

# Wildland Firefighter: Burn Injury Guidelines for Care

# Wildland Firefighters (FF)

## Burn Injury Guidelines for Care

- ❖ **Demographics:** Wildland Firefighters are male or female, mostly under 35 years of age
  - They LOVE their job and want to return from an injury as soon as possible
  - They often do not see home most of the fire season and are typically stationed in another state
  
- ❖ **Occupational Hazards which could result in impaired burn wound healing and potential infection:**
  - Dirty, dusty, smoky environment
  - Extreme heat and sometimes cold environments
  - Potential infection from contact with animals, plants and insects
  - Lifting and carrying heavy loads (up to 85 lbs.) long distances
  - Working in remote and isolated sites often at high altitude
  - Extensive walking and climbing often on steep, uneven, rocky, loose or muddy terrain
  - Long hours with limited and disrupted sleep
  - Hunger and irregular meals, dehydration
  - Extreme stress in rapid pull out emergency situations whether fire, falling rocks, or falling trees
  - Lack of a clean environment to change dressings

### **Important Information for ED Providers:**

- ❖ Most Wildland Firefighters do not have a Primary Care Provider at home nor in the state they are working in.
- ❖ A referral paper trail is important. If they are discharged from the ED with instructions to follow-up, please be as specific as possible. Have documented in the medical record who they are to follow up with, a Burn Center, Physical Therapy, or an orthopedist or surgeon at home. A specific name is not needed, but please do not put 'prn.'
- ❖ If local follow-up for a minor injury is needed, either the ED should set up that appointment with a community provider or have the follow-up performed in the ED itself.
- ❖ If burn injury follow-up is necessary beyond the ED, and no referrals are given from the ED, in order to qualify for Workers Compensation, the firefighter will then have to initiate the paperwork for benefits which can be a lengthy and time consuming process.
- ❖ If the injured firefighter is not told specifically that they cannot return to the fire line, they will do so. Please give specific work restrictions, do not just state "light duty."



# Initial First Aid Treatment for minor Burns

## Burn Injury Guidelines for Care

Think of the skin as a coat of armor for the human body. When a burn injury occurs, it causes a break in the skin and may subsequently cause an infection if it is not treated appropriately or right away. Frequently the question is asked, "How do I treat a minor burn?"

The American Burn Association's Burn Prevention Committee recommends the following guidelines for the treatment of minor burns. Please note that even a small burn, may have the potential to become infected. It is always advisable to seek medical attention **as soon as possible**. Remember when in doubt or if you think the individual's life is in danger, call 911. Remember if you call 911 using a cell phone you may or may not get the local 911 for the area you may be in. Remain calm and provide the operator with the necessary information to get the EMS personnel to you.

Burns are primarily divided into three categories, first-degree or superficial burns, second-degree, or partial thickness burns and Third-Degree or full thickness burns. How these types of burns are treated initially will determine whether there is a successful outcome.

**First-Degree burns** – are burns which involve the outer most layer of skin and are usually associated with a sun burn. Such an injury may occur from too much exposure to the sun (gardening, sunbathing, etc.). The skin is usually still intact, but may appear to be red, very warm or hot to touch and painful. There may also be small blisters, and swelling in and around the area of injury. Initial first-aid treatment for a first degree burn includes the following:

### DO's

- Stop the burning process: **cool the burn with running cool (not cold) water for at least 5 minutes**. But do not use ice, as this may cause further skin damage. Do not over cool! If the victim starts to shiver, stop the cooling process.
- Remove all jewelry, watches, rings and clothing around the burned area as soon as possible.
- Administer an over-the-counter pain reliever such as ibuprofen or acetaminophen for pain control. Follow the directions on the label. Consult a physician or health care provider if pain is not relieved.
- Cover the burn with a sterile gauze bandage or clean cloth. Wrap the burned area loosely to avoid putting too much pressure on the burn tissue.
- Minor burns will usually heal without further treatment.
- For small area burns, apply soothing lotions that contains aloe vera to the burned area to help relieve the pain and discomfort.
- Seek medical attention if there is a persistent fever not relieved by medication or redness that may extend beyond the border of the burn or pain is not controlled by ibuprofen or acetaminophen.
- Drink plenty of fluids (electrolyte containing solutions such as gator aid) if the person appears to be dehydrated.

### Don'ts

- Do not apply ice – this may cause further damage to the skin.
- Do not use any butter, ointments or other home remedies on the burn. Such substances may trap the heat in the tissue and makes the burn worse.
- Do not break any blisters...leave intact.
- Do not delay seeing medical attention if the burn is larger than the size of the victim's palm.

**Second degree burn** - occurs when the second layer of skin (dermis) is burned. This burn usually has the following characteristics: very red, blister formation, extremely painful and a fair amount of swelling. In general, if a second degree burn is smaller than 2-3 inches (7 centimeters) it may be treated as a minor burn. If the area burned is larger than this, or involves functional parts of the body such as feet, face, eye, ears, groin or located over major joints, more in-depth medical attention is needed. Take the person to the nearest emergency room, family doctor or minor emergency clinic to have the burn evaluated. Failure to do so may result in permanent disfigurement or loss of function.

**Third degree burns** – are **NOT** minor burns and should be evaluated and treated by a healthcare provider. A third degree burn is a very serious burn, no matter what the size or area of the body that may be involved. A third degree burn involves all layers of the skin and can cause permanent tissue damage. The skin may appear to be charred, blackened, or white. The skin texture may be very dry or leathery. All third degree burns should be evaluated by a healthcare provider immediately.

**Healing** – it may take several days for a mild first degree or second degree burn to heal. During that time, it is important that the affected area is observed for infection such as redness extending beyond the burned area, changes in the appearance of the wound or slight fever not relieved by Tylenol. As your skin begins to heal, you may also notice that it will itch, which can be very uncomfortable at times. This is normal and will eventually decrease. Frequent application of lotion can help keep the skin hydrated and minimize the itching process. If the itching is too severe, an over-the-counter medication such as Benadryl® may be helpful in easing the discomfort. Remember...always follow the directions on the label. The wound should be kept clean with daily dressing changes. If you have any concern or questions, consult your healthcare provider. Once the burn has healed, limit the exposure of the burn skin to direct sunlight. Always wear sun protection.

Following the above guidelines should promote healing to most minor burns. It is important to note that the consumer should always seek the advice of a healthcare provider if there is any question regarding the healing process of a minor burn. The American Burn Association and the Burn Prevention Committee is not responsible or liable for any untoward complications suffered by any individual following these suggested guidelines.

