Care After Burn Trauma: A Burn Toolkit for Providers

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Care After Burn Trauma: A Burn Toolkit for Providers

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Section I: Abstract

**Problem:** A burn injury can occur in a matter of seconds. Despite advances in medical innovations and scientific progress, accidental burns continue to represent a devastating major public health burden today. Burn traumas represent a great expense to the healthcare system, affect every age and demographic, and continue to possess significant morbidity and mortality.

**Context:** Due to the current knowledge deficit of basic burn treatment, this Toolkit will provide current best-practice guidelines with evidence-based wound care instruction.

**Interventions:** An interactive educational instruction, including a pre-test and post-test of overall comprehension, from initial assessment to management of burns. Included will be resources for providers and patients summarizing critical instruction and referral criteria.

**Measures:** Implementing a professional practice Burn Toolkit to enrich overall awareness and understanding of burns as demonstrated by increased post-test competency. Informed providers will be able to better address health care disparities unique to burn patients, as well as teach and promote burn injury prevention.

**Results:** After the Provider Toolkit Presentation, data analysis demonstrated improved post-test burn comprehension and overall understanding. Future indications include publication to reach a wider audience and workshops to decrease the overall incidence and societal cost of burns.

**Conclusions:** This Burn Toolkit will create an essential change in practice resulting in better assessment and burn care, resulting in improved physical and psychological outcomes.

*Keywords:* Burns, burn assessment, burn trauma, burn prevention, provider burn toolkit, burn referral
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Section II: Introduction

Problem Description

Accidental burn injuries continue to represent a devastating trauma worldwide. Over 486,000 people receive medical treatment for burn traumas annually, with 73% of reported burns occurring within the home environment (American Burn Association, 2016). The burden of burn disability affects the young and old disproportionately. Pediatric patients are at greater risk for harm due to their larger total body surface area relative to size, fragile skin, immature decision-making, and limits in physical coordination (Loller, Buxton, & Kerzmann, 2015). Geriatric patients represent another vulnerable population at high risk for burn injuries. Reduced mobility, delayed sensory processing, polypharmacy, and chronic comorbid conditions increase older adults’ likelihood of unintentional injury and limit wound healing (Grant, 2013). The risk of mortality due to burns is highest in ages under five years and greater than 65 years (Oliver, 2019).

The medical, social, and psychological cost of burn treatment is high. Approximately one-third of patients admitted for burn traumas were self-paying or lacked appropriate health insurance, further contributing to a financial burden (Lehna & Myers, 2010). The annual expense of burn treatment in the United States exceeds one billion healthcare dollars, not including hidden costs of loss of function, rehabilitation, and reintegration into society (Nielson, Duethman, Howard, Moncure, & Wood, 2017). Health disparities clearly exist between socioeconomic areas. Lower-income areas are at a disproportionately higher risk for trauma and long-term consequences of burns due to poor social support, societal stigma, education, and lack of resources. Burn-related fatalities are more likely to occur in areas of poverty and have detrimental social consequences (Girardeau & Hughes, 2018).
A burn injury can happen suddenly and unexpectedly to anyone, leading to grave suffering, disability, and lifelong disfigurement. Burns involve social and psychological consequences that persist long after physical healing. This Burn Toolkit for Providers is intended to be an educational resource and learning opportunity for healthcare professionals to offer rapid reference for assessment, treatment, and referral of burn injuries.

**Situation**

Increased awareness and knowledge of burn and fire prevention can limit unintentional incidents. Recent wildfires in the Amazon and across Australia have directed global attention to the widespread heartbreak, destruction, and expense of fires. According to the Insurance Information Institute, nearly 90% of all wildfires in the United States are directly related to human error and misjudgment (2020). In California as of December 2019, there were 6,800 reported wildfires destroying over 253,321 acres of land (California Department of Forestry and Fire Prevention, 2019). With multiple fires smoldering throughout the state, the likelihood of treating a burn victim or first responder increases. Climate changes with intensified winds and record high temperatures create ideal conditions for fire disaster (National Oceanic and Atmospheric Administration, 2019). The grave hazards of fire and burn traumas will continue to be a critical and current growing public health concern.

**Current Knowledge**

The majority of burns that occur in the community are preventable (Sahu, Adrawal, & Patel, 2016). Burn injuries frequently are cared for at home with a variety of home-remedy treatments that often lack scientific evidence. If a burn victim is fortunate to have access to treatment by providers who possess expertise and resources, healing results are favorable. Burns can be successfully managed in a primary care or outpatient setting with frequent follow up and
close monitoring for complications (Lloyd, Rodgers, Michener, & Williams, 2012). Poor quality or misunderstood initial treatment from a non-burn clinician, bystander, or family member, demonstrates the need for greater public education (Burgess, Cameron, Cuttle, Tyack, & Kimble, 2016). The intention of this Burn Provider Toolkit presentation is to inform healthcare providers for improved health outcomes, leading to better psychological and physical results (McWilliams, Hendricks, Twigg, & Wood, 2015).

**Initial Burn Management**

Burns are considered traumatic injuries. General emergency principles include initially ensuring the scene is safe before proceeding to conduct a primary and secondary assessment. Trauma guidelines utilize ABCDE mnemonic; ‘A’ for airway, ‘B’ for breathing and ventilation, ‘C’ for circulation and cardiac status, ‘D’ for disability and deformity, and ‘E’ for exposure (ISBI Practice Guidelines Committee, 2016). The priority of treating a burn victim should always be on cessation of the burning process with prompt removal of the heat source. If clothing is ignited or smoldering, officials advise immediately extinguishing flames by having the burning individual “stop, drop, and roll” (U.S. Fire Administration, 2018).

After the burning process is halted, assessment of physical damage is measured by the Total Body Surface Area (TBSA). Calculating TBSA estimates the percentage of partial thickness and or full thickness burned areas. Superficial, or first degree burns, are excluded in this calculation. There are two ways to determine TBSA, using the Wallace Rule of Nines or the Lund and Browder Chart. With the Rule of Nines, the head accounts for 9%, anterior trunk 18%, posterior trunk 18%, circumferential upper extremities 9% each, circumferential lower extremities 18% each, and perineum accounts for 1% TBSA (Mehta & Tudor, 2019). However, with children and infants having a proportionally larger head size relative to their body, the Lund
and Browder is considered more accurate for measurement and accounts for age in burn estimation (Lloyd, Rodgers, Michener, & Williams, 2012). Illustrations comparing different burn calculation tools can be found in Appendix A.

Rapid estimation of a burn victim’s TBSA not only aids in identifying the severity of the burn, but determines subsequent fluid resuscitation requirements. Fluid resuscitation is indicated for adults with burns of 20% TBSA or greater, and is indicated in burns of 10% TBSA or greater for geriatric and pediatric patients (Mehta & Tudor, 2019). To calculate the crystalloid fluids required, the Parkland Formula, developed by Shires and Baxter in 1968, is the most well-known protocol still used for trauma treatment today (Guilabert et al., 2016). The Parkland Formula is 2-4 ml intravenous Lactated Ringers (LR) solution per kilogram of body weight, per %TBSA, to be given over the first 24 hours after burn injury (Mehta & Tudor, 2019). This large amount of fluids infused is greater than other trauma patients, due to microvascular and hemodynamic changes unique to burns and the increased risk of developing hypovolemic shock after a burn.

Burns that are 15-20% TBSA have increased risk of developing a fatal systemic response known as ‘fluid creep.’ During the initial period of burn shock, vasoactive mediators and inflammatory cytokines are released, resulting in widespread intravascular fluid loss and capillary leaking (Schaefer & Lopez, 2019). This creates a state of hypoperfusion and hypovolemia, managed with aggressive fluid resuscitation and close monitoring for fluid volume overload. IV Lactated Ringers is the crystalloid solution of choice, due to the stability of the blood pH, however protocols vary by location and burn unit (Schaefer & Lopez, 2019).

Burns evolve over the first 24-48 hours, complicating accurate burn depth determination and fluid resuscitation needs (Lloyd, Rodgers, Michener, & Williams, 2012). Restrictive clothing and jewelry should be immediately removed from the burn victim unless adhered to the skin, and
tetanus prophylaxis administered promptly. For minor thermal burns, immediate treatment with cool running water at 15°C or 59°F is indicated (The Joanna Briggs Institute, 2016). Another effective means of cooling may be applying sterile saline or water-soaked gauze (Wiktor & Richards, 2019). This reduces the extent of tissue destruction by reducing contact temperature and may improve overall pain, healing times, and cosmetic outcomes (Frear, Griffin, Watt, Kimble, & Watt, 2018). Ice should never be used directly on burns. Exposure to freezing cold temperatures or ice water immersion can exacerbate tissue damage (Lloyd, Rodgers, Michener, & Williams, 2012). Patients with greater than 15% TBSA burned, as well as infants, children, and older adults, are especially susceptible to changes in temperature, therefore are at higher risk for developing hypothermia (The Joanna Briggs Institute, 2016).

It is also contraindicated to apply butter, salves, or sprays to burn injuries. Rupturing or removing initial blisters less than 6 mm increases risk of infection and is not advised (ISBI Practice Guidelines Committee, 2016). After initial cooling of the burn, covering the injured area with a non-adhesive sterile dressing helps to minimize temperature and fluid loss. Loosely wrapping burns protects injured tissue from bacteria, helps the wound maintain moisture, and provides comfort. Next it is prudent to seek medical care to help with the management of pain and potential shock.

Severe Burns

If an individual suffers from greater than 10% TBSA burns, has concurrent trauma, or if there is any suspicion of inhalation injury, urgent transfer to a specialized burn center is indicated (ISBI Practice Guidelines Committee, 2016). Initial airway assessment and management with burns is critical, as the rapid edema formation can obstruct adequate ventilation. Inhalation injury should always be suspected in unwitnessed burns that occur in closed spaces, drug or alcohol
use, loss of consciousness, singed nasal hairs, blackened sputum or secretions, or hoarse voice on initial presentation (Oliver, 2019). Thorough airway assessment should be the priority to rule out possible compromise, especially if the patient displays any of these symptoms. Severely burned or unconscious patients are often immediately intubated in the field, to establish a patent airway and prevent respiratory failure.

