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Final Culminating Project

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Abstract

This culminating project is focused on program/protocol development and clinical skills regarding the role of occupational therapy within the Burn Intensive Care Unit or BICU. Occupational therapy plays a crucial role when working with the burn population in the prevention of contractures, minimizing scarring, improving overall function, and increasing independence with activities of daily living (ADL) (McGourty et al., 1985). One of the ways this is accomplished is through splinting and positioning. With guidance and assistance from my mentor Anthony "Tony" De Piero MOTR/L, I developed a splinting program for all occupational therapists for six basic splints most seen within acute care and burn care. The splinting program also included a burn positioning protocol as a resource for the interdisciplinary team and students to enhance the continuation of care for patients with burn injuries. There was a need for the splinting program due to Tony being the main splint fabricator for Shands Hospital (North Tower) and frequently getting called away from his patients to fabricate splints throughout the hospital. There was a need for the burn positioning protocol due to there being no reference of guidelines available within the BICU for the interdisciplinary team to ensure patients are positioned appropriately as per the rehabilitation team's recommendations. Through this project, I enhanced my own clinical skills in burn care and splint fabrication and created a program to enhance the care provided by other practitioners within Shands Hospital.

Final Culminating Project

The culminating project for this capstone had two main focuses: program/protocol development and clinical skills. The first purpose of this project was to establish a splinting program of six common splints seen in acute care settings and to make step-by-step instructions available to all occupational therapists within the hospital who may be called upon to fabricate a splint for a patient. The goal of splinting within acute care is to position patients in optimal positions for healing following common injuries and to provide support, improved functional outcomes, and correct or prevent deformity. The second purpose was to develop a positioning protocol for the interdisciplinary team within the burn unit to enhance continuity of care for patients who have experienced a burn injury. The burn positioning protocol will serve as a reference for the interdisciplinary team on therapy positioning recommendations for burns of all sizes and offer photographic references to ensure positioning is performed properly outside of direct therapeutic intervention.

For this project to succeed I collaborated closely with my mentor, Tony De Piero MOTR/L and rehabilitation lead for the burn unit team, nursing staff within the burn intensive care unit (BICU), and rehabilitation team members including other occupational therapists and physical therapists. I relied heavily on the interdisciplinary approach to gauge the needs of the BICU team and rehabilitation department to ensure client-centered care and that my program and protocol met practitioners' needs. My splinting program and positioning protocol will be available to all staff within the hospital: the splinting program will be found within the splint cart that is kept in the rehabilitation gym within the burn unit and all therapy staff members will have access to the program to reference when needed; the positioning protocol will be found in

nursing stations within the BICU and available for all interdisciplinary team members to access and reference when needed.

Literature Review

Occupational therapy plays a crucial role when working with the burn population in the prevention of contractures, minimizing scarring, improving overall function, and increasing independence with activities of daily living (ADLs) (McGourty et al., 1985). Occupational therapists (OTs) are a part of a burn patient's care team as soon as they enter the hospital and are medically stable enough to be seen by the therapy team. One of the immediate roles of an OT, when an individual is admitted with a burn injury, is to identify a patient's risk for developing contractures and address the risk through positioning and splinting (McGourty et al., 1985). OTs are trained to identify contributing factors such as total body surface area (TBSA), the depth or degree of the burn, joints impacted, and the patient's medical status to determine a patient's risk for contracture and how to appropriately approach their splinting and positioning needs.

Contractures greatly impact the upper extremities following a burn, as the shoulder and elbow account for 72% of the joints impacted by contractures (Schneider et al., 2006). Many ADLs and instrumental activities of daily living (IADLs) are impacted by upper extremity impairments (Schneider et al., 2006). For example, the shoulder is one of the most impacted joints with burns, thus contractures over the shoulder joint and around the axilla limit overhead activities involved in bathing, grooming, dressing, and leisure activities (Schneider et al., 2006). OTs can assess a patient's risk for contracture and provide appropriate splints and positioning that achieve tissue lengthening and proper joint alignment (Williams & Berenz, 2017). For the shoulder scenario, an airplane splint or foam wedge is used to position the shoulder in 90 degrees of shoulder flexion and 70 degrees of horizontal abduction with the

forearm in neutral to keep the tissues around the shoulder elongated (Williams & Berenz, 2017).

The most common contracture of the hand is an “intrinsic minus” position, which is common with a dorsal burn to the hand. This occurs when the metacarpophalangeal (MCP) joints are in extension and the proximal interphalangeal (PIP) joints are in flexion, making it crucial to position the MCP joints in maximum flexion to stretch the collateral ligaments that will extend the PIP joints (Barillo & Paulsen, 2003; Stramba, 1981). The resting hand splint is commonly used to counter this contracture that positions the wrist in 30 degrees of flexion, interphalangeal (IP) joints fully extended, and the thumb abducted (Barillo & Paulsen, 2003). This resting hand splint also assists with preventing palmer arch contractures (Williams & Berenz, 2017). Volar burns usually result in flexion contractures and are high risk for contracturesure to the strong pull of the flexion muscles on the fingers and wrists (Stramba, 1981).

The boutonniere deformity is common when deep burns occur on the dorsum of the hand, fingers, and thumb. This deformity involves the central slip and when the extensor apparatus is compromised it can likely rupture this central slip, causing the deformity (Brown & Chung, 2017). OTs can perform a range of motion when there is an expected risk for the central slip involvement but should be following boutonniere precautions, which means only one joint of the digits can be in flexion at a time (Brown & Chung, 2017). Flexion of all joints (MCP, PIP, and DIP) simultaneously place maximal tension on the extensor apparatus and the central slip and could cause the boutonniere deformity (Brown & Chung, 2017).

Active movement is often the preferred method to prevent contractures and improve edema, but initially, patients are apprehensive about moving burn joints due to pain (Stramba,

1981). If the patient is intubated and sedated, they are unable to actively participate in range of motion (ROM), thus requiring extensive splinting and passive motion from occupational and physical therapists. This is also true if the patient is noncompliant with active ranging and positioning (Stramba, 1981). Patients will adopt a posture that alleviates pain thus increasing their risk for formation of deformities.

ROM and positioning also assist with edema reduction. The presence of edema in the extremities is common following a burn and can limit the patient's ability to mobilize the joints, decreases optimal joint position, delay wound healing, and more (Procter, 2010). Positioning, ranging, and elevation similar to the ones discussed above promote fluid reduction, decrease discomfort, and address ROM limitations (Williams & Berenz, 2017). A basic positioning that assists with edema reduction is raising the head of the bed to utilize gravitational pull to assist with blood flow when a patient has experienced a burn to the head (Sherghiou et al., 2009). A crucial role of OTs is to continuously assess a patient's edema and determine the proper therapeutic interventions needed. During the early stages of healing, positioning and elevation are crucial due to the decreased integrity of the skin and the inability to reduce edema through the application of compression garments. Once skin grafts are stable and the appropriate amount of healing has occurred, OTs can distribute compression garments to reduce edema and assist with scar management (Richard et al., 2009).