# EMS Treatment Guidelines

## Burn Injury Guidelines for Care

### Evaluate Airway and Breathing

Maintain Airway	Administer high flow O <sub>2</sub> using a non-rebreather mask if possible/appropriate
Indication for Intubation	History of being burned in a closed space Burns to the face and neck Greater than 40% TBSA Circumferential torso burn
Consider Rapid Sequence Intubation	
Access for Breathing	Auscultate Breath Sounds Bilaterally

### Maintain Circulation/Resuscitation Formula

Monitor Pulse Rate, and Blood Pressure

Circulatory Compromise	Indicated by progressive pain, pallor, pulselessness, paresthesia, and paralysis of the extremities.
------------------------	--

IV/IO line should be inserted as needed and may be placed through burned skin if necessary. Secure in place with Kerlix or Coban.

Starting points for fluid resuscitation rates:	5 years or younger : 125 ml LR/NS/hr
	6-13 years : 250 ml LR/NS/hr
	14 years or older : 500 ml LR/NS/hr

After TBSA has been calculated, fluid rate will be as follows:

Body weight in kg x % TBSA burns x 4mL of NS/Lactated Ringers over 24 hours (Administer 50% during the first 8 hours following the burn). **See Fluid Infusion Rate Chart.** If fluid management begins hours after the burn, infuse sufficient fluid to catch up to the total infusion of fluid for the first 8 hours. Patients with traumatic injuries may require additional fluid.

### Disability, Neurological Deficit

Typically alert & oriented	A- Alert V- Responds to verbal stimuli P- Responds only to painful stimuli U- Unresponsive
----------------------------	---

\*If deficits exist consider CO, history of anoxia, chemical exposure, or traumatic injury.

\*In addition to the AVPU scale, the Glasgow Coma scale can also be used.

### Exposure

Remove all clothing & jewelry	Keep patient covered and dry Keep emergency vehicle warm Warm IV fluids if possible Do not use wet dressings or wet blankets
-------------------------------	---

### Burn Patients are Trauma Patients; Evaluate for Associated Injuries

Follow local protocols to perform a typical secondary survey for traumatic injuries

Electrical Injuries:	Falls are common in electrical injuries; assess points of contact and monitor EKG
----------------------	---

Chemical Burns/injury to the Eyes:	Rule out corneal injuries, often associated with flash fires or explosions, irrigate potential chemical burns with copious amounts of fluids
------------------------------------	--

Patients with burn injuries do not typically develop shock within 60 minutes from time of injury if left untreated unless there are associated injuries or medical conditions in addition to the burn. Initially burns do not bleed; if there is bleeding there is an associated injury. **All agencies will adhere to their own pharmacological standards for medication administration.**

# Burn Estimate and Diagram

## Burn Injury Guidelines for Care

Area	Birth-1 yr.	1-4 yr.	5-9 yr.	10-14 yr.	15 yr	Adult	2nd	3rd	TBSA% Total
Head	19	17	13	11	9	7			
Neck	2	2	2	2	2	2			
Ant. Trunk	13	13	13	13	13	13			
Post. Trunk	13	13	13	13	13	13			
R. Buttock	2.5	2.5	2.5	2.5	2.5	2.5			
L. Buttock	2.5	2.5	2.5	2.5	2.5	2.5			
Genitalia	1	1	1	1	1	1			
R. U. Arm	4	4	4	4	4	4			
L. U. Arm	4	4	4	4	4	4			
R. L. Arm	3	3	3	3	3	3			
L. L. Arm	3	3	3	3	3	3			
R. Hand	2.5	2.5	2.5	2.5	2.5	2.5			
L. Hand	2.5	2.5	2.5	2.5	2.5	2.5			
R. Thigh	5.5	6.5	8	8.5	9	9.5			
L. Thigh	5.5	6.5	8	8.5	9	9.5			
R. Leg	5	5	5.5	6	6.5	7			
L. Leg	5	5	5.5	6	6.5	7			
R. Foot	3.5	3.5	3.5	3.5	3.5	3.5			
L. Foot	3.5	3.5	3.5	3.5	3.5	3.5			
TOTAL									

Cause of Burn \_\_\_\_\_

Additional injuries \_\_\_\_\_

Date of Burn \_\_\_\_\_

Time of Burn \_\_\_\_\_

Age \_\_\_\_\_

Sex \_\_\_\_\_

Weight \_\_\_\_\_ Kg

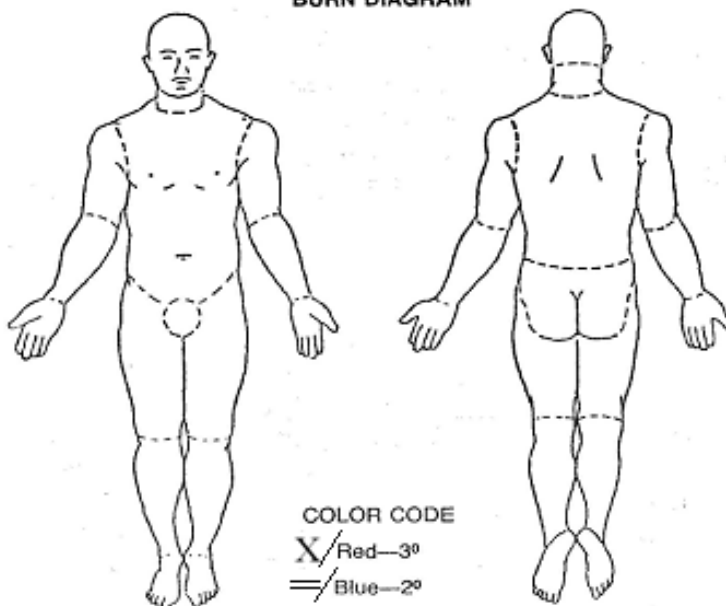
Height \_\_\_\_\_ cm

Date of assessment \_\_\_\_\_

Time of assessment \_\_\_\_\_

Assessed by \_\_\_\_\_

**BURN DIAGRAM**



# Adult Pain Medication Guidelines

## Burn Injury Guidelines for Care

Burn Pain may be excruciating, and it is not unusual initially for the narcotic dose to exceed the standard weight-based recommendations. During IV fluid resuscitation all pain medications should be given intravenously. The IM or SQ routes should not be used.

After the resuscitation phase has been completed, patients may be given oral pain medications. Please consider renal function before initiating any pain regimen, especially NSAIDs. With IV medications, titrate to effect and patient vital signs. **It is best to give smaller doses more frequently until the provider is comfortable with giving larger doses.** Patients will never be pain free; educate them about the burn injury and ask them what pain level is tolerable for them.