Burn referral should always be made for burns of the face, genitals, hands, feet, or across critical joint areas which could result in limited mobility or poor psychological outcomes. Circumferential burns also increase the risk of impaired neurovascular status, and should be monitored by Doppler frequently for alterations in perfusion. Full thickness burns may require emergency escharotomy or fasciotomies to reduce pressure, prevent compartment syndrome, and salvage extremities (ISBI Practice Guidelines Committee, 2016). Intravenous or intraosseous access should be initiated with large-bore lines for rapid infusion of fluids, as well as urinary catheter placement to closely monitor urine output (Oliver, 2019). The American Burn Association’s Referral Criteria to a specialized burn unit can be found in Appendix B.

**Modalities of Burns**

Burn injuries are organized based on etiology of tissue destruction. During the initial head-to-toe assessment, identifying and assessing the method of trauma is essential for timely and adequate treatment. Nearly 80% of burn injuries in young children are due to scald burns, whereas fire-related traumas are common in ages six and older, and more likely to be admitted for medical supervision and management (Matthews & Atwal, 2017).

**Thermal.**

Thermal burn injuries include flame, contact, steam and scalds, and occur with the energy transference from hot substances to the epidermis (Rice & Orgill, 2019). Best practice care
entails immediate removal of the heat source and reducing the temperature with clean cool running water to lessen inflammation and subsequent tissue injury (Alomar, Rouqi, & Eldali, 2016). Ice is always contraindicated for use in cooling of a burn, causing vasoconstriction and damage to microcapillaries (Hollywood & O’Neill, 2014). Heat from thermal burns causes irreversible destruction as proteins in the skin denature. The damaged protective epidermal barrier results in impaired thermoregulation, fluid loss, and increased susceptibility to pathogens (Wolf, 2018).

Chemical.

In contrast, exposure to chemicals requires careful decontamination depending on the substance before providing first aid (Girardeau & Hughes, 2018). Initial assessment should include determination if the chemical is alkali or acid. Alkaline agents breakdown proteins in grease, and can cause liquefactive necrosis upon prolonged contact with the skin (Matthews & Atal, 2017). Everyday alkali products include oven cleaners, cement, bleach, ammonia, washing powders, and baking soda. These agents are capable of deep infiltration and damage of tissue through the dermal layers. Common household acids such as vinegars, toilet cleaners, or battery acids can cause immediate irritation and corrosion of the skin. It is important that the exposed area is kept clean and dry, and urgent medical evaluation is sought. With chemical burns, the use of cool running water over the injury may be contraindicated and could worsen tissue destruction (ISBI Practice Guidelines Committee, 2016).

Electrical.

Electrical burns cause minor to very severe wounds, depending on the type of current, voltage, duration of exposure, and pathway of transmission through the body. As electricity is converted to thermal energy, often hidden internal organ damage can result from charged particle
currents (Wolf, 2018). It is important to ensure that the electrical source is disconnected from power before assessing and treating the patient. Electrical burns have a point of entry and an exit point. Medical follow up with electrocardiogram is always indicated due to increased risk of cardiac arrhythmias (Matthews & Atwal, 2017). Accidental shocks in the home caused by small appliances or contact with electrical outlets rarely cause significant injury, and are less likely to be reported. Greater than 30,000 incidents of nonfatal significant electrical injury occur each year in the United States, whereas exposure to higher electrical voltage, such as industrial sources or power lines, leads to over 300 reported fatalities annually (Runde, 2018).

**Cold.**

Cold injury, also known as frostbite, occurs when tissue is exposed to chilled temperatures, and can be worsened by underlying states of hypothermia. Individuals at higher risk are the homeless, soldiers, individuals who work outdoors or are exposed to inclement weather conditions for long periods of time (Zafren & Machem, 2018). With frostbite, formation of ice crystals intracellularly and extracellularly leads to rapid cell death. The surrounding tissue vasoconstricts, causing fluid shifts which lead to ischemic and endothelial damage of the microvasculature (Danzi, 2019). Rapid rewarming of the body is contraindicated; sudden increases in temperature cause inflammatory cytokines to be released furthering exacerbating tissue necrosis and causing extreme pain (Zafren & Mechem, 2018). Indicated treatment of cold burns involve medical and surgical evaluation with gradual reheating through warmed IV fluids or immersion in tepid baths warmed to 37°-39°C (Zafren & Machem, 2018).

**Radiation.**

Exposure to sources of radiation, either ionizing, thermal, ultraviolet, or radio frequency, has the potential to cause tissue necrosis. Radiation damages DNA of living cells through
ionization and can cause deep internal burns invisible to the naked eye (Bushberg, 2019). Deep ultraviolet skin injury can result in erythema, inflammation, and blistering wounds with risk of infection, fluid shifts, scarring, and permanent changes in the structure and pigmentation.

 Radiation damage can be especially problematic and painful for cancer patients undergoing prescribed irradiation treatment for malignancy. Nearly 95% of people receiving radiation for cancer experience some form of radiation-induced tissue injury or dermatitis as a result (Leventhal & Young, 2017). The highly fractionated and concentrated doses of radiation disrupt and destroy the self-renewing epidermis. Repeated exposure to high levels of radiation results in a prolonged dermal inflammatory process (Ryan, 2012). Tissue breakdown due to radiation is often cared for in the same manner as thermal burns, however the underlying pathophysiology differs. Radiation wreaks havoc on living cells, causing an uncontrolled and disorganized inflammatory process that persists long after the therapy ends. Furthermore, due to the dose-dependent pattern of tissue desquamation and an opiate-resistant pain pathology, specific oncologic considerations for wound healing should be made (Ryan, 2020). Management of long-standing radiation injuries often requires surgical intervention with full-thickness skin grafting due to the nonviable irradiated tissue that must be excised completely.

**Friction.**

Opposing forces have the potential to cause tissue damage due to heat generated and mechanical influences involved. Friction burns are commonly seen with vehicular or bicycle accidents, athletic injuries, and due to rolling belts such as treadmills or vacuums (Agrawal, Raibagkar, & Vora, 2008). Friction injuries normally do not require medical consultation or surgical evaluation, unless they are full thickness burns or display signs of infection. Pain should
always be addressed, and thorough assessment and irrigation to remove all debris from the wounds.

**Burn Pathophysiology**

According to the Jackson’s Burn Model, there are three distinctive areas of burn injury: the Zone of Coagulation, Zone of Stasis, and the Zone of Hyperemia (Nielson et al., 2017). The most severe tissue destruction occurs within the Zone of Coagulation, where an irreversible necrosis of proteins occur in the epicenter of injury. This is often the point of impact or location closest to the heat source. Wound proteins will denature at temperatures above 41°C or 106°F (Rowan et al., 2015). This necrotic area is surrounded by a Zone of Stasis, a region of ischemia with limited tissue perfusion. Partially viable tissue present in this middle location can either progress into complete necrosis, or turn the corner toward recovery. The outermost Zone of Hyperemia is the area that is most likely to recover and return to full function due to increased circulation, unless infection or hypoperfusion occurs (Hettiaratchy & Dziewulski, 2004). Burn wound healing represents an intricate and dynamic interplay, with overlapping phases of inflammation, proliferation, revascularization, and remodeling (Rowan et al, 2015).

**Burn Classifications by Depth**

Burns are also classified by the levels of tissue destruction that occurs. Illustration of the degrees of burns can be found in Appendix C.

**First degree.**

First-degree, or superficial burns, involve the top layers of the epidermis. Superficial burns appear erythematous and painful, a common example being a reddened sunburn. Risk of infection is minimal with first degree burns because there is no fluid loss and the skin barrier remains intact (Block, King, & Gosain, 2015). Normally superficial burns heal without scarring.
complications, especially in younger children. Superficial burns are often warm, erythematous and painful, as all accessory nerves remain intact. First degree burns are not included in the Total Body Surface Area estimation of burn injury.

**Second degree.**

Second-degree burns are described as either superficial partial-thickness or deep partial-thickness, indicating the burn damage extends deeper through the epidermis into the dermal layer. Superficial partial-thickness burns penetrate the upper papillary dermis, on initial presentation it will be very painful, moist, with blisters and blanchable erythema (Krishnamoorthy, Ramaiah, & Bhananker, 2012).

In contrast, deep partial-thickness burns may or may not have pain sensation due to destruction of nerve endings. These burns present with damage extending through the epidermis into the layers of the reticular dermis (Block, King, & Gosain, 2015). Deep partial-thickness burns appear pale, do not blanch when pressure is applied, and can leave permanent scarring and contractures.

**Third degree.**

With full-thickness or third-degree burns, the extent of skin damage traverses the entire dermis into the subcutaneous layers of the skin. Full-thickness burns frequently present as leathery, pale areas that are non-blanchable, and lack normal sensation. Third-degree burns often require inpatient admission for surgical intervention and fluid resuscitation, depending on the extent and location of burn (Krishnamoorthy, Ramaiah, & Bhananker, 2012). The recovery from full thickness burns can be challenging; patients are more likely to require fluid resuscitation, nutritional supplementation, psychosocial support, physical and occupational therapy that is best achieved in a specialized burn center.
Fourth degree.

Fourth-degree burns represent severe full thickness damage, with resulting injury affecting all layers of the skin and into muscle, fascia, and bone (Block, King, & Gosain, 2015). No pain is experienced with fourth-degree burns due to the extensive destruction of nerve proprioceptors. Fourth-degree burns require urgent admission to a burn unit for specialized emergency care, careful monitoring and calculated fluid resuscitation, intravenous pain management, and critical surgical intervention.

