Guidelines for the Stabilization of Burn Patients for 72 Hours until Transfer to a Burn Center

State Expert Panel on Burn Surge

December 2011

Introduction

The Wisconsin Hospital Emergency Preparedness Program (WHEPP) through the State Expert Panel on Burn Surge (see Appendix A: Members of the State Expert Panel on Burn Surge) provides these guidelines to hospitals for the stabilization of burn patients for 72 hours or more when immediate transfer to a Burn Center is not feasible. This is due to the fact that there are limited burn beds available in the state and in border state areas. An incident such as an explosion or fire could cause a surge of patients at a local hospital(s) with delays in transferring these patients to a Burn Center due to the unavailability of burn beds at the Burn Centers.

Wisconsin Hospital Plan to Manage a Surge of Burn Patients

Although burn patients should be transferred to the appropriate Burn Center as soon as possible, the extent of the incident and the availability of burn bed resources may be limited. Thus, hospitals in the vicinity of the incident may be called upon, at least initially, to stabilize and treat these patients, until the transfer to a Burn Center is possible. **Any hospital can be the site closest to an incident that causes burns to victims.**

ASPR Benchmark for Trauma and Burn Care Surge Capacity

The U.S. Department of Health and Human Services, Assistant Secretary for Preparedness and Response (ASPR) set the goal that hospitals have the capability of providing trauma and burn care, at a minimum, to at least 50 severely injured adult and pediatric patients per million of population due to a mass casualty incident. The following burn treatment capacity is recommended in each of the seven Hospital Preparedness Regions, using the ASPR recommended target formula:

Minimum Burn Bed Capacity		
WHEPP Region	**Population**	**Burn Capacity**
1	565,926	28
2	469,737	23
3	507,821	25
4	268,580	13
5	1,149,195	57
6	488,617	24
7	2,237,110	112
State	**5,686,986**	**282**

Although this ratio of 50 severely injured adult and pediatric patients per million of population provides a rational basis for planning purposes, the above numbers may be considered conservative, given the limited number of Burn Centers in the State of Wisconsin and in neighboring states:

WHEPP Region 7: Columbia/St. Mary's Hospital, Milwaukee
WHEPP Region 7: Children's Hospital of Wisconsin, Milwaukee
WHEPP Region 5: University of Wisconsin Hospitals, Madison
Minnesota: Hennepin Medical Center, Minneapolis
Minnesota: Regions Hospital, St. Paul
Illinois: Loyola University, Chicago
Illinois: University of Chicago, Chicago
Iowa: University of Iowa, Iowa City
Michigan: University of Michigan Health System, Ann Arbor

Burn Center Contact Information	
Children's Hospital of Wisconsin	800-266-0366
Columbia/St. Mary's Burn Center	414-272-BURN(2876) Milwaukee Metro 800-272-BURN (2876) Outside Milwaukee
University of Wisconsin Burn Center	800-472-0111
Hennepin Connect	800-873-4262
Hennepin Burn Center	800-321-BURN (2876)
Regions Hospital	800-922-2876
Loyola University Medical Center	708-216-3988
University of Chicago	773-702-6736
University of Iowa	319-356-2496
University of Michigan Health System	734-936-9669

Pediatric burn patients, to the extent possible, should be transferred to the above listed Burn Centers. If this is not possible, pediatric burn patients <2 years with TBSA[1] >15% or >2 years with TBSA >20% should be sent to a hospital with a Pediatric Intensive Care Unit. The following is the list of hospitals in Wisconsin that have a Pediatric Intensive Care Unit:

WHEPP Region 2: Ministry Saint Joseph's Hospital, Marshfield
WHEPP Region 3: St. Vincent Hospital, Green Bay
WHEPP Region 4: Gundersen Lutheran Medical Center, LaCrosse
WHEPP Region 5: St. Mary's Hospital, Madison
WHEPP Region 5: American Family Children's Hospital (UW), Madison
WHEPP Region 7: Children's Hospital of Wisconsin, Milwaukee

Burn Care Planning Assumptions

1. The ASPR National Hospital Preparedness Program target number of 50 severely injured adult and pediatric trauma and burn patients (282 beds are needed) will easily overwhelm the Burn Centers within the State and in our border states.

2. National burn bed capacity is limited. Current plans for transport of burn patients to out-of-state Burn Centers are likely to be inadequate for a large-scale trauma and burn incident.