### Mild to Moderate Pain:

Oral	IV
Acetaminophen 650-1000 mg	Acetaminophen 1000 mg
Ibuprofen 600-800 mg	Ketorolac 15-60 mg
Naproxen 250-500 mg	Fentanyl 25-50 mcg
Tramadol 50-100 mg	Morphine 0.5-2 mg
Acetaminophen with codeine 30/300 1-2 tablets	
Hydrocodone with acetaminophen 5/500 1-2 tablets	
Oxycodone with acetaminophen 5/325 1-2 tablets	

### Moderate to Severe Pain:

Oral	IV
Hydrocodone with acetaminophen 7.5/500 1-2 tablets	Fentanyl 25-100 mcg
Oxycodone with acetaminophen 10/325 1-2 tablets	Morphine 2-4 mg
Oxycodone 5-15 mg	Hydromorphone 0.5-2 mg
Morphine 15-45 mg	Ketamine 0.3mg/kg /dose
Hydromorphone 2-6 mg	Ketamine 0.05-0.1mg/kg/hr (use as an adjunct)

**For Moderate to Severe pain with around-the-clock use of oral pain meds, consider adding extended release products:**

Methadone 5-10 mg PO twice daily
Oxycontin 10 mg PO twice daily
MsContin 15 mg PO 3 times daily



# Fluid Infusion Rate > 30kg

## Burn Injury Guidelines for Care

\*Fluid of choice LR/NS, DO NOT use dextrose containing fluids

Wt (lbs)	Wt (kg)	% TBSA	/Hr for 1 <sup>st</sup> 8 Hrs of care	60 gtt set, gtt/min	20 gtt set, gtt/min	15 gtt set, gtt/min	10 gtt set, gtt/min
66	30	10	75	75	25.0	18.8	12.5
66	30	20	150	150	50.0	37.5	25.0
66	30	30	225	225	75.0	56.3	37.5
66	30	40	300	300	100.0	75.0	50.0
66	30	50	375	375	125.0	93.8	62.5
66	30	60	450	450	150.0	112.6	75.0
88	40	10	100	100	33.3	25.0	16.7
88	40	20	200	200	66.7	50.0	33.3
88	40	30	300	300	100.0	75.0	50.0
88	40	40	400	400	133.3	100.0	66.7
88	40	50	500	500	166.7	125.00	83.3
88	40	60	600	600	200.0	150.0	100.0
110	50	10	125	125	41.7	31.3	20.8
110	50	20	250	250	83.3	62.5	41.7
110	50	30	375	375	125.0	93.8	62.5
110	50	40	500	500	166.7	125.0	83.3
110	50	50	625	625	208.3	156.3	104.2
110	50	60	750	750	250.0	187.6	125.0
132	60	10	150	150	50.0	37.5	25.0
132	60	20	300	300	100.0	75.0	50.0
132	60	30	450	450	150.0	112.5	75.0
132	60	40	600	600	200.0	150.0	100.0
132	60	50	750	750	250.0	187.5	125.0
132	60	60	900	900	300.0	225.0	150.0
154	70	10	175	175	58.3	43.8	29.2
154	70	20	350	350	116.7	87.5	58.3
154	70	30	525	525	175.0	131.3	87.5
154	70	40	700	700	233.3	175.0	116.7
154	70	50	875	875	291.7	218.8	145.8
154	70	60	1050	1050	350.0	262.6	175.0
176	80	10	200	200	66.7	50.0	33.3
176	80	20	400	400	133.3	100.0	66.7
176	80	30	600	600	200.0	150.0	100.0
176	80	40	800	800	266.7	200.0	133.3
176	80	50	1000	1000	333.3	250.0	166.7
176	80	60	1200	1200	400.0	300.0	200.0
198	90	10	225	225	75.0	56.3	37.5
198	90	20	450	450	150.0	112.5	75.0
198	90	30	675	675	225.0	168.8	112.5
198	90	40	900	900	300.0	225.0	150.0
198	90	50	1125	1125	375.0	281.3	187.5
198	90	60	1350	1350	450.0	337.6	225.0
220	100	10	250	250	83.3	62.5	41.7
220	100	20	500	500	166.7	125.0	83.3
220	100	30	750	750	250.0	187.5	125.0
220	100	40	1000	1000	333.3	250.0	166.7
220	100	50	1250	1250	416.7	312.5	208.3
220	100	60	1500	1500	500.0	375.0	250.0
242	110	10	275	275	91.6	68.7	45.9
242	110	20	550	550	183.4	137.5	91.6
242	110	30	825	825	275	206.2	137.5
242	110	40	1100	1100	366.6	275.0	183.4
242	110	50	1375	1375	458.4	343.7	229.1
242	110	60	1650	1650	550.0	412.4	275
264	120	10	300	300	99.9	74.9	50.1
264	120	20	600	600	200.1	150.0	99.9
264	120	30	825	825	300.0	224.9	150.0
264	120	40	1200	1200	399.9	300.0	200.1
264	120	50	1500	1500	500.1	374.9	249.9
264	120	60	1650	1650	600.0	449.8	300

\*Patients with traumatic injuries may require additional fluids

# Initial Management Guidelines for the Adult Burn Patient

## Burn Injury Guidelines for Care

**Consider University of Utah Healthcare Burn Center consultation at (801) 581-2700.**

Prior to initiating care of the patient with wounds it is critical that healthcare providers take measures to reduce their own risk of exposure to potentially infectious substances and/or chemical contamination. In addition, patients with burns/wounds are at high risk for infection and potential cross contamination. Body substance precautions are the most effective way to do this. The level of protection utilized will be determined by patient presentation. Patients with burns > 20% TBSA are most at risk.

### Primary Assessment

Intervention /Care	Key Points
<b>Airway maintenance with C-Spine Protection</b> Consider inhalation injury with : <ul style="list-style-type: none"> <li>• History of closed space fire</li> <li>• Hypoxia</li> <li>• Facial Burns</li> <li>• Stridor</li> <li>• Carbonaceous sputum</li> <li>• Nasal Singe</li> <li>• Hoarseness</li> </ul> <b>Treatment</b> <ul style="list-style-type: none"> <li>• High flow oxygen using a non-rebreather mask, wean as appropriate.</li> <li>• Early intubation (Assess Glasgow prior to intubation)</li> <li>• Secure the ETT with ties passed around the head, do not use tape as it will not adhere to burned tissue.</li> <li>• A nasogastric tube should be inserted on all patients who are intubated.</li> </ul>	<ul style="list-style-type: none"> <li>• Airway edema increases significantly after fluids are started.</li> <li>• Stridor or noisy breath sounds are indicators of impending upper airway obstruction.</li> <li>• Prophylactic intubation is often preferred because the ensuing edema obliterates the landmarks needed for successful intubation.</li> <li>• An endotracheal tube that becomes dislodged may be impossible to replace due to obstruction of the upper airway by edema.</li> </ul>
<b>Breathing and Ventilation</b> <ul style="list-style-type: none"> <li>• Assess for appropriate rate and depth of respirations in addition to breath sounds.</li> <li>• Monitor pulse oximetry and obtain ABGs</li> <li>• Check CO level if indicated</li> <li>• In circumferential torso burns monitor chest expansion closely. Chest/abdominal escharotomy may be necessary; consider burn center consult.</li> </ul>	<p>An escharotomy is an incision performed longitudinally through burned tissue down to subcutaneous tissue over the entire involved area of full thickness circumferential (or nearly circumferential burn) that is causing constriction and loss of peripheral perfusion or airway constriction. Finger escharotomies are rarely indicated.</p>
<b>Circulation with Hemorrhage Control</b> <ul style="list-style-type: none"> <li>• Heart Rate</li> <li>• Blood Pressure</li> <li>• Pulses and capillary refill</li> <li>• Skin color of unburned skin</li> <li>• Cardiac monitoring as appropriate and available</li> <li>• Large bore IV or I/O line should be inserted as necessary. <b>Secure well.</b></li> </ul>	<ul style="list-style-type: none"> <li>• Due to the increased circulating catecholamines and hypermetabolism associated with burn injuries, a normal heart rate for an adult is 100-120 bpm.</li> <li>• Heart rates above this may indicate hypovolemia, inadequate oxygenation, unrelieved pain or anxiety.</li> <li>• Heart rates below this level may be due to an</li> </ul>