Burn Dressings

Basic principles of all burn wound care is to cover and protect. Due to the compromised dermal barrier, the goal is to provide warmth, moisture, comfort, and avoid bacteria. As edema formation and fluid loss increases over the first few days; burn dressings should never be restrictive. Depending on the modality and depth of burn, a non-adherent dressing such as petroleum-impregnated gauze can be applied over the burned area and covered with multiple layers of gauze to protect and pad the burned area. There is limited evidence for the indicated use of silver sulfadiazine or Silvadene (SSD) as a first line treatment. Multiple studies have demonstrated conflicting data, concluding that SSD may delay wound healing and cause neutropenia (Greenhalgh, 2019). Furthermore, Silvadene often creates a layer of pseudo-eschar over the wound surface, and it is difficult to identify areas of deeper tissue injury and to remove without forceful scrubbing.

Burn dressings should be changed frequently to maintain a clean wound environment and assess for signs and symptoms of infection. Prescribing antibiotics is contraindicated in outpatient management, and can lead to complications and polymicrobial resistance (Lanham, Nelson, Hendren, & Jordan, 2020). For heavily exudating areas, such as lower extremities,
dressings may need to be changed twice daily and elevation should be reinforced. Fingers and toes should always be wrapped individually, with the tips open to assess capillary refill and monitor neurovascular status. For burns of the face or neck, frequent cleaning and maintaining moisture with antibiotic ointment at least twice daily, in addition to avoidance of sunlight is indicated (Moss, 2010). Any brand of over the counter antibiotic ointment or petroleum-based substance can be used, covering limbs with nonadherent dressings and multiple layers of gauze.

**Burn Complications**

One of the biggest risks with burn trauma is infection. Immediately following injury, the body goes into a hypermetabolic state due to systemic response to the burn with widespread catecholamine release. The alteration and loss of the protective barrier increases the risk of pathogenic invasion and debris (ISBI Practice Guidelines Committee, 2016). Without the mechanical barrier of the skin, all denuded areas are considered contaminated. Cleansing to remove biofilms caused by bacterial contamination and colonization greatly aids in reducing risk of infection (ISBI Practice Guidelines Committee, 2016). Adequate hand hygiene should be taught and reinforced. Clean running water or sterile saline should be used to irrigate burn wounds. Signs of infection include erythema, increased pain, swelling, redness, fever, chills, and a malodorous or purulent drainage from the wound. Due to the hypermetabolic response to burns, low-grade fevers are not usually a reliable indicator of infection (Moss, 2010). For any signs of cellulitis, patients should immediately follow up in the emergency room or urgent care for appropriate assessment and antibiotic therapy.

Another risk is the development of scarring and immobility secondary to burn wounds. Patients who are burned across critical joints such as fingers, toes, elbows or knees should be referred to the burn unit for appropriate management with physical and occupational services.
Burns are painful, and patients are often reluctant to do required exercises to maintain full mobility. After the burn has healed, continued scar massage and use of lotions or creams on healed areas are important for maintaining full range of motion and flexibility.

**Accidental Versus Non-Accidental Trauma**

Humans are predisposed to unintentional injury. Common etiologies of accidental burns include hot coffee or tea scalds, barbeque flash flame burns, contact with hot surfaces such as stoves or electric glass fireplaces, and household chemical burns with bleach or detergents. Pediatric patients pose a unique problem due to their physiology making them higher risk for morbidity and mortality from burn trauma. Children not only possess more sensitive and delicate skin, but a comparatively high total body surface area for their size (Block, King, & Gosain, 2015). Furthermore, immature neurological systems make pediatric patients less resilient to changes in temperature and fluid shifts.

Not all burns are accidental. According to Haines & Fairbrother, 2015, p. 25, “it is estimated that there are 1.25 million cases of non-accidental trauma each year in the United States, and that approximately 2% to 10% of children presenting to the ED are victims of abuse or neglect.” Common signs of mistreatment include unusual burn patterns or incongruous stories, with variations in the account of the incident not matching the physical presentation of the injury. Suspicion should always be high if there is a delay between incident and seeking medical treatment. If non-accidental trauma is suspected, all providers are mandatory reporters.

Limited experience with non-accidental causes and suspicions of abuse or neglect may lead to unrecognized mistreatment or misdiagnosis. Victims of abuse can be any age, sex, ethnicity, or socioeconomic background. Warning signs of intentional trauma include unusual or questionable burn patterns, accompanying signs of abuse or neglect, and aggressive or
overprotective caretakers. The authorities must be notified if any of these behaviors take place, ensuring the patient’s safety first and foremost.

**Special Populations**

Burns are a traumatic injury and population-specific considerations should be made. For burned children, not only is the management of pain, stress, anxiety, family dynamics and expectations priority, but adequate sedation prior to procedures or dressing changes should be achieved. Due to the psychological and physical burden of burns, developmental regression can occur and psychosocial support is indicated. Once a child’s pain and anxiety is controlled, patients and their families are more receptive to burn care education.

Discomfort from burns can be one of the most severe forms of suffering, only worsened by anticipation of regular and necessary dressing changes (Block, King, & Gosain, 2015). Consistent and ongoing reassurance and explanation of wound care treatment are critical in allowing the patient and their caregivers to be active participants in their treatment. Given the potential adverse effects of mismanagement and post-traumatic stress disorder, it is imperative to decrease anxiety in all ages to promote healing and wellbeing (Castro, Leal, & Sakata, 2013). Many burn units offer psychological services through group counseling, recreational therapy, and Child Life Therapy, which is another rationale in referring pediatric patients to a specialized burn center.

Additional considerations should be made for the growing number of overweight patients. Obese individuals often possess multiple comorbid conditions; diabetes, cardiac and pulmonary diseases, altered immune responses and pharmacodynamics pose unique challenges to healthcare (Rowan et al., 2015). Despite initial appearance, overweight patients may be
nutritionally malnourished. Careful calculation of dietary requirements and fluids based on TBSA burned is important to prevent catabolism and promote wound healing.

As the population ages, there will be increasing amount of geriatric patients requiring treatment for burn injuries. Older adults are more likely to be affected by cognitive decline and polypharmacy that can alter reaction times to trauma (Grant, 2013). Due to delayed epidermal recovery, hypoproteinemia, dehydration, and less resources in place for support and recovery from burn injury, this is a particularly vulnerable population.

Section III: Methods

Narrative of Evidence

California contains many underserved areas with vulnerable and high-risk communities. Many people lack the health literacy and knowledge to care for themselves, and are less likely to determine when to seek urgent care appropriately. According to the review of literature, there exists conflicting data and a knowledge deficit of appropriate initial burn treatment (Lehna & Myers, 2010). Also, due to the lack of formalized education and exposure to burns in current medical curriculum, there is less likelihood of appropriate burn assessment. This reduces the ability of providers to recognize and identify nonaccidental injuries that require immediate burn center referral, when post-injury timing is critical for positive health outcomes (Girardeau & Hughes, 2018). With the risk of minor burns converting into full thickness burns, prompt and appropriate decision-making is essential.

Limited research exists assessing the health improvements of educational intervention teaching primary care providers surrounding burn prevention (Lehna & Myers, 2010). Forest and household fires not only destroy physical buildings and property, but can devastate the mental
health and wellbeing of those affected. These long-lasting negative effects and psychological results can be prevented through better patient and provider education.

**PICOT**

(P) In the state of California, (I) how will educating practitioners with a Burn Toolkit for Providers (C) compared to standard first aid current practices (O) affect initial evaluation, assessment, and treatment of burns (T) compared to pre-test baseline knowledge?

**Review of Evidence**

Using the CINAHL Complete database search, high quality evidence-based practice articles were reviewed. The following terms were utilized: “burn care” and “burn treatment.” To further narrow the literature search, articles were filtered and organized by most recent publications within the last 10 years and limited to the English language. Publications were filtered for peer-reviewed and multi-cited articles. The Review of Evidence evaluation table is provided in Appendix D, identifying main articles of significance. The studies identified for containing the most relevant and critical current knowledge were included and critically appraised utilizing the Johns Hopkins Research Evidence Appraisal Tool, grading each article based on the value of evidence and strength of quality.

Overall, the literature search demonstrated a need for increased community awareness regarding prevention and education of first aid practices. Greater knowledge of burn care results in improved health results (Sahu, Agrawal, & Patel, 2016). The review also concluded that burns affect young children and older adults disproportionately, burn injuries are largely preventable, and require the support of public prevention efforts (Oseni, Olamoyegun, & Olaitan, 2017).

Authors evaluated healthcare provider’s level of experience and rapid decision-making, and found that both are necessary for a burn victim survival (Girardeau & Hughes, 2018). Also
discussed were current advances in burn care, and the significance of pre-hospital care. Contrary to advances in house fire safety and prevention, burn injuries remain a complicated disease process and critical public health issue (Girardeau & Hughes, 2018).

With the growing geriatric population of the United States, comorbid conditions, lack of strength and coordination, and decreased sensation, older adults are at higher risk of unintentional trauma. Guidelines for older adults include thorough health inspection of the home environment and a comprehensive fire and burn safety assessment (Grant, 2013). Elderly individuals frequently go unrecognized as potential victims of fire. Safety inspections completed by home healthcare staff can evaluate and prevent injury in older adults by ensuring there is a clear exit in case of fire, and that fire department can safely access the residence. Ensuring that smoke and carbon monoxide alarms are present and working is critical. Older adults also have an increased risk of scald injuries from hot liquids or steam due to delayed reflexes and fragile epithelium. Full thickness or third-degree burns can happen with exposure of two seconds or less to liquids at 155°F or 68.3°C (American Burn Association, 2012). Current recommendations for household water heaters is 120°F or 49°C, and always checking that the bathwater temperature is no higher than 100°F or 37°C (Grant, 2013).

Community awareness regarding fire safety and burn first aid education directly correlates with positive health outcomes. According to Oseni, Olamoyegun, and Olaitan (2017), burn prevention programs are necessary for both developing countries as well as developed countries. Burns affect young children disproportionately, as they are exploring their environment and testing their limits. Pediatric burn injuries are largely preventable and require the support of public prevention efforts (Oseni, Olamoyegun, & Olaitan, 2017). One successful British teapot scald campaign throughout thirty-five years successfully decreased the number of
accidental burns from 20.8% to 2.7% (Eadie, Williams, & Dickson, 1995). Health measures and regulations are imperative for the health of the population, especially vulnerable populations.