Although many factors and medical interventions contribute to the prevention of contractures, my capstone project focused on the role of occupational therapy in splinting and positioning interventions. The survival rate for burn injury has improved due to medical advances, so one of the main focuses of burn care is to increase functional and cosmetic outcomes for our patients (Goverman et al., 2017). Although the use of splinting has been well

established, the utilization of splints varies among burn therapists and burn centers depending on philosophies utilized (Richard et al., 2000). In one study, it was found that significantly fewer days were needed to correct scar contracture with splinting interventions and lead to improved functional outcomes for patients (Richard et al., 2000). The goal of my splinting and positioning program is to establish an overarching education of the expected splinting and positioning interventions to burn unit staff and other occupational and physical therapists within the burn unit at Shands Hospital. Splinting and positioning play a vital role in recovery in this burn unit and should be utilized when it is appropriate throughout a patient's burn care.

Needs Assessment

To better assess the needs for my site and my culminating project, I used the SWOT analysis to assess strengths, weaknesses, opportunities, and threats of the splinting program and the positioning protocol (Leigh, 2009). This was completed and reviewed using the current literature for positioning and splinting practices of burn care. One strength identified for the splinting program was the support and collaboration with my mentor Tony De Piero MOTR/L. Due to his unique experiences with splinting, his fieldwork within an orthopedic institute, and his position as the main splint fabricator for Shands Hospital (North Tower), Tony has been a crucial resource to learn from and develop the program with for my culminating project. Another strength for the positioning protocol for the BICU was the support and collaboration with the interdisciplinary team who have a significant amount of experience working within burn care and the needs of patients within this population. A strength for both programs was the overall benefit to patients, staff, the interdisciplinary team, and all OTs within Shands Hospital for customizable and comprehensive client-centered care.

A weakness identified was the complexity and uniqueness of the splinting program. There will still be a lack of in-person education for the fabrication of splints. Although the program will supply step-by-step instructions on the process of fabricating the splint and a presentation of the project will be presented to the rehabilitation team, it would be difficult to provide individual training and advice to all OTs who may need to create a splint. A weakness of the positioning protocol is that it will not be available in all patients' rooms as a resource. At this time, we hope it will act as an educational resource for training or clarification when needed; however, currently the project will be difficult to expand.

One opportunity identified was the flexibility within the hospital to create the program and protocol. I did not encounter any roadblocks in creating these items and had the full support of my mentor and other members of the interdisciplinary team. Another opportunity was the eagerness and positive feedback of other OTs to have a resource, such as my splinting program, available to them. Although they have experience in both splinting and positioning, many OTs do not feel confident in their splinting and positioning abilities and were excited to have resources readily available.

The following strategies and recommendations were identified: collaboration and education. To increase awareness of the project, the importance of positioning, and the benefits for orthotic fabrication, there will need to be continued collaboration among the interdisciplinary team and all OTs within the hospital. This can be done through attending interdisciplinary team meetings and keeping an open line of communication with all OTs and other disciplines to continue to develop the program and provide suggestions for improvement and best practices. This will also allow for the program and protocol to continue to grow and support the best possible outcomes for patients within the BICU, as well as in other units of the hospital.

Goals and Objectives

The first goal was to enhance and improve clinical knowledge of burn rehabilitation throughout all stages of patient recovery (intensive care, acute care, and inpatient). Also, to fully understand the overarching role of occupational therapy with this population. The objectives to address this goal were as follows:

- To shadow and assist an occupational therapist with treatment sessions within the BICU, intermediate care, and acute care.
- Receive training on procedures and protocols from the interdisciplinary team within the BICU; address the role of the rehabilitation team, nursing staff, respiratory team, critical care team, and burn team.
- Conduct evaluations and treatment sessions under the supervision of my mentor.

The second goal was to develop and implement a splinting program and burn positioning protocol within the 16-week capstone experience with the guidance of my mentor. The hope was to positively impact the care of patients within the BICU and increase other OTs' role in orthosis fabrication for increased productivity and improve overall care for patients within the hospital. The objectives to address this goal were as follows:

- Develop a plan with my mentor on expectations of the project and identify needs for the program and protocol to be successful.
- Collect photographs of the splinting process for six different splints and positioning for burn patients and develop written instructions for each.
- Present the program and protocol to the rehabilitation team for education on these tools and for future training of practitioners and students.

These goals were met within the 16-week capstone period and created an opportunity for more OTs to be part of patient care that requires fabrication of orthoses. The positioning protocol has created a training tool and reference available for all members of the interdisciplinary team providing care within the BICU. Both projects (the splinting program and the positioning protocol) allow for continuation of education and client-centered care and for the improvement of functional outcomes for patients within Shands Hospital. These projects also afforded me a unique opportunity to provide care within a specialty area of the hospital and further my education and understanding of orthosis fabrication.

Summary

During my culminating project, I was developed a tangible program and protocol that is now available to all staff and students at Shands Hospital. The purpose of the program and protocol is to improve continuation of care from the interdisciplinary team and education for the rehabilitation team (Appendices A-F). I documented the implementation of both projects through photos and written instructions or descriptions to create a splinting booklet of six common splints and two burn positioning binders. The purpose of the booklet and binders was to provide visual and written instructions that are readily available to all staff and students to reference when needed.

One recommendation that was provided by my mentor was to ensure there was an author note for all orthoses relaying the fact that doctors' orders and clinical reasoning can vary from patient to patient. Although the booklet is a good resource it does not account for these discrepancies. For example, while making an orthosis for a patient who has had a skin graft or muscular flap, neither strapping nor material can go over or place pressure on the wound site.

Therapists must use their clinical knowledge and understanding while fabricating a splint to ensure the flap or graft remains protected while still accomplishing functional positioning.

Modifications and adjustments to orthosis wearing schedules for patients can vary, and it is important for communication with all members of a patient's care team to ensure compliance during their time in the hospital. One recommendation is updating the patient's care board that is present at bedside for all patients. Specifically, within the burn unit, orthosis wearing schedules vary throughout the stages of their care. For example, for a patient that is intubated and sedated we recommend having their splints and positioning done at all times when not impacting nursing or procedures. As the patient progresses with their healing and becomes more engaged with therapy, their wearing schedule and positioning may be shifted to be done only at night or at rest to promote active engagement with their environment and ADLs while awake.