<ul style="list-style-type: none"> <li>• IV/I/O Priority should be given to patients with burns &gt;20% TBSA.</li> </ul> <p>Starting points for fluid resuscitation rates are as follows :</p> <p>5 years or younger: 125 ml LR/NS/hr  6-13 years of age: 250 ml LR/NS/hr  14 years or older: 500 ml LR/NS/hr</p> <ul style="list-style-type: none"> <li>• More definitive calculation is performed during the secondary survey when TBSA is known.</li> <li>• Patients with burns usually do not develop shock within 60 minutes from time of injury if left untreated unless there are associated injuries or medical conditions in addition to the burn. Manage any bleeding as soon as possible.</li> </ul>	<p>underlying cardiac abnormality. Dysrhythmias may be the result of an electrical injury and are abnormal.</p> <ul style="list-style-type: none"> <li>• The B/P in the early stages of burn resuscitation should be the individuals pre-injury B/P or higher.</li> <li>• IV's may be placed through burned skin if necessary, suture to secure in place or use coban or kerlix roll.</li> </ul>
<p><b>Disability</b></p> <ul style="list-style-type: none"> <li>• Consider using the "AVPU" method: <ul style="list-style-type: none"> <li>-A – Alert</li> <li>-V – Responds to verbal stimuli</li> <li>-P – Responds to painful stimuli</li> <li>-U – Unresponsive</li> </ul> </li> </ul>	<p><b>Typically the burn patient is alert and oriented</b>  If altered neurological status, consider associated injury, CO poisoning, substance abuse, hypoxia, medications administered or pre-existing medical conditions.</p>
<p><b>Exposure</b></p> <ul style="list-style-type: none"> <li>• Check temperature</li> <li>• Remove all clothing and jewelry</li> <li>• <b>Keep patient and environment warm</b></li> </ul>	<p>Localized hypothermia causes vasoconstriction to the damaged area reducing blood flow and tissue oxygenation and may deepen the injury. Systemic hypothermia (core temp less than 95 F / 35 C) induces peripheral vasoconstriction that may increase the depth of the burn and interfere with clotting mechanisms and respiration in addition to causing cardiac arrhythmias.</p>

# Initial Management Guidelines for the Adult Burn Patient

## Burn Injury Guidelines for Care

Consider University of Utah Healthcare Burn Center consultation at (801) 581-2700.

### Secondary Assessment

#### History:

- Consider the use of “Ample” to aid in obtaining information
  - A- Allergies
  - M - Medications
  - P – Previous illness, past medical history
  - L – Last meal or fluid intake
  - E – Events/environment related to the injury
- Do not use silver sulfadiazine on a patient with a sulfa allergy; instead use another topical or wound coverage product.

### Intervention /Care

#### Burn Specific Physical Examination:

##### Airway and Breathing

- Supportive therapy and O<sub>2</sub>; wean as appropriate.
- to minimize facial and airway edema.
- Use reverse Trendelenburg for patients with C-spine precautions.
- Chest X-ray if intubated, inhalation injury suspected or underlying pulmonary condition.
- Chest X-ray will usually be clear on admit and then if inhalation injury is present will show infiltrates around the second day correlating with a deteriorating oxygen status.
- Frequent suctioning is necessary to prevent occlusion of the airway and endotracheal tube. Anyone with an inhalation injury is subject to increased respiratory secretions and may have a large amount of carbonaceous debris in the respiratory tract.

##### Estimate Burn Size and depth:

- Determine the extent of the burn using the Rule of Nines, Rule of the Palm or Lund-Browder chart.  
**See Burn Estimate and Diagram.**

##### Initiate Fluid Resuscitation:

Initiate fluid resuscitation for a patient with a TBSA >20% (adult) or >10%TBSA (child).

- $4\text{ml (LR)} \times \text{body weight (kg)} \times \text{TBSA \% burn} = \text{Lactated Ringers solution (LR) fluid in first 24 hours post burn (calculate from time of burn)}.$
- Give half the fluid (LR) in the first 8 hours then the next half (LR) over the next 16 hours.  
**See Fluid Infusion Rate**

##### Resuscitation Guidelines:

- Insert a Foley as necessary depending on burn size.
- Burns of the penis may require insertion of a foley catheter to maintain patency of the urethra.
- Titrate IV rate to maintain a urine output: 0.5ml/kg for adults (30-50ml/hr).

##### Eyes

- Remove contacts prior to eyelid swelling if facial involvement.
- Fluorescein should be used to identify corneal injury.
- If eye involvement consider consulting an ophthalmologist.

## **Circulation**

- Elevate burned extremities on pillows or blankets to improve circulation and minimize edema.
- Monitor pulses with a Doppler, if necessary.
- Circumferential chest injuries may become life threatening; an escharotomy may be necessary.
- Verify that pulselessness is not due to profound hypotension.
- Scrotal swelling, though often significant, does not require specific treatment.

Monitor for the following signs and symptoms in full thickness, circumferential burn injuries which may indicate circulatory compromise:

- Pallor or cyanosis of distal unburned skin on limb.
- Capillary refill > 5 seconds.
- Unrelenting deep tissue pain.
- Progressive loss of sensation or motor function.
- Inability to ventilate in patients with deep circumferential burns of the chest.

## **Body Temperature**

- Keep patient normo-thermic, especially during wound care.
- Keep patient covered. If supplies of blankets are depleted, patients can be wrapped in plastic wrap or aluminum foil for insulation and warmth.
- Warm the room.
- Warm IV fluid if possible, especially if patient is very hypothermic.