When an accidental burn occurs in a domestic setting, family members are likely to refer to the internet for quick solutions. The World-Wide-Web contains misleading and inaccurate information, that can further confuse the public, and cause delays in seeking timely treatment (Burgess, Cameron, Cuttle, Tyack, & Kimble, 2016). One study reviewed the first ten websites found on popular search engines and identified inconsistencies on burn first aid, the use of cool water versus ice, and when to seek medical care. It also identified the accessibility of online content with regards to reading level competency, language, and photos or pictures utilized to convey information. The initial treatment of burn information was evaluated and rated the online information on four concepts: “Remove, Cool, Cover, and Seek” (Burgess, Cameron, Cuttle, Tyack, & Kimble, 2016). There exists a lack of understanding of immediate actions to take to care for a burn at home. By enhancing the community’s foundational knowledge of burns, greater outcomes in care and prevention can be achieved (Lehna & Myers, 2014).

Early concepts of burn first aid treatment started in the 1880’s, and was mostly in response to pain sustained from thermal tissue damage (Cuttle et al., 2009). Many alternative therapies were performed out of tradition or superstition, with little scientific evidence. The priorities and objectives of burn care included pain reduction, increased regeneration of the dermis, and protection of damaged tissue (Girardeau & Hughes, 2018).

In addition to improved management of noxious pain, current evidence suggests improved clinical and cosmetic outcomes by running cool water over the injury area for 20 minutes. Using ice can cause detrimental effects to the burned area (Cuttle et al., 2009). A significant relationship between burn depth and the modality of burn first aid was determined.
Burns that received immediate cool running water resulted in less tissue damage, with decreased incidence of adverse psychological effects and skin grafting required (Cuttle et al., 2009). Initial reduction of the temperature of the burned area in simple first aid halts the progression of tissue destruction. Decreasing pain and inflammation is helpful for burn pain management, leads to better overall outcomes, and teaching simple cooling methods can be performed anywhere there is access to clean running water.

General burn knowledge and understanding is lacking among providers that have limited exposure to trauma medicine. To overcome this, the Burn Toolkit for Providers will offer an educational resource for greater improved patient outcomes and public health promotion of burn prevention.

**Theoretical Framework**

Implementing a Burn Toolkit for providers incorporates the theoretical framework of the Health Promotion Model (HPM). The ultimate goal of nursing is holistic health promotion and prevention of suffering. This nursing model framework explains the nature of people and their interaction within their environment (Nursing Theories, 2008). The Health Promotion Model also states that learned behaviors and acquired characteristics can influence beliefs, thus affecting and supporting health-promoting behaviors (Pender, Murdaugh, & Parsons, 2011). By educating healthcare providers to incorporate evidence-based health practices surrounding the management and prevention of burns, this will support the collective health of the community. Learning how to assess, treat, and refer, reinforces positive behaviors and avoidance of hazards.

**Specific Aims**

The Burn Toolkit abstract was selected upon submission in August 2019, and the original intention of the author was to present a live workshop at the California Association for Nurse
Practitioner 43rd Annual Education Conference on March 18, 2020. The plan was to disseminate current and accurate burn information to providers that care for vulnerable and underserved populations. The objective was to lower unintentional burn prevalence and the cost of injuries due to ineffective or delayed treatment. The widespread community education would help providers learn to care for burns in their practices, as well as teach basic burn care methods to treat burns at home. By presenting an educational workshop for providers with limited burn and trauma experience, this author hoped to increase understanding and offer evidence-based guidelines to develop confidence in burn care and improve patient outcomes. A copy of the DNP Statement of Non-Research Determination form can be found in Appendix E.

Due to the current COVID-19 pandemic and subsequent conference cancellation, the presentation was modified and given at the Advanced Wound Care Center at Stanford to practicing providers. A total of 10 participants completed the survey, with experience level ranging from ‘Beginner’ to ‘Sufficient’. This presentation included and pre and post-test of general burn knowledge, and offered additional information on prevention and awareness for the provider and patient.

**AIM Statement**

The Burn Toolkit for Providers presentation will include and pre and post-test of general burn knowledge, to increase the overall competency of current practices in burn care, and provide additional information on prevention and awareness to be disseminated to the community.

**SMART Goals**
Specific - Providers will be offered an educational Burn Toolkit describing common types and causes, treatments, signs or symptoms of infection, and when to appropriately refer burn trauma to specialized care.

Measurable - Assessment of pre-knowledge and post-knowledge of providers will show an overall increase in burn care competency.

Achievable - Burn Provider Toolkit presentation with descriptions and photos of different types of burns and treatments, and straightforward instructions of how to care for burns with additional community and provider resources.

Realistic - Educating providers of high risk underserved populations to disseminate burn information to decrease unnecessary emergency room and urgent care visits, limit the cost to society, and increase general awareness, value, and understanding of burns.

Timely - Education Toolkit will be provided and a pre and post-test assessment will be collected from participants after the presentation.

Gap Analysis

According to the review of evidence, a lack of understanding regarding pre-hospital provider burn education exists (Girardeau & Hughes, 2018). This author’s plan to create a resource to meet this need for burn education and prevention for general healthcare providers. Also provided will be an easy-to-read and utilize burn reference tool for underserved communities to help bridge the knowledge deficit. Further information and the full Gap Analysis can be found in Appendix F.

Work Breakdown Structure

The Work Breakdown Structure effectively identifies the project deliverables, and when the completion date for each is expected. The WBS is divided into four sections: Initiation,
Planning, Execution, and Control. During the initiation phase, the plan is to assess the needs of the providers and resources available. This will be completed by gathering information and conducting a preliminary survey of basic burn knowledge among providers. During the planning phase this author will create a first draft version of the presentation and materials. The author will submit drafts of their work for review and revision. The author will take the feedback and integrate it into a complete presentation.

The final draft and presentation will be completed and submitted to the CANP by the February 1, 2020 deadline. During the third execution stage, the Burn Toolkit for Providers will be presented on March 18, 2020 and the pre-test and post-tests will be completed and collected during the presentation. Upon completion of this project during the control phase, results from the surveys will be analyzed and meaningful data extracted. The presentation will be updated based on feedback for future presentations using the most current evidence-based information available. A step-by-step guide to the Work Breakdown Structure (WBS) can be found in Appendix G, and the GANTT chart of the project timeline can be found in Appendix H.

**SWOT Analysis**

For the burn provider education resources a Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis involves all levels: micro, meso, and macro systems. The full SWOT assessment will assist in defining the team, creating strategies to overcome barriers, and potential roadblocks to the project completion. Some of the identified strengths of this project include the diverse group of providers with varying specialties and backgrounds will be in the audience. Some of the weaknesses include a small subset of the advanced practice providers limited to California with a limited scope of practice. The opportunities found would be expanding this
presentation to include other languages and cultural practices, and the chance to affect change within the broader community. The SWOT analysis diagram can be found in Appendix I.

**Proposed Budget**

The financial constraints of ensuring project success are important considerations, and all efforts for this Toolkit made within limited budget was made. This project plan will be cost effective to implement with minimal surplus. Once a Burn Toolkit for Providers is created, replicating the information and updating to contain the most current and relevant evidence-based information. The overall budget for this project was estimated at $3879.00 to implement the Burn Provider Toolkit. Further detail of expenditure of the total project budget is provided in Appendix J. Drawings of burns were contracted with a local artist for $400, a copy of the contract agreement for the use of drawings can be found in Appendix K.

**Educational Intervention**

Often occurring in domestic settings, avoidable burn injuries continue to burden the healthcare system. Accidental burns affect every age and demographic. However, lower-income areas are at a disproportionately higher risk for burn injuries, and nearly 90% of all burn-related fatalities occur in areas of poverty (Girardeau & Hughes, 2018). Although guidelines exist, there is no standardized evidence-based practice manual for burn care. Each burn center utilizes location-specific educational resources and specific practice protocols. The American Burn Association has published guidelines, but they are often inaccessible to practitioners lacking trauma experience. By creating and sharing the Burn Toolkit presentation to general providers, the author’s goal is to offset the societal burden of inadequate or incorrect burn care and provide an accessible prevention resource for patients. Copies of the PowerPoint Slides for the CANP Burn Toolkit for Providers can be found in Appendix L.
Outcome Measures

By educating Advanced Practice Providers, physical therapists, nurses and students, this author hopes to positively impact health outcomes in burns. This includes underserved communities and improving the overall knowledge base and understanding of basic burn care and first-line treatment. Testing the pre-intervention prior to training and post-intervention knowledge after burn education competency of providers. After learning more about burn treatment, providers will show greater knowledge and understanding of common hazards and the initial treatment of burns. Included is the Burn Provider Reference in Appendix M and the Patient Education Handout in Appendix N which were provided after the presentation.

Analysis

Qualitative and quantitative methods will be used. No validated tool to assess burn comprehension currently exists (Lehna & Myers, 2011). This author plans to identify pre and post-test results of the provider’s increase in general knowledge, comprehension, and understanding of burns. Utilizing Microsoft Excel to analyze to survey the healthcare provider’s knowledge pre-education before and after implementation post-education knowledge to show that teaching was effective. The data will be organized and sorted for meaningful use and statistical analysis.

Ethical Considerations

Due to the nature of the teaching tool for healthcare providers, there will be no risk of privacy concerns as it will be utilized as an educational toolkit. There was no direct patient participation in the project implementation. With respect to patient confidentiality and the individual right to privacy, every measure was taken to maintain patient confidentiality. The privilege of provider-patient relationship is protected by law, and will not be challenged by the
implementation of this project. The nature of this Burn Toolkit will not require Institutional Review Board (IRB) approval, and is classified as an educational performance improvement project for improved health outcomes. See Appendix E for the DNP Statement of Non-Research Determination Form.