3. Federal resources for transport, portable facilities, burn team support and medical equipment (such as ventilators) could take anywhere from 12 hours to 7 days to arrive, or not be available at all, depending upon demand for these resources in other areas of the country .

4. Federal resources from the Strategic National Stockpile or its Managed Inventory assets to support state Burn Centers and other hospitals could take from 12 hours to arrive, once the Governor has made this request and the request has been approved by the federal government.

5. Hospitals at Trauma Level I and II have the resources to stabilize and treat burn patients if unable to transfer to a Burn Center.

6. Hospitals at Level III and IV also should be capable of stabilizing burn patients, if necessary, in a surge incident, especially with consultation support from the Burn Centers. However, one or two patients with severe burns may overwhelm the resources of these hospitals.

[1] TBSA means Total Body Surface Area.

7. Burn Centers have plans to manage a surge of burn patients by creating additional bed capacity to existing and available burn beds.
8. Treatment of burn patients is resource intensive. Treatment of burn patients may last for weeks after the incident.
9. Burn victims, as other patients, prefer to be treated locally.
10. Hospitals usually have the supply items necessary to care for burn victims.

Burn Treatment for a Burn Surge Incident: Flowchart

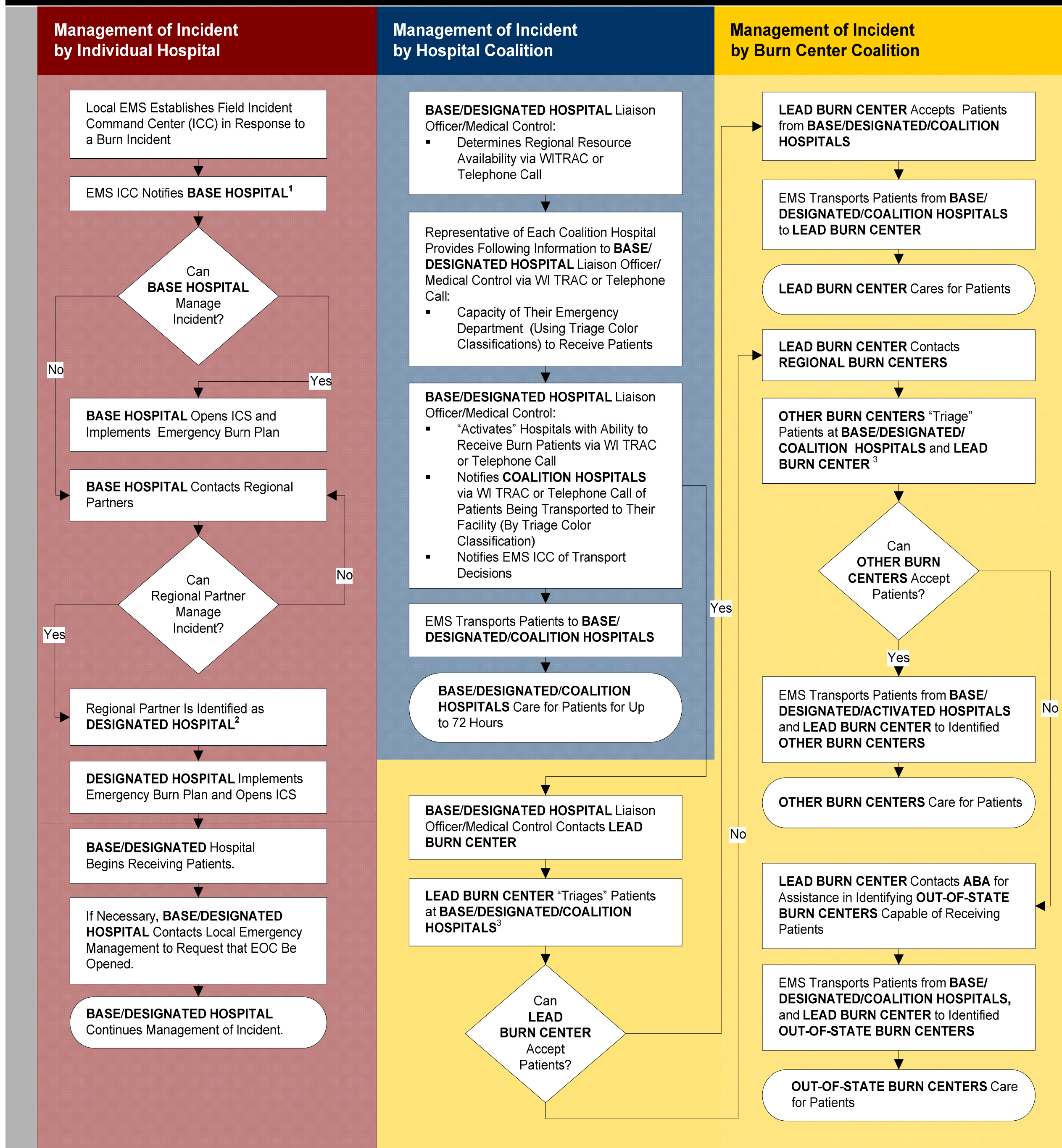
The following flowchart describes the procedures that will be implemented at hospitals in the state of Wisconsin, based on the severity of the burns and the number of victims involved.