An illustration of the splinting program is provided in the appendices (Appendix A-E). This includes instructions and visuals for fabrication of a resting hand, radial gutter, ulnar gutter, thumb spica, and slap splints for upper and lower extremities. All are splints commonly utilized within the acute care setting within multiple settings of the hospital. I provided step-by-step instructions with notes and considerations to be taken under advisement while fabricating each splint. This allows for OTs and students accessing the program to have a full understanding of expectations for the fabrication the splint.

An illustration of the burn positioning protocol is provided in Appendix F. These included positioning using a Pressure Relief Ankle Foot Orthosis (PRAFO), abduction wedge, elbow orthosis, prefabricated resting hand splint, Wrist Hand Finger Orthosis (WHFO), and pillows. In many instances, positioning mechanisms are removed by nursing during the performance of wound care, trips to the operating room, or medical emergencies. The positioning binder found

in these appendices allows for a visual reference for the nursing staff and other disciplines to ensure positioning is done appropriately. A common obstacle encountered is nursing staff being noncompliant with positioning protocols, impacting a patient's overall care. The overall outcome of my culminating project is one splinting booklet to be kept within the splinting cart that is stored in the rehabilitation gym for future use and two positioning protocol binders to be kept within the BICU at nursing stations. With the splinting program and positioning protocol, there is an opportunity for significant gains to ROM, reduction of edema, prevention of deformity, and improved overall functional outcomes for the patients at Shands Hospital. I received feedback and collaborated closely with my mentor to develop resources that can benefit the rehabilitation department for many years to come. My expectation for these projects is to be used as training, reference, and continuing education tools by OTs and other interdisciplinary teams with Shands Hospital. Although splints are made for several diagnoses or injuries, the resting hand splint is fabricated more often within the BICU, thus it is my hope that both my projects will improve the overall care for patients specifically within the BICU for the prevention of contracture formation and improvement of functional outcomes.

Future considerations of these projects are in-room splinting protocols that are accessible at all times during a patient's care and instructional videos that can be developed for the step-by-step instructions for splinting fabrication. These would increase the compliance with nursing staff, and possible float nurses on the burn floor to continue compliance with splinting and positioning while caring for burn patients. I also believe that although photographs and written instructions for the fabrication of splints are good resources, an instructional video may serve as a better learning tool for therapists who may learn better with visual and auditory instructions. My splinting program does not replace the attendance of continuing education courses for

splinting techniques, but it does supply foundational instructions for basic splints that may be encountered while providing care within the acute care setting.

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Appendix A

Splinting Program: Resting Hand Splint

Resting Hand Splint

Materials Needed:

- Splint cart
- Measuring tape
- Cutting board
- Exacto-knife
- Thermoplastic material
- Spatula
- Silver scissors
- Paper towels (to dry work space)

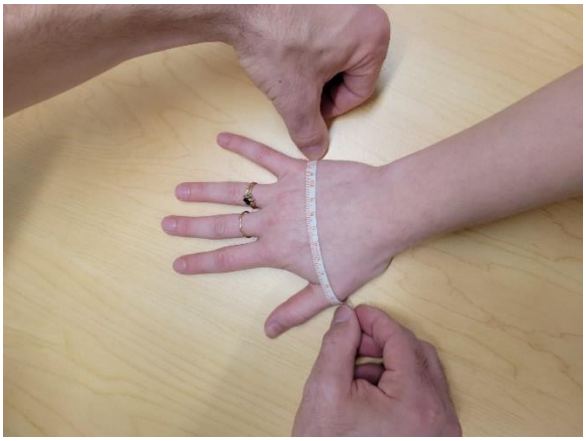
Burns: Bronswik and kirlix

Other: Velcro, strapping, black scissors

Measurements Needed:

1.) Length: Middle of forearm to the tip of the middle finger

2.) Width: Distance from lateral edge of thumb to pinky or the width of the palm



3.) Thenar Eminence (This is where the thumb with rest on the splint.): Tip of index to 1st web space (Between the thumb and index finger)

Step 1: Cutting out your material

- With the measurements 1 & 2 mark on the thermoplastic material where you will be making your cuts. This should form a rectangle.
    - Note: keep it simple and use the edges of the material so you should only have to make 2 cuts.
- Using the Exacto-knife cut out your rectangle (ON THE CUTTING BOARD)

Step 2: Place your rectangle in the water and wait.

CAUTION WATER IS VERY HOT DO NOT PUT YOUR HAND INTO THE BASIN

    - Note: if making multiple splints at once do not let them touch while resting in the water. The material will mold together and could ruin your splints.
- Take the material out of the basin using the spatula

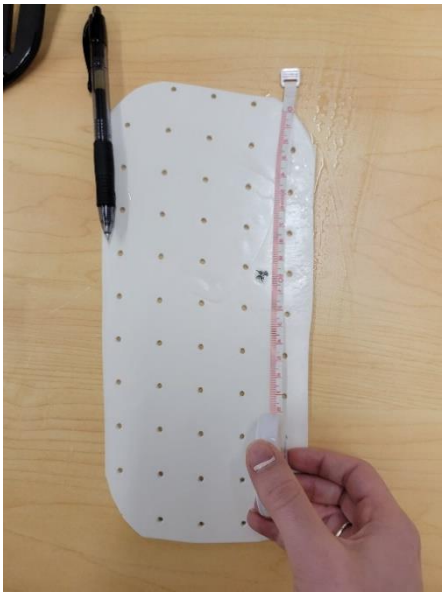
Step 3: Round the corners

- Now that the material is softer you can round the corners by using the silver scissors. This makes sure the splint does not poke or irritate a patient while being worn.

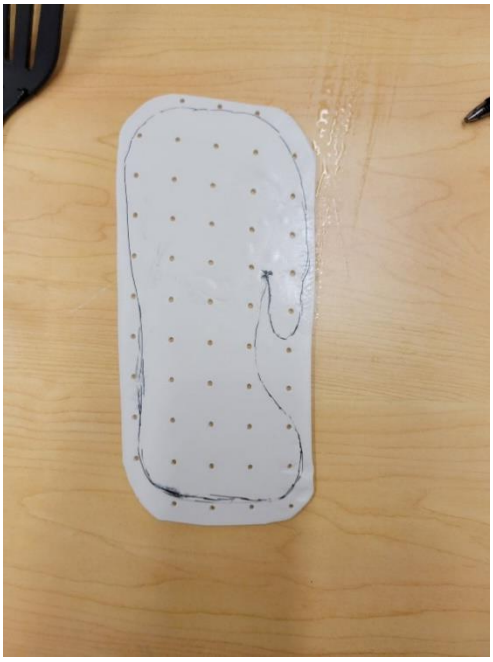
- Place the material back in the basin and wait for the material to soften again.
- Take your splint out with the spatula.