## **Labs**

- Labs on admission and as dictated by medical condition:
  - Arterial Blood Gases if inhalation injury is suspected
  - Serum Chemistries/Electrolytes
  - Complete Blood Count (CBC)
  - Glucose Levels, especially in children and diabetics
  - EKG for electrical injury or cardiac history
  - Type and Screen if additional trauma is suspected
- Tetanus prophylaxis unless given in last five years.

## **Comfort:**

- Frequent pain/sedation assessment; minimum every four hours.
- Assess patient pain score before and after pain/sedation medication given.
- Emotional support and education is essential.
- IV analgesia is the preferred route during the initial post injury period.
- Administer opioids in frequent small to moderate bolus doses.

**See Pain Medication Guidelines**

# Crucial Points

## Burn Injury Guidelines for Care

\* Items in bold are action items

### Airway Management

- Those with Inhalation injury will do worse than those without inhalation injury.
- Tracheobronchitis with severe spasm and wheezing may occur in the first minutes to hours post-injury.
- The onset of symptoms is so unpredictable that the patient with possible inhalation should be observed for 24 hours.
- Stridor or noisy breath sounds are indicators of impending upper airway obstruction.
- An endotracheal tube that becomes dislodged may be impossible to replace due to obstruction of the upper airway by edema.
- **Secure the ETT with ties passed around the head; do not use tape, as it will not adhere to burned tissue.**
- **A nasogastric tube should be inserted on all patients who are intubated.**
- In unresuscitated patients, supraglottic edema may be delayed in onset until fluid resuscitation is well underway. **Prophylactic intubation is preferred because the ensuing edema obliterates the landmarks needed for successful intubation.**
- Supraglottic edema may occur without direct thermal injury to the airway but secondary to the fluid shifts associated with the burn injury and fluid resuscitation.
- Noxious chemicals are adherent to smoke particles and cause damage to the epithelium of the large airways. Smaller airways and terminal bronchi are usually affected by prolonged smoke exposure.
- Pathophysiology changes associated with injury below the glottis include:  
Sloughing of the epithelial lining of the airway, mucus hyper secretion, impaired ciliary activity, inflammation, surfactant inactivation, pulmonary edema, ventilation/perfusion mismatch, increased blood flow, spasm of bronchi and bronchioles and impaired immune defenses.
- Chest X-rays are often normal upon admission of patients with inhalation injuries.
- The presence of inhalation injury markedly worsens prognosis of cutaneous burns, especially if the burn is large and the onset of respiratory distress occurs in the first few hours post-injury.
- Mucosal sloughing may occur as late as 4-5 days following an inhalation injury.
- Anyone with an inhalation injury is subject to increased respiratory secretions and may have a large amount of carbonaceous debris in the respiratory tract. **Frequent and adequate suctioning is necessary to prevent occlusion of the airway and endotracheal tube.**

### Fluid Management

- **Unless blood loss has occurred or the patient is extremely anemic, packed red blood cells should not be given.**
- Fluid loss associated with burn injuries is slow and progressive. Patients with burns usually do not develop shock within 60 minutes from time of injury if left untreated unless there are associated injuries or medical conditions in addition to the burn.
- Initially burns do not bleed; if there is bleeding there may be associated trauma.  
For more detailed fluid management instructions refer to the **Initial Fluid Infusion rate chart.**

## Eating and Drinking

- During IV fluid resuscitation, patients are not given anything to drink or eat because the stress on the body as a result of the burn affects the stomach's ability to digest. If food or fluids are given before normal stomach activity returns, the patient may become sick and vomit.
- After two to three days the body begins to use energy at a very rapid rate. This increased use of energy is characterized by an increase in heart rate, respiratory rate and body temperature. Due to these changes, the body requires a large amount of calories and protein to heal.
- **In large burns, an IV alone provides inadequate nutrition, so it may be necessary to place a feeding tube.** This tube can be removed when patients are able to eat enough on their own.
- **Patients should be encouraged to drink fluids containing calories and protein instead of water.**
- There are many drinks available to add calories and protein; milk is the easiest and least expensive. Other options include supplements such as Carnation Instant Breakfast, Ensure, etc.

## Wound Management

- **Prior to initiating care of the patient with wounds, it is critical that healthcare providers take measures to reduce their own risk of exposure to potentially infectious substances and/or chemical contamination. In addition, patients with burns/wounds are at high risk for infection and potential cross contamination. Body substance precautions are the most effective way to do this. The level of protection utilized will be determined by patient presentation. Patients with burns > 20% TBSA are most at risk.**
- **Any clean, non-sterile dressings may be used on a burn patient.**
- **Burned scalps and faces should be shaved daily if possible.**
- **Genitalia and perineal burns may require a foley to maintain patency.**
- **Wrap fingers and toes separately if possible when burned.**
- **Be sure to check for sulfa allergy prior to applying silver sulfadiazine cream to a patient.**
- **Elevate burned extremities above the level of the heart on pillows or blankets.**
- The layer of silver sulfadiazine should be thick enough to prevent the wound from drying out prior to the next dressing change.
- Other appropriate dressing coverage includes silver-impregnated or any broad spectrum antimicrobial.
- The purpose of a dressing is to keep the cream from rubbing off before the next dressing change.
- **Do not use silver sulfadiazine cream on the face and keep all topical creams out of the eyes.**
- If silver sulfadiazine or silver products are not available, consider using another antibiotic ointment such as Bacitracin/Neomycin/Polysporin.
- For more detailed dressing instruction refer to the **Outpatient Wound Care Instruction Sheet.**

## Pain Control

- Burn pain is excruciating because of the exposed nerve endings and patients will require large doses of narcotics.
- Education to the patient regarding why the burn hurts is important; this will alleviate some of their anxiety and make them feel better.
- For more detailed pain control instructions refer to the **Adult Pain Medication Guidelines.**

## Temperature Control

---

- Because burn patients are unable to regulate their own body temperature, blankets need to be used in order to keep the patient warm.
- **If supplies of blankets are depleted, patients can be wrapped in plastic wrap or aluminum foil for insulation and warmth.**
- Hypothermia causes vasoconstriction of the blood vessels and will decrease blood flow to already compromised areas of burn injury.



# Wound Management Treatment Guidelines

## Burn Injury Guidelines for Care

It is not always possible to know burn depth for several days as burn appearance may be deceiving or burn injury may deepen.

### First Degree



Limited damage to epidermis, skin intact

- Painful
- No immediate blister formation
- Red

Heals completely in 3-5 days, without scarring

\*Give pain medications as necessary.  
Open to air.  
Wash with mild soap, water and wash cloth twice per day.

### Superficial/Partial Thickness (Second-degree)



Epidermis destroyed, minimal damage to superficial layers of dermis

- Pink or red
- Moist
- Weepy
- Blanching
- Blisters
- Painful

Usually heals completely within 5-21 days with little or no scarring. Grafting not usually required.