Definitions

1. Base Hospital is defined as the hospital closest to the incident
2. Burn Center, for the purposes of this plan, include the following hospitals:
    a. University of Wisconsin Hospital, Madison
    b. Columbia/St. Mary's Hospital, Milwaukee
    c. Children's Hospital of Wisconsin
    d. Hennepin County Medical Center, Minneapolis, MN
    e. Regions Hospital, St. Paul, MN
    f. Loyola University Medical Center, Chicago, IL
    g. University of Chicago Burn Center, Chicago, IL
    h. University of Iowa, Iowa City, IA
    i. University of Michigan Health System, Ann Arbor, MI
3. Burn Incident is any incident that involves
    - burn victims with severity of burns that cannot be managed by local hospital resources and/or
    - the number of burn victims is such that this number of burn victims cannot be managed by transfer to the Burn Center(s).

    Note: *EMS should be familiar with local hospital resources and should be able to identify a burn incident, based on its knowledge of local hospital resources to manage a Burn Incident.*
4. Designated Hospital is the hospital that voluntarily agrees to manage the incident as requested by the Base Hospital
5. Hospital Coalition is the name for a group of hospitals, identified by the Base or Designated Hospital, as the hospitals initially contacted to assist in management of the incident. In all burn incidents, all state and border state Burn Centers, as identified in this plan, should also be alerted.

Medical Control is defined as the physician or designee who provides advice and direction to Emergency Medical Services who are providing medical care at the scene of an emergency or en route to a health care facility.



Notes

1. **BASE HOSPITAL** is the hospital closest to an incident.
2. **DESIGNATED HOSPITAL** is the hospital that voluntarily chooses to manage an incident.
3. The triaging of patients is a dynamic process that repeats itself until all critical burn patients are being cared for in a certified burn center.

Management of the Burn Incident by an Individual Hospital

1. The first agency on scene (EMS, fire, law enforcement) establishes the field Incident Command Center (ICC) in response to the Burn Incident (see definition). Based on the nature of the incident and the number of victims involved, the field Incident Commander may request the activation of the local Emergency Operations Center (EOC).

2. EMS follows State Trauma Advisory Council Triage and Transfer Protocols. If the Triage and Transfer Protocols cannot be followed because of the nature of the burn incident, then EMS in the field should triage the burn victims by the triage colors of RED, YELLOW, GREEN, and BLACK, according to standard triage procedures.

3. The field Incident Commander is to notify the Base Hospital that a burn incident has occurred and give an estimate of the number of victims involved.

4. If Medical Control at the Base Hospital decides that the Base Hospital can manage the incident, then no further hospitals, other than the Burn Center, may need to be involved. The Base Hospital will activate, as necessary, its Emergency Operations Plan and Incident Command System, stabilize the burn victim(s), contact the appropriate Burn Center and then follow the instructions of the Burn Center for which patients should be transferred.

Management of the Burn Incident by a Hospital Coalition

1. If Medical Control at the Base Hospital believes that it cannot manage the incident by itself, then the Base Hospital, through its Liaison Officer, should alert other hospitals through WI Trac that it is in need of assistance to manage the incident. The alert to coalition hospitals should also involve state and border state Burn Centers, as identified in this plan, as appropriate.

   Note*: Use of WI Trac does not preclude the use of other communication methods. WI Trac, however, has the ability to reach many facilities at the same time, update all facilities and has other functions, such as Command Center, that could be used to manage the incident.*

2. If the Base Hospital cannot serve as the Designated Hospital (the hospital that manages the incident), then the Base Hospital should identify another hospital that can serve as the Designated Hospital.