Step 4: Design

Using measurement #3; measure from the top and slightly medial of the splint and mark where the thenar eminence should begin. (you can make an indent with your finger since the material should be soft)



- From this point you can draw your thumb piece and a curvature where the thenar eminence will rest. Mark to curve for the top of the hand



- Cut along your design (silver scissors only)

- Return splint to water basin

Step 5: rolling the thenar eminence

- Remove the splint with the spatula
- Roll the thenar eminence away from the inside of the splint (this will reduce the formation of indents on the patients hand and free the thenar eminence)

Step 6: Molding to the Patient

- If able: position the Patient's in supination
    - This allows for gravity to assist with wrist extension while molding
    - If unable to supinate the hand be mindful to keep the Patients wrist in slight wrist extension.
- Hold the patient's hand in ideal positioning for 2-3 minutes until material hardens
    - Digits is IP extension
    - MCP in 70-90 degrees of flex
    - Wrist in extension.
- If the patient is able to help hold this position this is ideal but often not the case to be mindful that all joints are in their proper position while the material cools.

Step 7: The dome test

- By placing the splint on the table check that the forearm arc (where the forearm rest) forms a proper dome shape and is even on both sides.
- Not a necessary step but good to double check your splint will properly fit the patient.

Step 8: Smoothing the edges and trimming

- While molding you may have noted the splint is larger than the patients needs with some extra material around the digits and thumb; Mark these areas an how much you want to trim while still keeping all digits within the length of the splint
- Dip where you would like to trim in the basin for 30 seconds to soften the material before cutting.
    - DO NOT PUT THE WHOLE SPLINT INTO THE WATER! Your mold will get ruined
- Cut as needed. (Silver scissors only)
- Identify rough spots on the edges of the splint; Dip into the water for a few seconds and smooth with your fingers
    - This makes the splint smooth and decrease risks of spots that could irritate the patient's skin

Step 9: Strapping

BURNS: DO NOT use strapping!

- Line the splint with a thin layer of Bronswik

- Secure with Krilex


FOR OTHER INJURIES:

- Cut small Velcro squares and strapping with black scissors
- Place at wrist, thumb, PIP and forearm



Step 10: Don on Patient

- Educate patient on wearing schedule and importance of compliance with wearing the splint.

- If patient is sedated: Educate nursing on wearing schedule and update patient board for continuation of care.

Appendix B

Splinting Program: Ulnar Gutter Splint

Ulnar Gutter Splint

Material Needed:

- Splinting cart
- Measuring tape
- Cutting board
- Exacto-knife
- Thermoplastic material
- Spatula
- Silver scissors
- Paper towels
- Velcro
- Strapping (blue or tan)
- Black scissors

Measurements Needed:

1) Length: Tip of Ring finger to wrist crease
    a. If the order requests for the splint to include the wrist just extend the measurement for mid forearm.

2) Width: 3rd web space on dorsal side to the 3rd web space on ventral side (wrap around the ulnar side of the hand)


Step 1: Cut out your material.

- With the measurements 1 & 2 mark on the thermoplastic material where you will be making your cuts. Should make a rectangle.
- Using the Exacto-knife cut out your rectangle (ON THE CUTTING BOARD)

Step 2: Place your piece into the water and wait.

- Take the material out of the basin using the spatula.

Step 3: Round the corners

- Now that the material is softer you can round the corners by using the <u>silver scissors.</u> This makes sure the splint does not poke or irritate a patient while being worn.
- 
- Place the material back in the basin and wait for the material to soften again.
- Take your splint out with the spatula.

Step 4: Molding to Patient

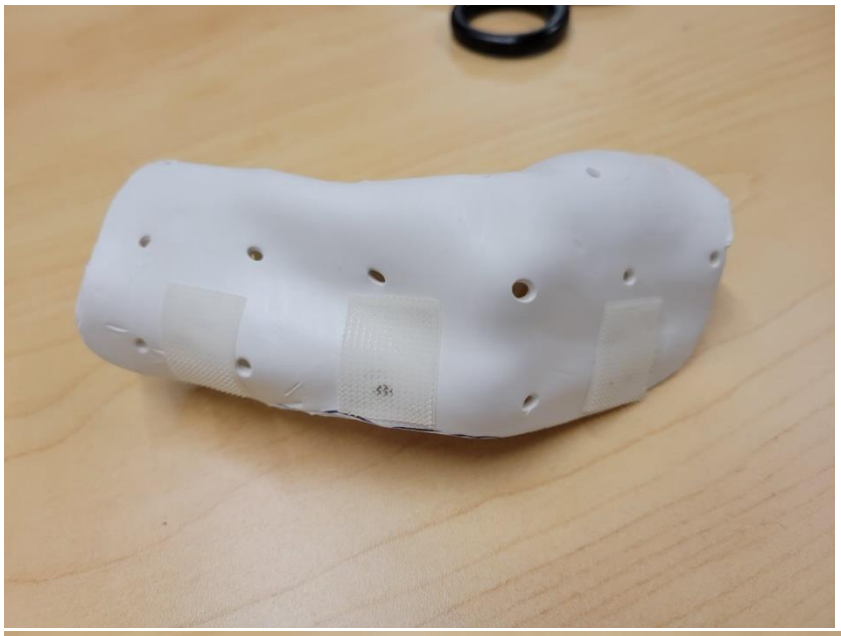
- Hold the material around the lateral aspect of the hand.
  - Ensure the tip of the 4th digit is covered by the splint.
  - IPs in extension
  - MCP of 4&5th digits are in 70-90 degrees of flexion.
- Hold for 2-3 minutes until material has hardened.


Step 5: Trim & smoothing edges

- Ensure the Middle finger has full ROM and is not occluded by the splint.
- Ensure the wrist has full ROM without too much material poking the patient when flexing or extending the wrist.
- Mark where the material needs to be trimmed.
- Dip where you would like to trim in the basin for 30 seconds to soften the material before cutting.
    - DO NOT PUT THE WHOLE SPLINT INTO THE WATER! Your mold will get ruined.
- Cut as needed. (Silver scissors only)
- Identify rough spots on the edges of the splint; Dip into the water for a few seconds and smooth with your fingers.
    - This makes the splint smooth and decrease risks of spots that could irritate the patient's skin.

Step 6: Strapping

- Cut small Velcro squares using black scissors.
- Place Velcro:
    - 2 at DIP
    - 2 at PIP
    - 1 in the palmer aspect of the splint
    - 1 at the midpoint of the dorsal side of the splint
- If the splint includes the forearm an extra strap at forearm/wrist (About where a watch would rest)



Step 7: Don on Patient

- Educate patient on wearing schedule and importance of compliance with wearing the splint.