\*Give pain medications.  
Wash with mild soap, water and wash cloth.  
Dress wound with topical ointment; change every 12-24 hours.  
If silver-impregnated dressing is used, follow manufacturer's guidelines.

### Deeper (Second-degree)



Epidermis and dermis involved

- May be red or pearly white
- Drier in appearance than superficial injury.
- Painful

May take 3-8 weeks to heal, sometimes with heavy scarring. May require a skin graft.

\*Give pain medications.  
Wash with mild soap, water and wash cloth.  
Dress wound with topical ointment; change every 12-24 hours.  
If silver-impregnated dressing is used, follow manufacturer's guidelines.

### Full Thickness (Third degree)



All epidermis and dermis destroyed

- White, cherry red, brown or black in color
- Hard and leathery
- Insensitive to pinprick

Prolonged healing; will require a skin graft.

\*Give pain medications.  
Wash with mild soap, water and wash cloth.  
Dress wound with topical ointment; change every 12-24 hours.  
If silver-impregnated dressing is used, follow manufacturer's guidelines.

# Outpatient Wound Care Instructions

## Burn Injury Guidelines for Care

If you have questions, please call the University of Utah Health Care Burn Center at (801)581-2700.

### **SILVER SULFADIAZINE DRESSING (THERMAZENE OR SILVADENE)**

Your burn has been dressed in Silver Sulfadiazine. This is to be changed twice a day. This is very important to promote healing and prevent infection.

Follow these guidelines as your care provider has instructed you:

- a. Wash the burn with mild soap, water, and a washcloth, removing all old ointment and any loose skin.
- b. Blot dry.
- c. Apply a thick coat of Silver Sulfadiazine (like icing on a cake) and cover with a minimal amount of gauze netting. Silver Sulfadiazine tends to work better when some air can get through the dressings.

### **BACITRACIN/NEOSPORIN/POLYSPORIN AND NON-STICK GAUZE**

Your burn has been dressed in a topical ointment with non-stick gauze. This dressing is changed once a day. This is very important to promote healing and prevent infection.

Follow these guidelines as your care provider has instructed you:

- a. Wash the burn with mild soap, water, and a washcloth, removing all old ointment and any loose skin.
- b. Blot dry.
- c. Apply a thin layer of ointment, only to the injured areas.
- d. Place non-stick dressing over the ointment. Do not overlap excessively.
- e. Cover with a minimal amount of gauze followed by netting.

### **SILVER IMPREGNATED DRESSING**

Your burn has been dressed in a Silver Impregnated Dressing. This dressing is **NOT** to be changed until your next clinic visit.

Follow these guidelines as your care provider has instructed you:

- a. Keep dressing clean, dry and intact. If your dressing becomes wet, please contact your care provider. You may change the outer gauze wrap and netting if there is excessive drainage or it becomes dirty. Do NOT remove silver-impregnated dressing.

## **General Wound Care Guidelines**

### **MOISTURIZER AND SUN BLOCK**

Oil glands, which provide natural oils to keep the skin moisturized, become damaged as a result of the burn injury. Frequent application of moisturizer to healed areas can help skin stay hydrated and therefore less dry. Healed skin is pink and shiny with no drainage.

As the skin heals it relearns its natural pigmentation, although it may never completely return to its original color. During this time it is important to protect your skin from the sun. If the skin is sunburned or tanned while healing, pigmentation can change long term. During the first year, or as long as your skin is pink, red or purple, you should use sunscreen and protect your skin with clothing or compression garments.

## **FACE AND NECK BURN**

Face and neck burns should be washed at least twice a day, removing old ointment and any loose skin. Apply topical ointment to all open areas. If this ointment is rubbed off during the course of the day, reapply topical ointment as often as needed to keep wounds moist.

## **INFECTION**

A low-grade fever associated with burn injuries is normal. Cellulitis, however, is a localized infection of the burn wound and would benefit from simple treatment. If there is redness spreading out from the burn wound and the surrounding skin is warm and swollen, you should contact the care provider immediately.

## **BATHING**

**\*DO NOT BATHE IF IN SILVER IMPREGNATED DRESSINGS.** A sponge bath to other areas is fine as long as the wounds dressed in the silver product remain dry. \*

A daily bath is helpful in wound management. Shampoo and other chemicals involved in bathing will not contaminate your burn injury. Before getting out of the tub/shower, wash your wounds as described above.

## **DIET**

Fluid intake is very important. Increasing your normal fluid intake with juices and drinks high in protein and calories will help speed healing. If available, flavored sports drinks are a great option. Be sure to eat well-balanced, nutritious meals.

## **ACTIVITY**

Maintaining function of a burned extremity decreases pain and swelling as well as promotes healing. Therefore, we encourage normal activity except when otherwise instructed by your care provider.

## **PAIN CONTROL**

Dressing changes are often very painful and medication cannot take all the pain away. It may be helpful for you to take pain medication 30 minutes before doing the dressing change. Please talk with your care provider about appropriate pain medication and any required refills.

## **ITCHING**

Your dry skin, combined with sensory nerves growing back, causes itching. Although uncomfortable at times it will lessen over the next few months. Talk to your care provider about medications that might ease itching.

## **TIGHT TOUGH SKIN**

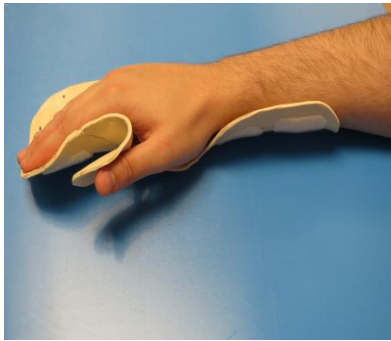
Continued physical therapy and stretching will soften the skin over time. It will not feel that way forever.

# Physical Therapy Guidelines

## Burn Injury Guidelines for Care

### Positioning

Burn-injured extremities should be elevated with pillows. Upper extremities should be positioned with the shoulders abducted to 90°, elbows extended, palms up. If the hands are involved, the patient should have a resting hand splint. This can be fabricated out of gauze wraps, casting material, splinting material or purchased (see illustrations). The lower extremities should be positioned with the knees in extension and the feet supported in neutral. If the burn is partial thickness, the feet can be supported with pillows. If the burn is deep, the feet should be in a foot splint, if possible. It is important to keep the heels protected with gel pads and limit weight bearing on the heels while the patient is on bed rest. In addition, patients with neck and ear burns should not be allowed to use pillows with the exception of a donut head pillow. Gel pads can be used on the back of the head to help prevent pressure sores.