3. The Designated Hospital should then, to the extent possible, communicate to the Liaison Officer at the field Incident Command Center

   a. the names of the hospitals in the coalition that are prepared to receive victims and
   b. the number of patients by triage designation that can be accepted by each hospital
   c. the names of the Burn Centers that have been notified.

4. The field Command Center (EMS Transportation Group Supervisor) should have only one hospital with which to communicate.

5. All hospitals in the coalition will activate, as necessary, its Emergency Operations Plan and Incident Command System.

a. Upon activation of the Hospital Command Center, each hospital in the Coalition is to send an up-date through WI Trac that it has been activated and is prepared to receive the burn victim(s).

b. Each coalition hospital should also post on WI Trac, under MCI Patient Capacity, the number of burn victims it can receive by color category: RED, YELLOW, GREEN, GRAY[2]. The number of triage-color patients that the hospitals can accept will assist Medical Control and EMS Transport Group Supervisor in the determination of destination hospitals.

c. The coalition hospitals may contact the Burn Centers for treatment information. If digital images of burn wounds are sent to Burn Centers for consultation, the standard procedures for de-identifying information to be in compliance with HIPAA are to be followed.

6. Medical Control at the Base or Designated Hospital will, to the extent possible, assist the EMS Transport Group Supervisor[3] in the triage of patients to the hospitals in the coalition.

    a. Medical Control will use his/her knowledge of the capabilities of coalition hospitals to manage the transport of RED, YELLOW, GREEN, GRAY burn patients to the appropriate coalition hospitals.

    b. Medical Control notifies each coalition hospital of the number and triage color of the burn victims it may receive.

    c. The Hospital Command Center of the coalition hospital will advise Medical Control of the Base or Designated Hospital of their capability to accept burn victims.

    ***Note**: These above procedures are based on those patients being transported from the field. The coalition hospital(s) may need to divert patients to other coalition hospitals based on the number of burn victims who self-present to the hospital.*

Management of the Burn Incident by the "Lead" Burn Center
Note: In this phase, it is assumed that all patients have been transported from the field to coalition hospitals and to Burn Centers.

1. The Burn Center closest to the incident shall be considered the "lead" unless otherwise specified by a decision among the Burn Centers.

2. The coalition hospitals, to the extent that communications permit, shall work with the "Lead" Burn Center to help the triage and transport of burn victims to the appropriate Burn Centers from the coalition hospitals.

3. The "Lead" Burn Center will communicate with the other appropriate Burn Centers and the State Emergency Operations Center (if activated).

4. The "Lead" Burn Center will communicate with coalition hospitals and provide an estimate of the number of hours/days that the hospitals may need to care for treat the burn victims until transport and transfer to a Burn Center can be arranged.

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[2] GRAY refers to expectant (patients that may not survive) in the SALT triage system.
[3] It is recognized that field to hospital communications may not be possible in all areas. In these areas, EMS usually has a plan on how to get messages to their destination hospitals.

Management of the Burn Incident by the "Lead" Burn Center in Collaboration with the American Burn Association and the State Emergency Operations Center (SEOC)

1. The "Lead" Burn Center will contact the American Burn Association if state and border state Burn Centers do not have the capacity to manage the number of burn victims resulting from the incident.

2. The American Burn Association will provide directives to the "Lead" Burn Center and the SEOC about out-of-state burn bed availability and when these out-of-state Burn Centers can receive these burn victims.

3. The "Lead" Burn Center, in collaboration with the American Burn Association and SEOC, will work with the coalition hospitals about the transport of burn victims, being cared for by the coalition hospitals, to out-of-state Burn Centers.

Burn Training and Resources for EMS and First Responders

EMS and First Responders should have plans for the management of Mass Casualty Incidents. They are encouraged to use the following document on which to base their Mass Casualty Incident response plan: ***Wisconsin EMS Mass Casualty Incident Response Planning Guide***[4].

There is no special training necessary for EMS for the management of burn victims outside of basic ***ABC*** and pain management. The Burn Centers have proved guidelines for EMS regarding the initial management and transport of patients with burns. (See Appendix B: Consensus Guidelines for the Initial Management of Burns by EMS.)

- EMS and First Responder Medical Directors are encouraged to use these "Guidelines" and include them in their operational protocols.
- These "Guidelines" should be incorporated in protocol books carried on each ambulance.
- EMS and First Responders should carry the supplies on their ambulance as recommended by the "Guidelines".