Appendix C

Splinting Program: Radial Gutter Splint

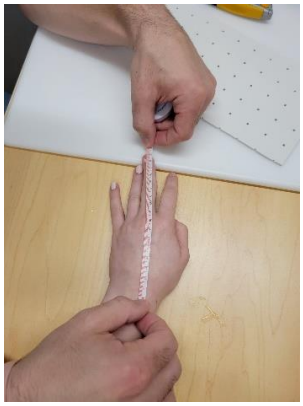
Radial Gutter Splint

Material Needed:

- Splinting cart
- Measuring tape
- Cutting board
- Exacto-knife
- Thermoplastic material
- Spatula
- Silver scissors
- Paper towels
- Velcro
- Strapping (blue or tan)
- Black scissors

Measurements Needed:

1) Length: Tip of Long finger to wrist crease
    a. If the order requests for the splint to include the wrist just extend the measurement for mid forearm.



2) Width: Width: 3rd web space on dorsal side to the 3rd web space on ventral side (wrap around the radial side of the hand)

3) Thumb Placement (After steps 1-3) hold the mold up to the patient's hand and mark and "x" where the CMC joint lies.

Step 1: Cut out your material

- With the measurements 1 & 2 mark on the thermoplastic material where you will be making your cuts. Should make a rectangle.
- Using the Exacto-knife cut out your rectangle (ON THE CUTTING BOARD)

Step 2: Place your piece into the water and wait

- Take the material out of the basin using the spatula

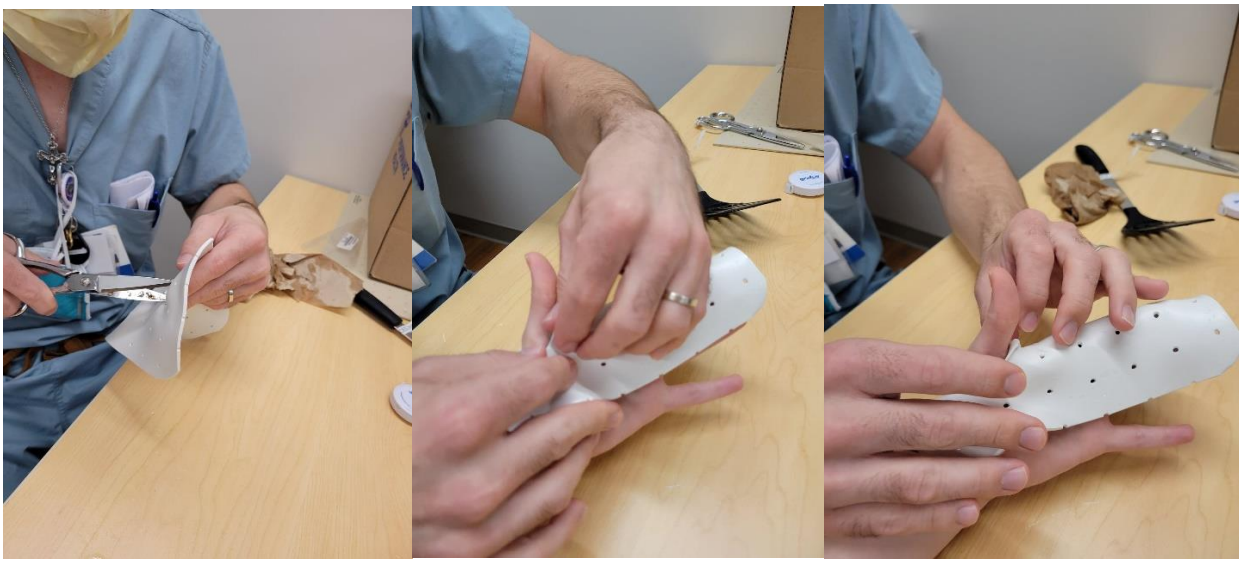
Step 3: Round the corners

- Now that the material is softer you can round the corners by using the silver scissors. This makes sure the splint does not poke or irritate a patient while being worn.

- Place the material back in the basin and wait for the material to soften again.
- Take your splint out with the spatula.

Step 4: Cutting out the thumb hole

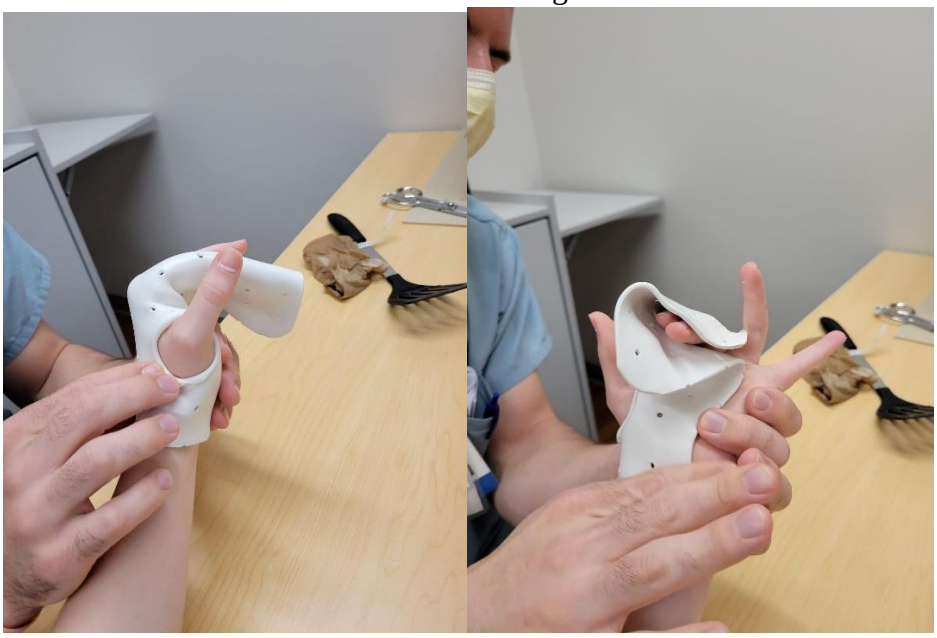
- Complete measurement #3: hold the material to the patients hand and mark and "X" where the CMC joint lies
- Using the silver scissors cut the "X" creating a hole for the thumb joint.
- To expand this, place mold the splint to your own hand and place your thumb through the hole. This will give you an opportunity to expand the hole slightly before placing it on the patient.



Step 5: Molding to Patient

- Hold the material around the medial aspect of the hand.
    - Ensure the tip of the 3rd digit is covered by the splint.
    - IPs in extension
    - MCP of 3rd & 2nd digits are in 70-90 degrees of flexion.

- Ensure the thumb has full ROM and the edges are rounded outside of the splint.



- Hold for 2-3 minutes until material has hardened.

Step 6: Trim & smoothing edges

- Ensure the Ring finger has full ROM and is not occluded by the splint.
- Trim excess material around the tips of the digits
- Ensure the wrist has full ROM without too much material poking the patient when flexing or extending the wrist.
- Mark where the material needs to be trimmed.

