skills to develop her competency on specific tasks, she developed independent problem solving strategies, and began expressing pleasure at her accomplishments. These were all great improvements from the initial evaluation results.
Conclusions & Significance

- DK will remain a patient at SHC
- Play as a model of practice: it can be both a means and an end in burn care
- Future research at SHC regarding KT
- Holistic, occupation-based occupational therapy can and does occur in pediatric burn care!

In order to provide you all with some therapeutic closure as well. I’d like to highlight the major conclusions of this case as well as its significance to the future of OT.

First, DK will remain at patient at Shriners for continued surgical management and therapy. Unfortunately, scar tissue does not grow with a child; consequently, she will need continued reconstruction and rehabilitation until she fully matures.

Second, this case demonstrates that play as a model of practice in pediatric burn care is not only possible, it is essential in both the development of therapeutic interventions and in measuring functional outcomes.

Third, the results and findings from this case report regarding the trial usage of Kinesio Tape in burn care has inspired a line of research that will hopefully be continued by my site mentor Patti Sharp and her colleagues at the Shrine in Cincinnati.

Fourth, I hope this case serves to educate and promote a holistic, occupation-based approach to pediatric burn care,

And lastly, I hope you see that…
Burn Care & Rehabilitation

It works!

The photo on the left is of DK at her admission 9 months ago and the photo on the right is of DK at the museum with my site mentor, Patti and I.
I’d like to end by first, thanking my family and friends for their endless support over the past three years. I’d also like to thank DK and her family for welcoming me into their world. I’d also like to thank Dr. Metz, my faculty mentor and Patti Sharp, my site mentor for their guidance, interest, time, and encouragement. Finally, this capstone would not have been possible without the opportunity offered by the Shriners in Cincinnati. You are all truly appreciated.
References