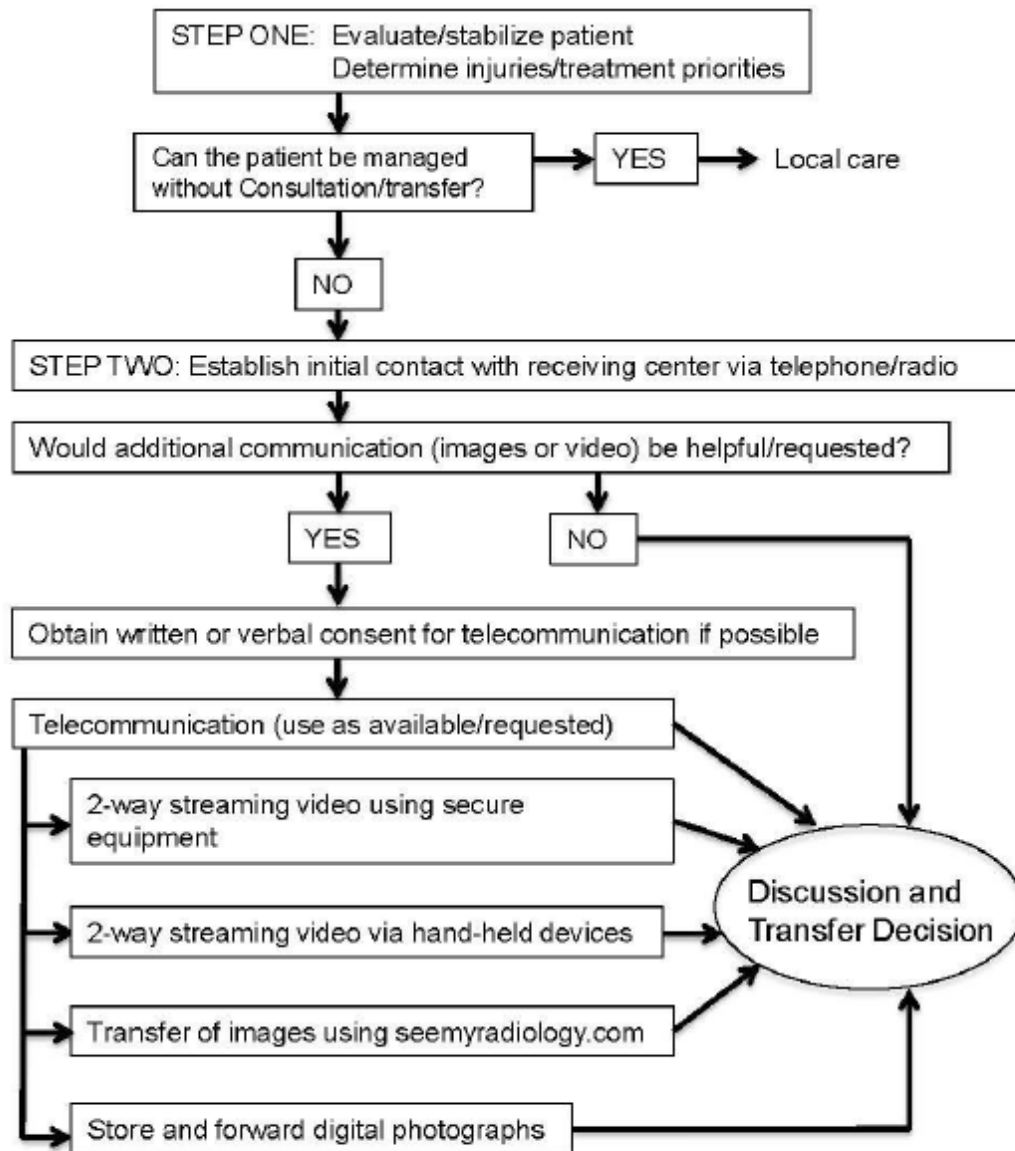
### Activity/ROM

The patient should not be encouraged to increase activity during the first 24-48 hours of fluid resuscitation. Once the patient is stable and they do not have any additional injuries such as fractures or exposed tendons, they should be able to move all areas that are burned. They should flex and extend the knees, elbows and wrists. They should raise their arms over their heads. They should make circles with their ankles. They should touch each fingertip to their thumb and then straighten the fingers. If the back of the hand has a deep burn they should not try and make a fist. Standing and ambulating are fine, even if the bottoms of the feet are burned. Sitting and trying to feed themselves should be encouraged. The patient should continue to elevate extremities during periods of rest, which will prevent swelling.

Exercise stimulates circulation, reduces swelling, maintains strength and functional movement and prevents scar contracture. Exercise and mobility also prevent serious medical conditions such as blood clots, pneumonia and bone loss. A burn wound will heal in the position it is held most often. For this reason it is important to maintain proper positioning during rest to prevent contractures.

Communicating with the  
University of Utah Healthcare Center  
Phone: 801-581-2700

**Burn Injury Guidelines for Care**





### Consent for Telehealth Consultation and Treatment

To better serve the needs of people throughout our region, some health care services are now available by two-way interactive video communications and/or by the electronic transmission of information, which may assist in the evaluation and treatment of health care problems. Referred to as "telemedicine" or "telehealth" this means that I may be evaluated and treated by a provider at the University of Utah (University Provider) by telemedicine from Salt Lake City, Utah. Since this may be different than the type of consultation with which I am familiar, I understand and agree to the following:

1. The University Provider may be at a different location from me. A physician or other provider ("local provider") may be at my location with me to assist in the consultation. Consultation may also take place at my home without a local provider present.
2. The telemedicine process may consist of transmission of video or digital photographs of me, or of transmission of x-rays, test results, or details of my medical record. These will be transmitted to and discussed with the University Provider.
3. Information transferred electronically may be more vulnerable to disclosure or tampering than information transferred by other means.
4. In an emergent situation either the University provider or my local provider will determine/direct who will be present during the telemedicine consultation.
5. In a non-emergent situation I will be informed if any additional personnel are to be present other than myself, individuals accompanying me, the University Provider and Local Provider. I will give my verbal permission prior to additional personnel being present.
6. Video recordings may be taken of the telehealth consultation, after I have given my written permission prior to recording. Video recordings and other data, including x-rays, images, and photos may be kept, viewed, and used for purposes including teaching, training, technical, scientific, research, or administrative purposes, including performance improvement.
7. The University provider will obtain additional consent if use of compact disc recordings and other data, including x-rays, images, and photos is desired for any other purpose.
8. The local provider, if present and the University Provider will keep a written record of the consultation in my medical record.
9. I understand that my participation in telemedicine is voluntary. I have the right to
  - A. Refuse the telemedicine consultation, or stop participation at any time.
  - B. Limit the physical examination during the consultation.
  - C. Request that the local provider refrain from transmitting information if I make the request before the information is transmitted
  - D. Request that nonmedical personnel leave the room or be denied permission to view the telemedicine consultation at any time.
  - E. Request to consult privately with the University Provider at any time.
10. This signed consent form is valid for three years.