- Dip where you would like to trim in the basin for 30 seconds to soften the material before cutting.
    - DO NOT PUT THE WHOLE SPLINT INTO THE WATER! Your mold will get ruined.
- Cut as needed. (Silver scissors only)
- Identify rough spots on the edges of the splint; Dip into the water for a few seconds and smooth with your fingers.
    - This makes the splint smooth and decrease risks of spots that could irritate the patient's skin.

Step 7: Strapping

- Cut small Velcro squares using black scissors.
- Place Velcro:
    - 2 at DIP
    - 2 at PIP
    - 1 in the palmer aspect of the splint
    - 1 at the midpoint of the dorsal side of the splint
- If the splint includes the forearm an extra strap at forearm/wrist (About where a watch would rest)
- 

Step 8: Don on Patient

- Educate patient on wearing schedule and importance of compliance with wearing the splint.

Appendix D

Splinting Program: Thumb Spica

Thumb Spica Splint

Materials:

- Splint bag
- Delta Splinting Material
- Cotton Liner with thumb
- Delta Material Scissors
- Ruler
- Basin filled with water
- Cushion
- Standard Scissors (for nondelta material)
- Liner
- Velcro
- Straps

Recommend wearing gloves while making this splint

*No measurements needed for this splint. *

Step 1: Don the cotton liner onto the patient

- Roll the thumb liner past the IP joint

Step 2: Slide the ruler into the cotton liner on the dorsal aspect of the hand/arm so it is exposed on the medial and later aspects of the cotton liner.

Step 3: Cut 3 small pieces of the cushion.

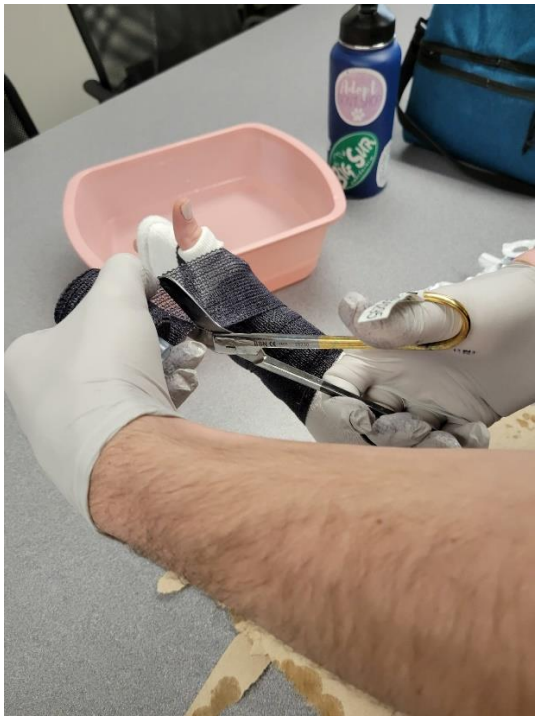
- Place one over the styloid process of the ulna and another over the styloid process of the radius
- Place the last piece within the webspace of the thumb and 2nd digit

Step 4: Place the Delta material within the basin of water.

Step 5: Wrapping the hand

- Begin at the base of the wrist and work up the hand.

- When you reach the base of the thumb cut a small sliver into the delta material to allow it to wrap within the web space of the thumb and the 2nd digit



- Wrap up to the MCP joints of the 2nd- 5th digits and down to the mid forearm.

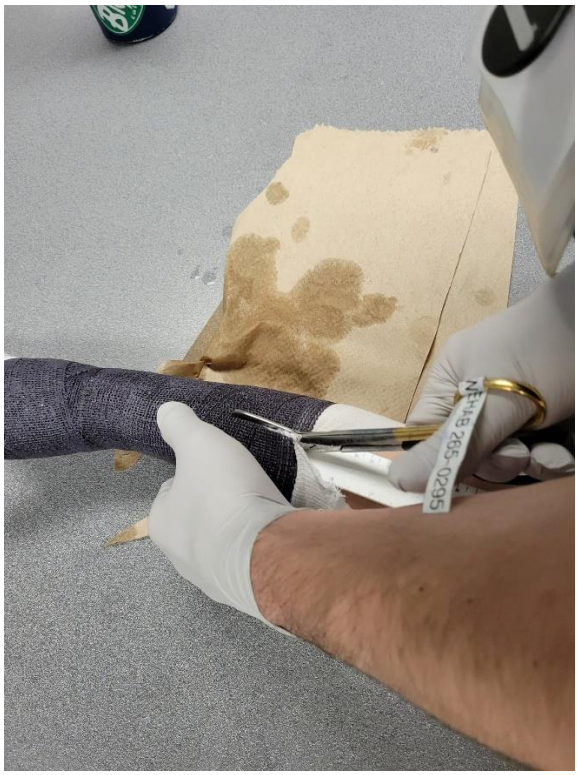
Step 6: Let the splint harden.

- Rub damp hands along the splint to ensure all areas adhere properly.

- Let it dry/harden
- Note: the material warms while its adhering; Notify your patients they will feel a little warmth while it hardens.

Step 7: Cut splint off patient.

- Once the material has hardened using the delta scissors cut along the ruler to remove the splint from the patient.



Step 8: Trim

- Trim the splint at the base to shorten it to the mid forearm and also to curve the edges to allow for a more comfortable fit for the patient.
- Trim the top of the splint to curve the edges and ensure the MCP joints have full ROM.

Step 9: Line the splint with soft liner

- Wrap the liner around all edges of the splint to ensure a comfortable fit for the patient.


Step 10: Velcro placement

- 2 pieces at wrist crease
- 2 pieces at the base of the splint or at the forearm.

Step 11: Straps and don on patient

- Educate patient on wearing schedule and importance of compliance with wearing the splint.

Appendix E

Splinting Program: Slap Splint (Upper Extremity & Lower Extremity)

Slap Splint (UE & LE)

Materials Needed:

- Splint cart
- Measuring tape
- Cutting board
- Exacto-knife
- Thermoplastic material
- Spatula
- Silver scissors
- Paper towels (to dry work space)

UE Measurements:

1) Length: Mid upper arm to mid Forearm along the lateral aspect

2) Width: Mid medial to mid lateral aspect along the posterior aspect of the arm

LE Measurements:

1) Length: From tip of toes, along the planter aspect of the foot, along the ankle to the mid of the calf.

2) Width: At the widest point of the calf included in the splint: medial to lateral sides of the leg along the posterior aspect.