Hospital-associated EMS, Paramedics, and Advanced EMTs may take advantage of the Advanced Burn Life Support course, ABLS Now©. (See Appendix D: Advance Burn Life Support Training.) For access to additional online training, one can also visit: www.michiganburn.org.

Burn Training for Wisconsin Hospitals

The Wisconsin Hospital Emergency Preparedness Program currently also has training available for hospital personnel. The following individuals are recommended for this course:

1. There should be 24-hour nursing care for any burn patient. Nurses should have successfully completed ABLS Now© from the American Burn Association. Multiple nurses should receive this training, so at least one ABLS trained nurse is available on each shift.

2. There should be 24/7 physician consultation available. Physicians should have ABLS Now© from the American Burn Association. It is recommended that at least one Emergency Department physician and one General Surgeon receive this training.

[4] This planning guide can be found at http://www.dhs.wisconsin.gov/ems/Prevention_safety/prevention_index.htm

Other Staff that care for burn patients may also take advantage of the ABLS Now© (e.g. Respiratory Therapists, etc.) at the discretion of the hospital. (See Appendix D: Advance Burn Life Support Training.) For access to additional online training, one can also visit: www.michiganburn.org.

Example of 22 Burn Patients in Weston, Wisconsin

The following example demonstrates how this process would unfold in a scenario where there are 22 burn victims due to an explosion in a manufacturing plant.

An explosion occurs at the Universal Garment Factory that employs 200 persons. Blue Shield EMS arrives on the scene and established Incident Command. Blue Shield estimates that there are 22 employees who are suffering from burns.

Blue Shield EMS begins triage and identifies 4 RED patients, 8 YELLOW patients and 10 GREEN patients.

Blue Shield EMS contacts Medical Control at St. Helen Hospital (the closest hospital – the Base Hospital) and notifies them that there are an estimated 22 burn victims, some serious. St. Helen Hospital determines it cannot manage the incident by itself. The hospital activates Incident Command and the Liaison Officer contacts 6 other hospitals in the region through an alert on WI Trac, based on the understanding of the treatment capabilities of the hospital contacted. The Liaison Officer also contacts the 5 Burn Centers. Based on this estimate, each of the contacted hospitals agrees to accept patients and activates its Incident Command.

University of Wisconsin Hospital Burn Center, which is closest to the scene, has assumed the role of "Lead" Burn Center. UW Hospital has communicated with other Burn Centers, which have posted their contact information as updates to the original alert posted by St. Helen Hospital on WI Trac with the notice that each Burn Center is available to any of the coalition hospitals for consultation about the treatment of burn patients that they will receive. The "Lead" Burn Center collaborates with the other Burn Centers to determine how soon patients from the coalition hospitals can be transferred to a Burn Center. The "Lead" Burn Center then communicates to the coalition hospitals estimated time until transfer to a Burn Center will be available. The "Lead" Burn Center also notifies the American Burn Association of the incident and the number of burn victims involved, although at this time it is not anticipated the there will be a need for other Burn Centers to be involved.

Since St. Helen (Base Hospital) is a Critical Access Hospital and has limited staff it requests that St. Camillus Hospital, Trauma Level II, 250 beds, serve as the Designated Hospital. St. Camillus agrees to serve as the Designated Hospital.

Each of the coalition hospitals updates the WI Trac alert to indicate they have activated their Emergency Operations Plan and are able to receive patients from the field. Each hospital also posts the number of patients it is able to receive by triage color on WI Trac under MCI Patient Capacity. (This posting allows Medical Control at the Designated Hospital to determine how many and what types of patients the hospital can receive).

St. Camillus, as the Designated Hospital, contacts the field Incident Commander to report:

- Names of the coalition hospitals and Burn Centers contacted and willing to accept patients: *St. Helen, St. Camillus, St. Gertrude, St. Lawrence, St. Mary's and St. Joseph Hospitals*

- The number of patients each hospital can accept by triage designation:
  - St. Helen: 1 YELLOW and 1 GREEN
  - St. Camillus: 2 YELLOW and 2 GREEN
  - St. Gertrude: 1 YELLOW, 3 GREEN
  - St. Lawrence: 1 YELLOW, 2 GREEN
  - St. Mary: 2 YELLOW, 2 GREEN
  - St. Joseph: 1 YELLOW
  - University of Wisconsin Burn Center: 2 RED
  - Columbia/St. Mary's Burn Center: 2 RED
  - Children's Hospital: I RED, 1 YELLOW

Medical Control at the Designated Hospital communicates with each of the coalition hospital and advises them of the number of patients by triage color that they are likely to receive. St. Helen Hospital and St. Camillus Hospital, which are closest to the scene, are beginning to see patients self-presenting to the hospital with minor injuries and burns from the explosion.