Section IV: Results

Pre and Post-Test Results

A comprehension quiz on general burn comprehension was given to participants before and after the educational workshop. Examples of the Provider Pre-Test can be found in Appendix O, and Provider Post-Test can be found in Appendix P. This included twelve questions aimed at determining provider comfort level and background knowledge of basic burn care. This quiz was made up of true or false as well as multiple choice questions. Each question can be categorized by treatment, symptoms, protocol, or general knowledge of burns.

During the presentation all questions were addressed, including rationales. Only one of the questions, number four, could be interpreted multiple ways and could be clarified or eliminated from future quizzes altogether. The Post-Test comprehension quiz included the same questions, with additional assessment of learning and feedback on effectiveness of presentation.

Section V: Discussion

Summary

The project aim was to improve the overall understanding and familiarity with burn care and treatment. According to the preliminary results from small sample size, improved understanding demonstrated on best practices for burn care was achieved. On the post-test quiz, all of the surveys rated high satisfaction (5 out of 5) with the quality of presentation, the resources provided, and the knowledge of the instructor.
Further implications to disseminate knowledge through journal publication, presenting at future conferences, or offering continuing education credits to incentivize learning.

**Interpretation**

The Burn Toolkit resulted in increased comfort in overall assessment and treatment of burns. After the presentation, the Pre and Post-Test surveys showed improved scores from 68% average scores a standard deviation of 2.49, to 96% burn competency scores with a standard deviation of 1.37. This variance demonstrates an increase in knowledge and accuracy.

**Limitations**

After the original intention of presenting at the CANP Conference was cancelled, the Burn Toolkit was presented in April 2020 to various providers within Stanford Health Care. Barriers were identified such as minimal burn experience, and lack of priority due to limited experience with trauma. Burn education may not be perceived as relevant to the providers in their everyday practice or population served. Further constraints included time and resources to implement the Burn Toolkit for a wider audience. The intent of creating a Provider Toolkit was to be presented and shared among providers, especially in primary care, with room for modifications and updates as needed. The information presented used the most current and evidence-based information that was published at the time of creation in December 2019.

Further limitations included the population and prior wound experience of the practitioners who completed the surveys. The results came from a limited sample size with basic to advanced understanding of wound care principles. Despite this, there was an increase in overall understanding from a baseline burn knowledge. In order to have a greater impact on the community, the information would need to be offered on a larger scale or published. This DNP
Preventable burns continue burden on the healthcare system. Providing the Burn Toolkit for Providers will offer information and enhance overall burn competency. The goal is to create an open dialogue to augment knowledge and understanding of treatment, and prevention of burns. The potential short-term implications will be enriched competency of burn care and a change in practice for initial treatment of burn trauma. This will result in improved psychological and physical health outcomes, and more appropriate referrals to the burn center with reduced waste of unnecessary resources.

With the ongoing advances in wound healing and burn knowledge, and overall improvements in global socioeconomic development, the incidence and severity of traumatic burn injuries has continued to decline (Smolle et al., 2016). Community prevention projects and educational efforts have helped to increase the knowledge of home hazards such as limiting hot water temperatures in households and ensuring that functioning smoke detectors are in place.

The potential long-term implications in educating providers will in turn share their knowledge with the public, and the incidence of accidental or preventable burns will decrease resulting in less public health care costs. By empowering providers with burn education resources, this will lessen the public health burden of preventable burns. Reduction of ineffective treatment of burn injuries will help to improve the health outcomes of children and older adults in lower socioeconomic areas, our most vulnerable populations.
Section VII: References


Burgess, J. D., Cameron, C. M., Cuttle, L., Tyack, Z., & Kimble, R. M. (2016). Inaccurate, inadequate and inconsistent: A content analysis of burn first aid information online doi://doi.org/10.1016/j.burns.2016.09.017


injury/frostbite?query=frostbite


http://search.ebscohost.com/login.aspx?direct=true&AuthType=sso&db=ccm&AN=129625364&site=ehost-live&scope=site&custid=s3818721


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teach burn prevention correlate with their actual burn prevention knowledge? Journal of
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from https://www.cancernetwork.com/article/radiation-dermatitis-recognition-prevention-and-management
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Lloyd, E. C. O., Rodgers, B. C., Michener, M., & Williams, M. S. (2012). Outpatient burns:
Mathers, R. Figure 1: Superficial Thickness Burn Drawings, Illustrated by Raven Mathers, 2020
Mathers, R. Figure 2: Partial Thickness Burn Drawings, Illustrated by Raven Mathers, 2020
Mathers, R. Figure 3: Full Thickness Burn Drawings, Illustrated by Raven Mathers, 2020
from https://www.rcemlearning.co.uk/reference/major-trauma-burns/
doi:10.1016/j.burns.2014.06.015
Lippincott Williams & Wilkins. doi:10.1097/01.ASW.0000390374.34201.c8
prediction center. Retrieved from https://www.noaa.gov/


Section VII: Appendices
Appendix A: Estimating Total Body Surface Area (TBSA)

Wallace Rule of Nines

(Lawrence Rule of Nines. Contributed by OpenStax College, 2020)

Lund and Browder Chart

(Lund and Broder Diagram, Remote Primary Health Clinic Manuals, Burns, 2014)
Appendix B: ABA Burn Center Referral Criteria

Burn Center Referral Criteria

A burn center may treat adults, children, or both.

Burn injuries that should be referred to a burn center include:

1. Partial thickness burns greater than 10% total body surface area (TBSA).
2. Burns that involve the face, hands, feet, genitalia, perineum, or major joints.
3. Third degree burns in any age group.
4. Electrical burns, including lightning injury.
5. Chemical burns.
6. Inhalation injury.
7. Burn injury in patients with preexisting medical disorders that could complicate management, prolong recovery, or affect mortality.
8. Any patient with burns and concomitant trauma (such as fractures) in which the burn injury poses the greatest risk of morbidity or mortality. In such cases, if the trauma poses the greater immediate risk, the patient may be initially stabilized in a trauma center before being transferred to a burn unit. Physician judgment will be necessary in such situations and should be in concert with the regional medical control plan and triage protocols.
9. Burned children in hospitals without qualified personnel or equipment for the care of children.
10. Burn injury in patients who will require special social, emotional, or rehabilitative intervention.

Excerpted from Guidelines for the Operation of Burn Centers (pp. 79-86), Resources for Optimal Care of the Injured Patient 2006, Committee on Trauma, American College of Surgeons

Severity Determination

First Degree (Partial Thickness)
Superficial, red, sometimes painful.

Second Degree (Partial Thickness)
Skin may be red, blistered, swollen. Very painful.

Third Degree (Full Thickness)
Whitish, charred or translucent, no pin prick sensation in burned area.

Percentage Total Body Surface Area (TBSA)

(American Burn Association Current Referral Criteria, 2006)
Appendix C: Burn Classification by Depth of Tissue Damage

Figure 1: Superficial Thickness Burn Drawing, Raven Mathers, 2020

Figure 2: Partial Thickness Burn Drawing, Raven Mathers, 2020

Figure 3: Full Thickness Burn Drawing, Raven Mathers, 2020
## Appendix D: Review of Evidence Table (1 of 2)

<table>
<thead>
<tr>
<th>Citation</th>
<th>Study Design</th>
<th>Methodology of Data Collection</th>
<th>Intervention/Study Findings</th>
<th>Appraisal/Level of Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cuttle, L., Kravchuk, O., Wallis, B., Kimble, R., Cuttle, L., Kravchuk, O., &amp; Kimble, R. M. (2009). An audit of first-aid treatment of pediatric burns patients and their clinical outcome. Journal Of Burn Care &amp; Research, 30(6), 1028-1034. doi:10.1097/BCR.0b013e3181bf7d1</td>
<td>Retrospective chart review of 459 pediatric patient charts. Friction burn injuries were included in the data, oral poisonings and inhalation injuries were excluded.</td>
<td>Using statistical analysis Minitab 15, this study explored data of the nominal and ordinal. The significance of the conclusions was confirmed with individual X or logistic regression analysis. Findings included 86.1% of the children that presented to the hospital had some form of first aid treatment, commonly administered by a family member.</td>
<td>Significant relationship found between burn depth and burn first aid, especially superficial burns. Burns that received immediate CRW resulted in less tissue injury, less complication, and less incidence of skin grafting needed P = .007. Cold water was applied to 349 pediatrics, or 80.2%. Outcomes/time to complete regrowth of damaged tissue was most significantly associated w/ the depth of the burn and/or the mechanism of burn injury.</td>
<td>According to the Joanna Briggs Critical Appraisal Tool, this article demonstrates Level I Evidence. This indicated that the research results clearly address the clinical outcomes. Furthermore, bias is minimized by the quality criteria being met, all conflicts of interest were clearly stated and disclosed.</td>
</tr>
<tr>
<td>Egro, F., O’Neill, J., Briard, R., Cubison, T., Kay, A., Estela, C., &amp; Burge, T. S. (2010). Pediatric superficial scald burns reassessment of our follow-up protocol. Journal Of Burn Care &amp; Research, 31(1), 196199.doi:10.1097/BCR.0b013e3181bfb7d1</td>
<td>Chart audit to identify if a professional member of the interdisciplinary burn team with burn experience deciding if a patient needed further follow up at their 2-week post-burn appt.</td>
<td>Retrospective study using charts of pediatric patients younger than 16, with greater than 5% Total Body Surface Area (TBSA) affected, and those that were burned 5 years prior. Total of 75 pediatric patients.</td>
<td>Experienced burn providers can accurately determine and predict children that at the 2 week follow up post-burn injury will require further follow up.</td>
<td>The Joanna Briggs Appraisal Tool was used to identify the Level of Evidence Level II. This research addresses clinical outcomes, but without the evidence labeling cannot meet the quality criteria for Level 1 Evidence. This study did not contain the data necessary to validate a tool.</td>
</tr>
<tr>
<td>Frear, C. C., Griffin, B., Watt, K., Kimble, R., &amp; Watt, K. (2018). Barriers to adequate first aid for paediatric burns at the scene of the injury. Health Promotion Journal of Australia, 29(2), 160-166.doi:10.1002/hpj.a.184</td>
<td>Reviewing the treatment of 2,522 pediatric patients at a tertiary burn center in Australia. Children’s care was either identified as “inadequate” vs. “adequate” with a descriptive analysis of results to determine differences among children in location, socioeconomic status, gender, and ethnicity.</td>
<td>Cross-sectional design from years 2013-2016. Info from interviews of the families of 2,522 patients were interviewed and transcribed. Data analysis via chi-square to examine the variations between the groups across a range of injury and demographic factors. When assumptions were violated, Fisher’s exact test was utilized. Also independent t-tests were used when the variables were numerical or ordinal.</td>
<td>Although most burns occurred nearby sources of cool running water, often children were undertreated for their burns. About 31.3% children had access to cool running water, and over 92% of the children were provided some form of first aid. The mechanism of injury, scald burns, received the best first aid P &lt; 0.0001.</td>
<td>The Duke Critical Review Form for Therapy Study categorized this article as Level II Evidence, demonstrating research results addressing clinical outcomes as well as using methods of scientific investigation, but not meeting the quality criteria to achieve Level 1 evidence status. The source of the opinion is not clearly identified in this study, although the authors stated there was no conflict of interest.</td>
</tr>
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### Appendix D: Review of Evidence Table (2 of 2)