Step 1: Cut out your material

- With the measurements 1 & 2 mark on the thermoplastic material where you will be making your cuts. Should make a rectangle.
- Using the Exacto-knife cut out your rectangle (ON THE CUTTING BOARD)

Step 2: Place your piece into the water and wait

- Take the material out of the basin using the spatula

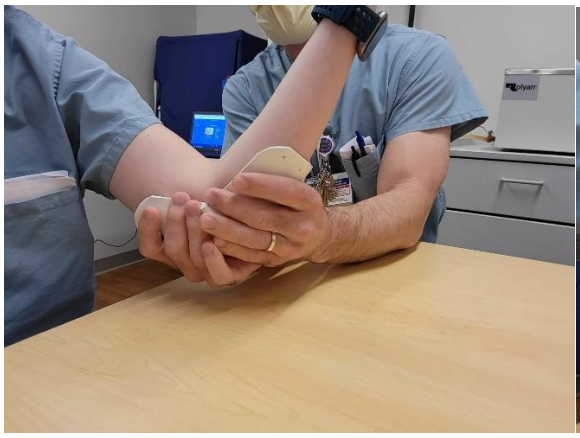
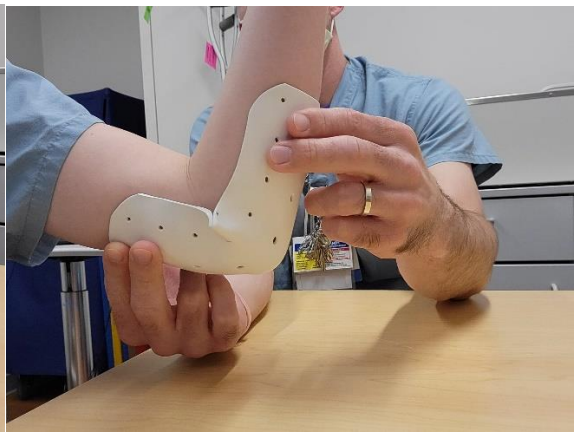
Step 3: Round the corners

- Now that the material is softer you can round the corners by using the <u>silver scissors.</u> This makes sure the splint does not poke or irritate a patient while being worn.

- Place the material back in the basin and wait for the material to soften again.
- Take your splint out with the spatula.

Step 4: Molding to Patient (UE)

- Patient positioned in 90 degrees of flexion at the elbow
- Hold for 2-3 minutes until material has hardened

Step 4: Molding to patient (LE)

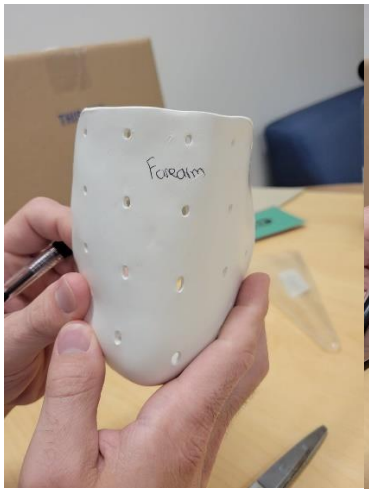
- Position patient in 90 degrees of dorsiflexion at the ankle
- Mold material along the posterior aspect of the leg.
- Hold for 2-3 minutes until material has hardened

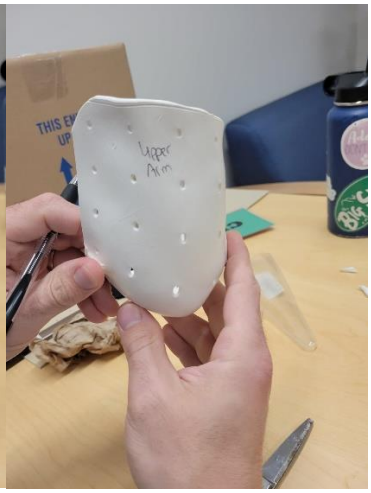

Step 5: Trim & smoothing edges (UE)

- This splint “dog ears” will form where the elbow is flexed; soften these and trim them off


- Identify any areas that may be applying pressure to the patient.
- Dip where you would like to trim in the basin for 30 seconds to soften the material before cutting.
    - DO NOT PUT THE WHOLE SPLINT INTO THE WATER! Your mold will get ruined.
- Cut as needed. (Silver scissors only)

- Identify rough spots on the edges of the splint; Dip into the water for a few seconds and smooth with your fingers
    - This makes the splint smooth and decrease risks of spots that could irritate the patient's skin
- Label the splint with "upper arm" and "forearm to ensure the patient re-dons the splint appropriately





Step 5: Trim and smoothing edges (LE)

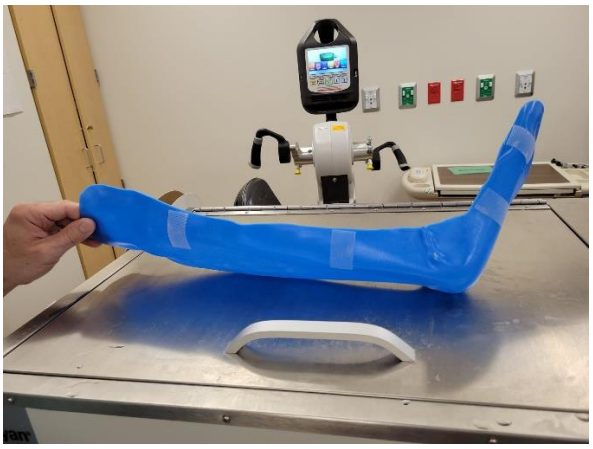
- This splint "dog ears" will form where the elbow is flexed; soften these and trim them off
- Identify any areas that may be applying pressure to the patient or access material that may be overlapping the foot.

Step 6: Strapping (UE)

- Cut small Velcro squares using black scissors
- Place Velcro:
    - 2 at Forearm
    - 2 at upper arm
- Attach straps

Step 6: Strapping (LE)

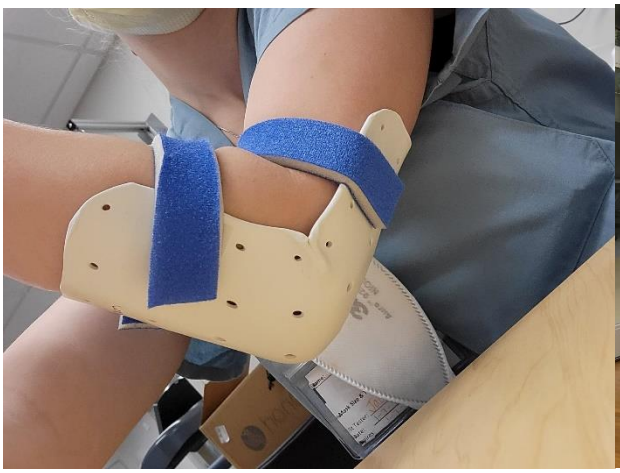
- Cut small Velcro squares using black scissors
- Place Velcro:
    - 2 at digits
    - 2 at mid foot
    - 2 at ankle
    - 2 at calf



- Use strapping to increase support of ankle in dorsiflexion. Use as appropriate and as needed.
    - Crisscross from digits to above the ankle
    - Cross the foot to secure foot in place
    - Crisscross from calf to mid-calf to mid foot
    - Cross the calf to keep leg in place.
- Use more Velcro as needed.