The "Lead" Burn Center contacts the coalition hospitals and instructs them on when their burn patients can be transferred and to which Burn Center.

Appendix A: Members of the State Expert Panel on Burn Surge

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Terry Frink, University of Wisconsin Hospital and Clinics, Madison

Patty Haugh, **RN, MSN, CCRN**, Clinical Nurse Specialist, Critical Care, Columbia/St. Mary’s Hospital, Milwaukee

Gaby Iskander MD, Trauma and Surgical Intensive Care (SICU) Medical Director, Saint Joseph's Hospital and Marshfield Clinic; Chair, State Trauma Advisory Council

Mark Johnston, **RN BSN**, Staff Nurse, Regions Hospital, St. Paul, MN

Jason Selwitschka, EMT-P, Emergency Room Technician, Theda Clark Trauma Center, Neenah Wisconsin

Mark A. Sinotte, EMT-P, Emergency Preparedness Coordinator/Trauma Coordinator, Aurora Medical Center, Oshkosh

Amy Stacey, **MS, RN**, Adult Trauma Program Coordinator, University of Wisconsin Hospital and Clinics, Madison

Dennis Tomczyk, Director, Hospital Preparedness, Wisconsin Division of Public Health, Madison

Lori Wallman, Region 5 Hospital Preparedness Manager, Madison

Deb Weber, Milwaukee Fire Department, Milwaukee

Cinda Werner, **MS, RN**, Director, Trauma and Transplant Services, Children’s Hospital of Wisconsin, Milwaukee

Angie Whitley, Westfields Hospital, New Richmond

Appendix B: Consensus Guidelines for the Initial Management of Burns by EMS

These Consensus Guidelines are intended to be used by EMS on a daily basis (and also in disaster incidents) for ALL burn patients.

Signs & Symptoms:

1st degree burns (superficial): Reddened skin that blanches with pressure
2nd degree burns (partial thickness): Moist, red, weeping surface, intact or broken blisters, painful
3rd degree burns (full thickness): Dry, pale, dark red, white, brown or charred skin, may be painless
Airway compromise: Wheezing, dyspnea, hoarseness, stridor
Inhalation injury: Facial burns, singed nares, carbonaceous sputum, enclosed space fire, altered LOC

Obtain History of:

- PMH/Meds/Allergies
- Recent illness or trauma
- History of event, mechanism of injury, other trauma (falls, loss of consciousness, etc), time of injury
- Electrical contact (AC/DC, amps, volts or lightning)
- Enclosed or open space exposure
- Type of chemical or toxic exposure
- Duration & concentration of exposure
- Presence of fire, smoke, or distinctive odors

Notes:

1. Guidelines for children apply for children under age 12 or < 36 kg (Broselow)
2. TBSA = Total burn surface area

General Guidelines

- Stop the burning process (remove clothing)
- Assess ABC's (airway, breathing, circulation)
- Establish IV access
- Treat pain
- Remove jewelry or other potentially constricting items
- Look for other trauma
- Keep environment warm
- Frequent vital signs & assessment of peripheral pulses: *BP can be taken on burn extremities*
- Electrical burns: EKG monitoring, look for contact wounds
- Chemical burns: Copious irrigation with warm water. *Brush dry chemicals off prior to irrigation, certain chemicals require special considerations (e.g. hydrofluoric acid)*
- Transport patients in clean, dry sheet (or burn sheet) – no ointments

Consider transport to nearest burn center.

Airway Control/Inhalation Injury

- 100% high-flow oxygen
- Look for signs of inhalation injury.
  - Consider potential for inhalation injury in all victims of closed-space injury.
  - Consider potential for inhalation injury in all those who inhaled fumes or steam.
  - Carbon monoxide & cyanide are commonly present in closed-space fires.
- Consider intubation.