<table>
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<tr>
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<tr>
<td>Kazis, L. E., Lee, A. F., Rose, M., Liang, M. H., Nien-Chen Li, Ren, X. S., . . . Pidcock, F. (2016). Recovery curves for pediatric burn survivors. <em>JAMA Pediatrics, 170</em>(6), 534-542. doi:10.1001/jamapediatrics.2015.4722</td>
<td>Systematic Literature Review of variation in clinical practice of pediatric burn care using a cohort of 1,076 children with burns at four regional Shriners Hospitals.</td>
<td>Systematic review based on measures set by an expert panel of burn providers. Total of 36 process-based indicators were identified in 4 clinical areas: 1. Initial evaluation and burn resuscitation 2. Acute excision 3. Psychosocial/Pain care 4. Reconstruction and after care</td>
<td>This study found that adherence was lowest in areas of critical care and acute excisional surgical intervention, whereas the psychosocial and pain management were found to have high adherence across all four sites. Substantial variation in practice guidelines was observed for pediatric burn care.</td>
<td>Level IV Evidence based on Therapeutic/Care Management of Burns. Authors had no conflicts of interest or additional funding to disclose.</td>
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<tr>
<td>Smolle, C., Cambiaso-Daniel, J., Forbes, A. A., Wurzer, P., Hundeshagen, G., Branski, L. K., . . . Kamolz, L. (2017). Recent trends in burn epidemiology worldwide: A systematic review. <em>Burns (03054179), 43</em>(2), 249-257. doi:10.1016/j.burns.2016.08.013</td>
<td>Systematic Review utilizing data from multiple countries using multiple intensive care units. Systematic search on PubMed.</td>
<td>A multicenter study with results and data gathered 46 from international ICU’s.</td>
<td>Total of 46 studies met inclusion criteria, majority being from very high income countries, 22% high income countries, 8% middle income countries, and no data from low income countries. Studies identified trends in burn incidence in certain countries (Australia, Czech Republic, Iran, and Israel), and a downward trend of burn incidence (including the USA/Canada). Overall decrease in burn admissions/mortality due to legislative changes, successful prevention programs, and increased workplace safety.</td>
<td>Level IV Evidence as demonstrated by a systematic review of diagnostic yield studies. The source of opinion is not clearly identified in this study, although the authors stated there was no conflict of interest nor specific grant funding from public agencies, commercial, or non-profit sectors.</td>
</tr>
<tr>
<td>Wang, Y., Beekman, J., Hew, J., Jackson, S., Issler-Fisher, A. C., Parungao, R., . . . Maitz, P. K. M. (2018). <em>Burn injury: Challenges and advances in burn wound healing, infection, pain and scarring</em> doi://doi.org/10.1016/j.addr.2017.09.018</td>
<td>A review of current literature on burns with discussion of current burn treatment, new and novel strategies to improve burn care.</td>
<td>Literature review of various advancements made in recent years on burn care, treatment, and management.</td>
<td>Advancements that have been made in burn research and injury management, including new skin substitutes and new surgical approaches with the integration of laser technology. Challenges remain- how to reduce overall time from injury to recovery, and ways of accelerating burn wound regeneration.</td>
<td>Level III Evidence by way of a systematic review of the literature</td>
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Appendix E: Signed Statement of Non-Research Determination Form (1 of 3)

DNP Statement of Non-Research Determination Form

Student Name: Whitney Weyhing

<table>
<thead>
<tr>
<th>Title of Project:</th>
<th>Care After Burn Trauma: Burn Toolkit for Providers</th>
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</thead>
<tbody>
<tr>
<td>Brief Description of Project:</td>
<td>This proposed DNP project will include an educational presentation of a Burn Toolkit for Primary Care Providers using the current, most evidence-based information available to educate providers and the general public on care for burn injuries.</td>
</tr>
<tr>
<td>A) Aim Statement:</td>
<td>By January 2020 develop, implement, and evaluate a Burn Toolkit for Providers in order to increase the overall competency of burn care, and provide community resources for reference.</td>
</tr>
<tr>
<td>B) Description of Intervention:</td>
<td>This Burn Toolkit will include a pre-test and post-test of general burn knowledge, assessment, and management of burn injury. Also will be a quick reference ‘Burn Basics for Providers,’ summarizing critical instruction, as well as a ‘Burn Safety Handout’ with information and photos for the community.</td>
</tr>
<tr>
<td>C) How will this intervention change practice?</td>
<td>This provides a summary of the current, most evidence-based information available to educate providers and the general public. The additional reference sheets will also provide quick need-to-know information of how to care for and safely treat burns at home.</td>
</tr>
<tr>
<td>D) Outcome Measurements:</td>
<td>The intended outcome of implementing this project is to improve provider’s awareness and understanding of burns. The providers educated will be better able to address the health care needs of burn patients validated by pre vs. post-test improvements, as well as teach and disseminate burn injury prevention to decrease the overall incidence and societal cost of burns.</td>
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</table>
Appendix E: Signed Statement of Non-Research Determination Form (2 of 3)

To qualify as an Evidence-based Change in Practice Project, rather than a Research Project, the criteria outlined in federal guidelines will be used:  
(http://answers.hhs.gov/ohrp/categories/1569)

☐ This project meets the guidelines for an Evidence-based Change in Practice Project as outlined in the Project Checklist (attached). Student may proceed with implementation.

☐ This project involves research with human subjects and must be submitted for IRB approval before project activity can commence.

EVIDENCE-BASED CHANGE OF PRACTICE PROJECT CHECKLIST *

<table>
<thead>
<tr>
<th>Project Title: Care After Burn Trauma: Burn Toolkit for Providers</th>
<th>YES</th>
<th>NO</th>
</tr>
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<tbody>
<tr>
<td>The aim of the project is to improve the process or delivery of care with established/accepted standards, or to implement evidence-based change. There is no intention of using the data for research purposes.</td>
<td>X</td>
<td></td>
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<tr>
<td>The specific aim is to improve performance on a specific service or program and is a part of usual care. ALL participants will receive standard of care.</td>
<td>X</td>
<td></td>
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<tr>
<td>The project is NOT designed to follow a research design, e.g., hypothesis testing or group comparison, randomization, control groups, prospective comparison groups, cross-sectional, case control). The project does NOT follow a protocol that overrides clinical decision-making.</td>
<td>X</td>
<td></td>
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<tr>
<td>The project involves implementation of established and tested quality standards and/or systematic monitoring, assessment or evaluation of the organization to ensure that existing quality standards are being met. The project does NOT develop paradigms or untested methods or new untested standards.</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>The project involves implementation of care practices and interventions that are consensus-based or evidence-based. The project does NOT seek to test an intervention that is beyond current science and experience.</td>
<td>X</td>
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</tr>
<tr>
<td>The project is conducted by staff where the project will take place and involves staff who are working at an agency that has an agreement with USF SONHP.</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>The project has NO funding from federal agencies or research-focused organizations and is not receiving funding for implementation research.</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>The agency or clinical practice unit agrees that this is a project that will be implemented to improve the process or delivery of care, i.e., not a personal research project that is dependent upon the voluntary participation of colleagues, students and/or patients.</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>If there is an intent to, or possibility of publishing your work, you and supervising faculty and the agency oversight committee are comfortable with the following statement in your methods section: &quot;This project was undertaken as an Evidence-based change of practice project at X hospital or agency and as such was not formally supervised by the Institutional Review Board.&quot;</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>
Appendix E: Signed Statement of Non-Research Determination Form (3 of 3)

**ANSWER KEY:** If the answer to **ALL** of these items is yes, the project can be considered an Evidence-based activity that does NOT meet the definition of research. **IRB review is not required. Keep a copy of this checklist in your files.** If the answer to **ANY** of these questions is **NO**, you must submit for IRB approval.

*Adapted with permission of Elizabeth L. Hohmann, MD, Director and Chair, Partners Human Research Committee, Partners Health System, Boston, MA.