I acknowledge the nature of my condition and the nature and purpose of the proposed telemedicine procedures and any substantial and significant risks of serious harm together with their alternative methods of treatment or non-treatment, have been explained to my satisfaction.

I acknowledge/understand the attendant risks involved and voluntarily assume them in the hopes of obtaining the desired beneficial results.

I acknowledge/understand that all claims for negligence and other claims against the University of Utah and its employees and agents, including physicians, nurses, technicians, and students may be governed by the provisions of the Utah Governmental Immunity Act, Utah Code Annotated Section 63G-7-101 et seq., as may be amended from time to time, a special law restricting how and when a claim must be presented and limitations on the amount recovered.

Signature of Patient: \_\_\_\_\_ Date: \_\_\_\_\_

Patient Representative: \_\_\_\_\_ Date: \_\_\_\_\_  
(if patient unable to sign)

Witness: \_\_\_\_\_ Date: \_\_\_\_\_

Patient Name: \_\_\_\_\_  
(please print)

Local Provider: \_\_\_\_\_

Location: \_\_\_\_\_

Please FAX signed form to (801) \_\_\_\_\_ and place original in patient's record.

**Confidential:** This material is prepared pursuant to Utah Code Annotated § 26-25-1 et seq., for the purpose of evaluating health care rendered by hospitals or physicians and is **not part** of the medical record. It is also classified as "protected" under the Government Records Access and Management Act, Utah Code Annotated § 63G-2-101 et seq.



# Burn Patient Consultation Information Sheet

## Burn Injury Guidelines for Care

### Telemedicine using live stream

- The requesting health care facility will contact the University of Utah Health Care Burn Center (UUHC BC) at (801) 581-2700 and request a burn telemedicine consultation.
- Patient consent will be obtained if possible using the University of Utah Burn Center Informed Consent for Telemedicine Consultations form, or similar facility-specific patient informed consent form. The form will then be faxed to the UUHC BC at (801) 585-2103.
- UUHC BC will turn on the telemedicine equipment and prepare to receive the requesting health care facility telemedicine call for patient consultation.
- The patient providers will use the Burn Estimate and Diagram (referring provider) in addition to the Burn Center Referral Sheet (burn center provider) to document the consultation.

### Telemedicine using store and forward of patient images

- The requesting health care facility will contact the University of Utah Health Care Burn Center (UUHC BC) at (801) 581-2700 and request a burn telemedicine consultation using store and forward of patient images.
- UUHC BC will send an email to the requesting facility at the specified email address with PHI in the subject line; this ensures that patient information is protected.
- Requesting ED physician will obtain patient consent for the store and forward of images using the University of Utah Burn Center Informed Consent for Telemedicine Consultations form, or similar facility-specific patient informed consent form. The form will then be faxed to the UUHC BC at (801) 585-2103.
- Patient images will then be attached to the PHI email and sent to the UUHC BC with a PHI in the subject line so that images will be secure.
- UUHC BC and referring physician will then communicate via phone regarding patient images.
- The patient providers will use the Burn Estimate and Diagram (referring provider) in addition to the Burn Center Referral Sheet (burn center provider) to document the consultation.

**\* When you first receive an encrypted (PHI) email from UUHC BC using the Cisco Registered Envelope Service (CRES), you will be asked to register through Cisco. This process will take approximately five minutes, and you will be asked to choose a password and a security phrase. You will then be asked to activate your account. This process ensures patient information is kept secure. This account will cover all PHI email from the UUHC BC sent to the registrant's email address.**

**Secure emails come from the following address: CRES Do Not Reply (DoNotReply@res.cisco.com).**

**For more information and to read FAQ regarding CRES, please use the following link and choose the option stating "Third party secure mail"**

<http://www.secureit.utah.edu/training/securemail/index.html>

## Patient consultation utilizing the PEAK radios

- The requesting Health Care facility will contact the University of Utah Health Care Burn Center (UUHC BC) using the PEAK radio system and request a burn patient consultation. The channel to be used is currently the SST Coalition option, but eventually there will be a designated Burn Channel.
- The facility will obtain patient consent.
- The patient care providers from the requesting Health Care Facility and the UUHC BC will communicate utilizing the PEAK radio regarding the burn patient consultation.
- The PEAK radio is a secure channel which cannot be picked up by scanners. All facilities with PEAK radios will be able to hear a patient consultation if they are tuned to that channel.
- The patient providers will use the Burn Estimate and Diagram (referring provider) in addition to the Burn Center Referral Sheet (burn center provider) to document the consultation.





# Burn Anticipated Resource Table

## Burn Injury Guidelines for Care

**BURN TRIAGE TABLE:** This table illustrates the anticipated ratio of resources to benefit from the treatment of burns of various sizes in various aged patients. Each category reflects both the volume of resources necessary to care for the patients in each group, and the expected outcome.

Age	Burn Size Group, % TBSA All									
	0-9.9	10-19.9	20-29.9	30-39.9	40-49.9	50-59.9	60-69.9	70-79.9	80-89.9	≥ 90
0-1.99	Very High	Very High	High	High	High	Medium	Medium	Medium	Low	Low
2-4.99	Outpatient	Very High	High	High	High	Medium	Medium	Medium	Low	Low
5-19.99	Outpatient	Very High	High	High	High	High	Medium	Medium	Low	Low
20-29.99	Outpatient	Very High	High	High	High	Medium	Medium	Medium	Low	Low
30-39.99	Outpatient	Very High	High	High	Medium	Medium	Medium	Low	Low	Expectant
40-49.99	Outpatient	Very High	High	Medium	Medium	Medium	Medium	Low	Low	Expectant
50-59.99	Outpatient	Very High	High	Medium	Medium	Low	Low	Expectant	Expectant	Expectant
60-69.99	Outpatient	High	Medium	Medium	Low	Low	Low	Expectant	Expectant	Expectant
≥ 70	Very High	Medium	Low	Low	Low	Expectant	Expectant	Expectant	Expectant	Expectant

Palmieri TL et al.

Triage/Resource Table for a Burn Disaster  
Developed from the American Burn Association NBR

Categories are defined as follows:

**OUTPATIENT:** Survival and good outcome expected without requiring initial admission.

**VERY HIGH:** Mortality ≤10%, anticipated length of stay ≤ 14-21 days, 1-2 surgical procedures.

**HIGH:** Mortality ≤ 10%, anticipated length of stay ≥ 14-21 days, multiple surgical procedures.

**MEDIUM:** Mortality 10 – 50%, with provision of aggressive treatment which may require prolonged hospitalization and multiple surgical procedures.

**LOW:** Mortality 50 – 90%, even with provision of prolonged, intensive resources.

**EXPECTANT:** Mortality ≥ 90%, even with prolonged aggressive care.

Patients palm inclusive of fingers closed = 1%  
Total Body Surface Area