Step 7: Don on Patient (UE&LE)

- Educate patient on wearing schedule and importance of compliance with wearing the splint.



Appendix F

Burn Positioning Protocol

SPLINTING

1) Resting hand splint

Prefabricated

Custom

- These splits are used to keep the wrist is extension the digits in 70 degrees of flexion and the thumb in abduction.

How to Don:

Prefabricated

Step 1: Secure the straps (x2) around the wrist.

- This allows you to stabilize the hand before wrestling with the fingers.
- The strap closest to the wrist has a cushion; ensure that cushion is against the patient for extra padding.

Step 2: Pull the finger dividers between digits 2-5.

Step3: Secure the distal two straps across the digits.

- One should cover the MCP joints of the digits.
- One should cover the DIP joints of the digits.

Step 4: Move the thumb into abduction and onto the thumb rest area of the splint.

Step 5: Secure the final 2 straps over the thumb and CMC joint.

- One should secure the thumb distally over the IP joint.
- Once should secure the thumb proximally over the CMC joint.

Custom

Step 1: Line the splint with a thin layer of Bronswik

Step 2: Place the patient's hand into the splint.

- Ensure the thumb is on the thumb rest.

Step 3: Secure with Krilex.

- Begin wrapping at wrist and then wrap around the hand.
- Ensure the Kirlex has enough pull on the fingers down and to the splint.

2)Elbow Orthosis (Prefabricated)

- This splint is meant to keep a patient's elbow in extension.
    - Note: if the patient has a resting hand splint as well as an EO; Don the hand splint first and then the EO.

How to Don

Step 1: Prep the splint by lining it with chux.

- Burn dressings can be wet or have drainage so to keep the splint clean and from having to be replaced constantly we line the EO with a folded or cut in half chux.

Step 2: Position the patient's elbow in FULL extension.

Step 3: Run the EO w/ chux under the arm.

- There is "Posey" label on the outside and in the middle of the EO, this is about where the elbow joint should lie in the splint.

Step 4: Wrap the patient's arm in the chux and splint.

Step 5: Secure with Velcro strapping.

3)Pressure Relief Ankle Foot Orthosis (PRAFO)

- This splint has multiple functions. It allows the ankle to be “floating” to prevent pressure ulcers, it prevents inversion and eversion of the foot and it positions the ankle in 90 degrees.

How to Don:

Step 1: Place the patient’s foot/ankle/leg into the PRAFO.

- Ensure the heel is completing seated in the back of the PRAFO.
    - Do this to ensure the ankle reaches 90 degrees of dorsiflexion.

Step 2: Secure the leg with the calf strapping.

- Ensure the padding is against the patient.
- This strap is reversable so if the padding is not aligning properly simply remove the strap and secure the opposite the opposite side.

Step 3: Secure the final straps on the ankle and foot.

- Ensure the foot is in midline and the ankle is still in 90 degrees.

Step 4: THE KICK PLATE

- There is a small metal kick plate on the posterior surface of the PRAFO. This ensures the ankle/foot remain in midline while the patient is supine.
- The kick plate should always be on the lateral aspect depending on the foot it is donned on.

The therapy team will only keep **one** PRAFO in a room even if both lower extremities were impacted. This means the PRAFO will be rotated from the right to left foot ever so often. For example: Before dressing change the PRAFO was donned on the Right foot, then after the dressing is completed then PRAFO will be moved to the Left foot. This ensures compliance with the wearing schedule set by therapy.

POSITIONING

1) Wedge

This is an abduction wedge, also seen in orthopedic units for lower extremity injuries or hip replacement surgeries. Here in the BICU they have a different purpose, to position the upper extremities in abduction. This is important following scapular, axilla, and even some chest burns.

How to Don:

Step 1: Prep the wedge with chux.

- Again, burn dressings can be wet and wounds tend to have drainage so in an effort to protect the wedge and keep from replacing it you can line it with a folded chux.

Step 2: Lift the patient's arm into abduction and slide the wedge into the axilla.

Step 3: Position the patients arm in neutral or where the thumb of the hand is towards the ceiling.

- IMPORTANT: Many of our more critical patients have several lines, vent tubing, or other barriers where use of the wedge would not be ideal. Make sure these lines are not impacted by the wedge. If unsure contact the therapy team.
- ALSO IMPORTANT: If the patient is positioned for pressure relief or drying the side that is inclined should not be placed in a wedge. This can cause pressure on the brachial plexus. If unsure contact the therapy team.

Step 3: Run the medial straps through the bed rails. This keeps the wedge in position if the patient shifts or moves while in it.

Step 4: Secure the arm with the Velcro straps.

Step 5: Place a pillow at the base of the wedge between it and the patient.

- This allows for extra support to keep the wedge in place and in the proper position.

2)Positioning the Upper Extremity with Pillows

The therapy team may opt for pillows instead of the wedge for several reasons such as, the axilla may not be impacted by the burns or the wedge is not an option due to lines or tubing.

Important things to consider when positioning the UE with pillows:

- 2-3 pillows **always**; especially at rest.
    - Edema reduction is crucial and 2 or 3 pillows allows for the UE to be right at or above heart level.
- Elbow in extension
    - If the patient does not have an EO donned, then try and keep them in extension. This can be difficult with patients not sedated.

3)Positioning the Lower Extremity with Pillows

The therapy team will opt for pillows instead for several reasons. A PRAFO is not medically appropriate or needed at this time, the ankle is not impacted by the burn, or the PRAFO is rotated to the opposite foot.

Important things to consider when positioning the LE with pillows:

- 1-2 pillows
    - Depending on edema or severity of the burns 2 pillows should be enough to get the LE at heart level while the patient is at rest.
- Turn the pillow horizontal.
    - When the pillows are vertical, they reach the knee causing the knee to slightly flex. This can cause knee contractures.
- Make sure the heel is “floating”
    - Roll the pillow under the ankle leaving it floating above the bed.
    - This prevents unwanted pressure on the heel of the foot that could lead to pressure ulcers.

4)Positioning of the head

Burns to the neck and ears are commonly seen in this unit. It is important for the neck to remain in extension to prevent cervical contractures and the ears to be kept free to reduce pressure and edema. That means, NO PILLOWS.

- Allowing the head to rest directly on the mattress allows for the neck to naturally fall into extension and the ears to rest free from pressure.