**STUDENT NAME (Please print):** Whitney L. Weyhing

____________________________________________________
Signature of Student: ___________________________ DATE: 09/07/2019

**SUPERVISING FACULTY MEMBER (CHAIR) NAME (Please print):**

____________________________________________________
Signature of Supervising Faculty Member (Chair):

____________________________________________________ DATE
Appendix F: Gap Analysis

<table>
<thead>
<tr>
<th></th>
<th>Before Burn Provider Toolkit Presentation</th>
<th>After Burn Provider Toolkit Presentation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Providers</strong></td>
<td>Pre-test lacking knowledge, lack of burn understanding/recognition</td>
<td>Improved burn knowledge on assessment and treatment</td>
</tr>
<tr>
<td><strong>Process</strong></td>
<td>Willingness to learn</td>
<td>New ideas/skills learned</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>STRATEGIC OBJECTIVE</th>
<th>CURRENT STANDING</th>
<th>DEFICIENCY</th>
<th>ACTION PLAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Providers will learn about burns</td>
<td>Lack of knowledge and understanding</td>
<td>Overall knowledge deficit</td>
<td>Implement Burn Education Toolkit for Providers</td>
</tr>
<tr>
<td>Providers will learn burn prevention</td>
<td>Lack of burn prevention techniques</td>
<td>No knowledge source or Toolkit in place</td>
<td>Implement Burn Education Toolkit for Providers</td>
</tr>
<tr>
<td>Increase community awareness of burns</td>
<td>Currently a lack of knowledge on burns</td>
<td>Lack of resources, time, money, effort</td>
<td>A quick-access burn assessment tool of how to care for a burn</td>
</tr>
</tbody>
</table>
Appendix G: Work Breakdown Structure

1.1 Initiation
   1.1.1 Evaluation & Recommendations, Gap Analysis
   1.1.2 Identified Learning Needs and Goals of Providers
   1.1.3 Deliverable: Submit Burn Toolkit Project Charter
   1.1.4 Review and Edit Burn Toolkit Project Charter
   1.1.5 Burn Toolkit Project Charter Signed/Approved

1.2 Planning
   1.2.1 Create Preliminary Burn Education Toolkit Scope Statement
   1.2.2 Determine Toolkit for Providers Material to Cover
   1.2.3 Draft First Edition of Burn Toolkit
   1.2.4 Review and Revise Burn Toolkit
   1.2.5 Submit Final Burn Toolkit
   1.2.6 Milestone: Burn Toolkit Submitted for Management Approval

1.3 Execution
   1.3.1 Providers Complete a Pre-test Burn Knowledge Test
   1.3.2 Present Burn Toolkit for Providers
   1.3.3 Address the Provider Quick Reference Sheet
   1.3.4 Address the Community Resource for Patients
   1.3.5 Providers complete a Post-test Burn Knowledge Test

1.4 Control
   1.4.1 Burn Toolkit Education Project Data Analysis of Pre and Post-Test Results
   1.4.2 Modifications of Toolkit and Provider Resources with Suggestions
   1.4.3 Update Burn Education Project With Current Evidence
### Appendix H: GANTT Chart Project Timeline

<table>
<thead>
<tr>
<th>Course/Life Event</th>
<th>2019</th>
<th>2020</th>
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<tbody>
<tr>
<td>Gather information- Perform Literature Review</td>
<td>Spring</td>
<td>X</td>
</tr>
<tr>
<td>Identify problem and Gap in Knowledge</td>
<td>Spring</td>
<td>X</td>
</tr>
<tr>
<td>Formulate outline of Prospectus</td>
<td>Summer</td>
<td>X</td>
</tr>
<tr>
<td>Create Burn Toolkit Prospectus</td>
<td>Fall</td>
<td>X</td>
</tr>
<tr>
<td>Ask artist to make custom burn drawings</td>
<td>Fall</td>
<td>X</td>
</tr>
<tr>
<td>Combine into manuscript, edit and finalize</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Finalize Presentation, submit to CANP - Feb 10</td>
<td>X</td>
<td>Fall</td>
</tr>
<tr>
<td>Practice presentation in front of colleagues</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Presentation at CANP- March 18</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Post-Presentation Data Analysis- March 20 - 30</td>
<td>X</td>
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<tr>
<td>Submit final manuscript - March 30</td>
<td>X</td>
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### Appendix I: SWOT Analysis

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<th>Helpful</th>
<th>Harmful</th>
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<tr>
<td><strong>Internal</strong></td>
<td><strong>STRENGTHS</strong></td>
<td><strong>WEAKNESSES</strong></td>
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<tr>
<td></td>
<td>- Diverse group of providers from all</td>
<td>- Advanced Practice Providers from California only</td>
</tr>
<tr>
<td></td>
<td>over California with various specialties</td>
<td>- Perceived lack of knowledge amongst providers</td>
</tr>
<tr>
<td></td>
<td>and backgrounds</td>
<td>- Lack of consistency in care provision</td>
</tr>
<tr>
<td></td>
<td>- Varying individual levels of knowledge and</td>
<td>- Varied exposure to burns in practice</td>
</tr>
<tr>
<td></td>
<td>experience in healthcare</td>
<td>- Lack of time/resources to provide adequate burn teaching</td>
</tr>
<tr>
<td></td>
<td>- Willingness to learn, signing up and</td>
<td></td>
</tr>
<tr>
<td></td>
<td>attending workshop on their own accord</td>
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<tr>
<td><strong>External</strong></td>
<td><strong>OPPORTUNITIES</strong></td>
<td><strong>THREATS</strong></td>
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<tr>
<td></td>
<td>- Overall knowledge deficit of best-practice</td>
<td>- Provider buy-in to participate beyond workshop</td>
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<tr>
<td></td>
<td>treatment of burns</td>
<td>- Lack of resources: time, money, physical barriers or</td>
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<td></td>
<td>- Lack of current programs for burn</td>
<td>lack of applicable patients</td>
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<tr>
<td></td>
<td>prevention</td>
<td>- Limited interest in burn and wound care</td>
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<td></td>
<td>- Lack of formal education on wound</td>
<td>- Lack of translation to non-English resources and other</td>
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<tr>
<td></td>
<td>and trauma care</td>
<td>cultures</td>
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### Appendix J: Proposed Budget

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<td>Direct Expenses</td>
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<td>Payment of graphic artist for custom burn drawings</td>
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<td>$100 per graphic x 4 diagrams</td>
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<td>Provider and patient reference sheets</td>
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<td>Airfare from SFO to Ontario International Airport</td>
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<td>United March 18, 2020 – March 22, 2020</td>
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<td>Uber ride from Ontario Airport to Marriott Riverside</td>
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<td>March 18 and March 22, $30 each way</td>
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<td>Marriott March 18, 2020 – March 22, 2020</td>
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<td>Indirect Expenses</td>
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<td>20 hrs x hourly wage ($80 estimated after taxes)</td>
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<td>Data Analysis of Pre and Post-Test Results</td>
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<td>4 hrs x hourly wage ($80 estimated after taxes)</td>
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<td><strong>Subtotal Indirect Expenses</strong></td>
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<td><strong>Total Burn Toolkit Budget</strong></td>
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Appendix K: Letter of Artist Agreement for Use of Drawings

February 1, 2020

Artist Agreement for Use of Personal Drawings

I, Raven Mathers, agree to give Whitney Weyhing full authority to use the three burn drawings labelled: Superficial Burn, Partial Thickness Burn, and Full Thickness Burn respectively, for use and reproduction in the final Burn Toolkit Manuscript and educational PowerPoint presentations.

Whitney Weyhing will pay the artist a $100.00 deposit on January 31, 2020 and the final $200.00 when the drawings are completed on February 3, 2020, for a total of $300.00 to Raven Mathers.

_____________________________  ___________
Raven Mathers  date

_____________________________  ___________
Whitney Weyhing  date
Appendix M: Provider Burn Resource

**Burn Provider Reference**

**For all burn injuries:** remember the 3 Cs of burns
*Remove person from the source of the burn, put out the fire with Stop, Drop, and Roll*

1. **Cool**
*Run burn injury under cool, clean running water for 15-20 minutes to reduce tissue damage and pain. Ensure that body temperature is maintained with towels/blankets to prevent hyperthermia and shock*

2. **Cover**
*Cover and wrap burn in clean sterile gauze or nonstick dressing, careful to leave vesicles and bullae intact. Never use ice, butter, or toothpaste on burns!*

3. **Call**
*Call 911 or go to ER immediately if the burn is large, affecting the face, hands, or feet, having significant pain or if difficulty breathing which could indicate airway compromise*

**FOR SUPERFICIAL OR PARTIAL THICKNESS BURNS:** small scattered areas of the body, reddened, painful, with or without blisters, less than 10% TBSA not including the face, hands, feet, or perineum
- Cool with clean, running water (do not use ice or butter) for 15-20 minutes
- Wash well with mild soap and water, leave blisters intact
- Apply antibiotic ointment to burned areas
- Cover with a clean, soft bandage or nonstick dressing to help decrease pain
- Very painful- advise acetaminophen or ibuprofen (dosed by weight) every 4 - 6 hours
- Encourage elevation of burned limbs on pillows or recliner to help with pain and inflammation
- Increase fluids and high protein foods to assist with wound healing
- Coordinate follow up wound care in office or outpatient burn center

**FOR DEEP PARTIAL THICKNESS OR FULL THICKNESS BURNS:** larger than 10% TBSA including burns of face, hands, feet, genitals, electrical injury, chemical injury, any sign of inhalation injury (singed nasal hairs/ altered consciousness in fire)
- Ensure fire is extinguished, burned clothing or contaminated with chemicals is removed
- Run burns under cool, clean running water
- Cover burns with clean gauze or towels to facilitate burn inspection by emergency provider
- Call 911 or go to the nearest emergency department

**URGENT REFERRAL TO BURN CENTER:**
- > 10% TBSA burned or full thickness burns present
- Burns of face, hands, feet, or perineum
- Electrical/chemical burns, signs of inhalation injury
- Burns with concomitant trauma or substance abuse
- Any suspicion of abuse or neglect
Appendix N: Patient Education Handout

**Accidents can, and do happen. The quality of your care for a burn impacts the outcome.**

**For all burn injuries:** remember the 3 C’s of burns  
*Remove person from the source of the burn, put out the fire with Stop, Drop, and Roll*

1. **Cool**  
Run burn under cool, clean running water for 15-20 minutes to reduce size and damage  
*(Make sure that they are kept warm with towels or blankets!)*

2. **Cover**  
Wrap the burn in clean gauze, nonstick dressings, or clean towels leaving all blisters intact  
*(Never use ice, butter, or toothpaste on burns!)*

3. **Call**  
Call 911 or go to the emergency room immediately if the burn is large, affecting the face, hands, or feet, or if you are having difficulty breathing

**For a minor burn injury:**
- “Minor” = small areas of the body, reddened, and/or with small blisters  
- Cool with clean, running water (do not use ice or butter) for 15-20 minutes  
- Wash well with mild soap and water, leave blisters intact  
- Apply antibiotic ointment to burned areas  
- Cover with a clean, soft bandage or nonstick dressing to help decrease pain  
- Give Acetaminophen (Tylenol), Ibuprofen (Motrin/Advil) according to the directions on the container - no Aspirin for children!  
- Elevate burned arm or leg, if possible on pillows to help with pain and swelling

**For a severe burn injury:**
- “Severe” = larger areas of the body, burns of the face, hands, feet, any electrical injury, or any burn with additional injuries or with associated breathing problems  
- For fire or flame burn:  
  - Extinguish fire; make sure all clothing is extinguished and ensure scene is safe  
  - Remove any clothing that has been burned  
  - Run under cool, clean running water  
  - Cover with clean gauze or towels  
  - Call 911 or go to your nearest emergency department

**CALL YOUR PROVIDER IF YOU EXPERIENCE:**
- Nausea or vomiting  
- Fever of 102°F or 38.8°C or higher  
- Redness/swelling around burn that increases after 24 hours
Appendix O: Provider Burn Pre-Test Comprehension Example (page 1 of 2)

Burn Toolkit Comprehension Quiz 🔥 Pre-Test

I would rate my current PRE knowledge and confidence in assessing and treating a burn victim as:

☐ Expert ☐ Sufficient ☐ Somewhat adequate ☐ Beginner

Current Employment: (select all that apply)
___ Inpatient ___ Outpatient ___ Home Health ___ Student ___ Administration ___ Research ___ Other

Read each question carefully, then write T (true) or F (false) on the line next to the question:

1. ___ With severe frostbite injury, the goal is to salvage affected extremities and stabilize the patient by warming affected areas as rapidly as possible.

2. ___ Second degree burns are generally painless.

3. ___ A priority for all burns is infection control.

4. ___ Referral for urgent surgical excision with skin grafting is always indicated for third degree burns.

5. ___ For any suspicion of abuse or neglect with a burn, providers should notify the authorities immediately and involve social workers to ensure the patient’s safety.

6. ___ Fever not a useful indicator of infection with a burn injury.

7. ___ Silver sulfadiazine ointment has limited eschar penetration and the potential to cause neutropenia.

Answer the following questions:

8. A nine year old presents to a family clinic with large, intact flame burns covering 14% of his body after playing near a firepit. Both arms and shoulders are burned, as well as chest, neck, and face. His parents are with him and very upset. What is the next most appropriate step?

    a. Adequately pre-medicate patient for pain, then gently rupture blisters with a sterile instrument. Clean burned areas with cool running water or normal saline, apply antibiotic ointment and nonstick dressings.

    b. Leave all blisters intact, cleanse with sterile saline or water and apply antibiotic ointment and sterile nonstick or petroleum dressings, wrap limbs with soft gauze and advise parents to help elevate arms on pillows or towels to avoid swelling and pain.

    c. Irrigate burns thoroughly with normal saline, apply Silvadene to all open areas, cover with nonstick dressing and wrap with gauze. Provide pain medication as needed.

    d. Ensure that the child is stable and safe, then call the burn unit for urgent admission.
Appendix O: Provider Burn Pre-Test Comprehension Example (page 2 of 2)

9. If a patient is found unconscious in a burning building, initially you should always suspect and rule out:
   a. Inhalation injury
   b. Head trauma
   c. Carbon monoxide poisoning
   d. Opioid abuse

10. You see an 11 month old in urgent care who has deep second degree burns on the edges of their mouth after chewing through an electrical cord. The next most appropriate action is:
   a. Gently cleanse the tissue with sterile water or normal saline. Apply antibiotic ointment to open areas and instruct parents to supplement nutrition and avoid direct sunlight.
   b. Call the burn unit for advice and possible EKG/cardiac monitoring or direct admission.
   c. Separate and interview the caregiver on the specific whereabouts of the child and caregiver when the accident happened, how the infant gained access to the electrical cord, and call CPS if any suspicion of neglect or abuse.
   d. Assess the infant for signs/symptoms of infection, start immediate fluid resuscitation with the Parkland formula: 4ml x Total Body Surface Area (TBSA%) x Weight (kg).

11. What is the most common etiology for Burn Unit admission in the United States?
   a. Electrical injury
   b. Scald burn
   c. Fire/flame burn
   d. Contact burn
   e. Necrotizing skin infection

12. Which of the following statements regarding burn care is incorrect?
   a. Hand burns involving the digits should be assessed and dressing changed frequently. Circumferential burns of the fingers should be wrapped individually with fingertips exposed to monitor for changes in neurovascular status.
   b. Burns in patients with pre-existing medical conditions or concomitant trauma often complicate management and/or prolong recovery and wound healing.
   c. Electrical burns, including lightening injuries, meet criteria for burn unit referral.
   d. Risk of morbidity and mortality rise with increased total body surface area (TBSA) burned, but does not increase with age.
Appendix P: Provider Burn Post-Test Comprehension Example (page 1 of 3)

Burn Toolkit Comprehension Quiz 🔥 Post-Test

Speaker: Whitney Weyhing
Date:

I would rate my current POST knowledge and confidence level in assessing and treating a burn victim as:

☐ Expert ☐ Sufficient ☐ Somewhat adequate ☐ Beginner

Read each question carefully, then write T (true) or F (false) on the line next to the question:

1. ___ With severe frostbite injury, the goal is to salvage affected extremities and stabilize the patient by warming affected areas as rapidly as possible.

2. ___ Second degree burns are generally painless.

3. ___ A priority for all burns is infection control.

4. ___ Referral for urgent surgical excision with skin grafting is always indicated for third degree burns.

5. ___ For any suspicion of abuse or neglect with a burn, providers should notify the authorities immediately and involve social workers to ensure the patient’s safety.

6. ___ Fever not a useful indicator of infection with a burn injury.

7. ___ Silver sulfadiazine ointment has limited eschar penetration and the potential to cause neutropenia.

Answer the following questions:

8. A nine year old presents to a family clinic with large, intact flame burns covering 14% of his body after playing near a firepit. Both arms and shoulders are burned, as well as chest, neck, and face. His parents are with him and very upset. What is the next most appropriate step?

   a. Adequately pre-medicate patient for pain, then gently rupture blisters with a sterile instrument. Clean burned areas with cool running water or normal saline, apply antibiotic ointment and nonstick dressings.

   b. Leave all blisters intact, cleanse with sterile saline or water and apply antibiotic ointment and sterile nonstick or petroleum dressings, wrap limbs with soft gauze and advise parents to help elevate arms on pillows or towels to avoid swelling and pain.

   c. Irrigate burns thoroughly with normal saline, apply Silvadene to all open areas, cover with nonstick dressing and wrap with gauze. Provide pain medication as needed.

   d. Ensure that the child is stable and safe, then call the burn unit for urgent admission.
Appendix P: Provider Burn Post-Test Comprehension Example (page 2 of 3)

9. If a patient is found unconscious in a burning building, initially you should always suspect and rule out:
   a. Inhalation injury
   b. Head trauma
   c. Carbon monoxide poisoning
   d. Opioid abuse

10. You see an 11 month old in urgent care who has deep second degree burns on the edges of their mouth after chewing through an electrical cord. The next most appropriate action is:
   a. Gently cleanse the tissue with sterile water or normal saline. Apply antibiotic ointment to open areas and instruct parents to supplement nutrition and avoid direct sunlight.
   b. Call the burn unit for advice and possible EKG/cardiac monitoring or direct admission.
   c. Separate and interview the caregiver on the specific whereabouts of the child and caregiver when the accident happened, how the infant gained access to the electrical cord, and call CPS if any suspicion of neglect or abuse.
   d. Assess the infant for signs/symptoms of infection, start immediate fluid resuscitation with the Parkland formula: 4ml x Total Body Surface Area (TBSA%) x Weight (kg).

11. What is the most common etiology for Burn Unit admission in the United States?
   a. Electrical injury
   b. Scald burn
   c. Fire/flame burn
   d. Contact burn
   e. Necrotizing skin infection

12. Which of the following statements regarding burn care is incorrect?
   a. Hand burns involving the digits should be assessed and dressing changed frequently. Circumferential burns of the fingers should be wrapped individually with fingertips exposed to monitor for changes in neurovascular status.
   b. Burns in patients with pre-existing medical conditions or concomitant trauma often complicate management and/or prolong recovery and wound healing.
   c. Electrical burns, including lightening injuries, meet criteria for burn unit referral.
   d. Risk of morbidity and mortality rise with increased total body surface area (TBSA) burned, but does not increase with age.
Appendix P: Provider Burn Post-Test Comprehension Example (page 3 of 3)

**Current Employment:** (select all that apply)

___ Inpatient  ___ Outpatient  ___ Home Health  ___ Student  ___ Administration  ___ Research  ___ Other

Please rate your level of satisfaction for the following statements:

1. How satisfied are you with the overall quality of the Burn Toolkit presentation?

   1  2  3  4  5

2. How satisfied are you with the Provider Burn and Patient Education handout resources?

   1  2  3  4  5

3. How satisfied are you with the knowledge and quality of instruction?

   1  2  3  4  5

Please indicate your level of agreement with the following statements:

1. The Burn Toolkit for Providers workshop was well organized.

   1  2  3  4  5

2. The material was applicable to my current job role.

   1  2  3  4  5

3. The instructor was knowledgeable about the subject matter.

   1  2  3  4  5

4. The length of time allotted for the Burn Provider Toolkit was appropriate.

   1  2  3  4  5

4. I feel prepared to assess and treat a burn victim after the presentation.

   1  2  3  4  5

Feedback or further suggestions:
## Appendix Q: Burn Toolkit Pre and Post Results Analysis

### Pre

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<th>Question #</th>
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<th>2</th>
<th>3</th>
<th>4</th>
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