- Evidence of airway compromise
    - Significant decrease in mental status
    - Circumferential partial or full thickness chest burns
    - Extensive burns or facial burns

Assessment of Injury

- Lund-Browder diagram preferred for adults and children.
- Alternatives:
    - Rule of 9's for adults
    - Pediatric Specific Rule of 9's for children
    - *Patient's* palm, including fingers = 1%

Fluid Resuscitation

***Adults and children > 30 kg*:**

- Parkland formula: 2-4ml/kg/TBSA % with Lactated Ringers with burns ≥ 15% for partial or full thickness burns
- Normal saline is acceptable pre-hospital, but prefer use of LR (or balanced salt solution).
    - *Half given in first 8 hours, the remainder during the next 16 hours.*

Children < 30 kg: Parkland formula + maintenance fluids

- Parkland formula: 3-4ml/kg/TBSA % with Lactated Ringers with burns ≥ 15% for partial or full thickness burns.
    - *Half given in first 8 hours, the remainder during the next 16 hours.*
- Maintenance fluid
    - 4ml/kg/hr or 100ml/kg/day for first 10kg, plus
    - 2ml/kg/hr or 50 ml/kg/day for second 10kg, plus
    - 1ml/kg/hr or 20ml/kg/day for all further 10kg

Pain control

- Narcotics as needed: Consider small, frequent doses.
- Call for ALS intercept if needed for pain control.
- Consider anti-anxiety medications in addition to pain meds (especially in children).

Monitoring Resuscitation

- Adjustments to fluid rate will be dependent upon patient response.

The Parkland formula is a guideline: Both over and under resuscitation causes problems.

These Consensus Guidelines were developed by:

- Children's Hospital of Wisconsin Burn Center (Milwaukee)
- Columbia St. Mary's Milwaukee Burn Center (Milwaukee)
- Regions Hospital Burn Center (St. Paul, Minnesota)
- University of Wisconsin Hospital & Clinics Burn Center (Madison)

Courtesy of the

American Burn Association

Advanced Burn Life Support (ABLS)

Learn more about the ABA and ABLS at www.ameriburn.org

Burn Center Referral Criteria

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.

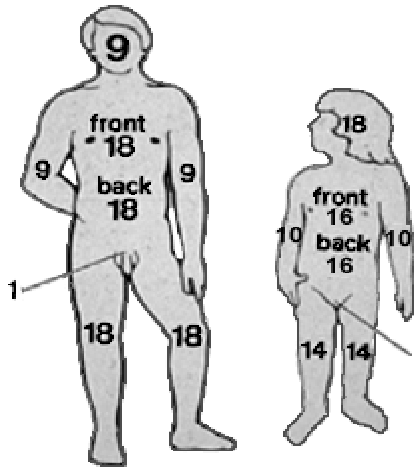
Severity Determination

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

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

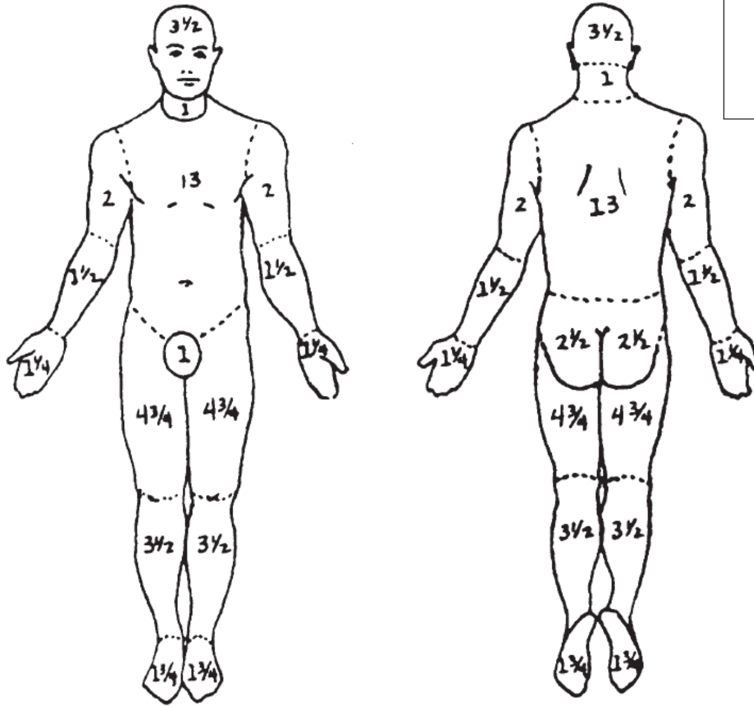
Third Degree (*Full Thickness*)
Whitish, charred or translucent, no pin prick sensation in burned area.

Percentage Total Body Surface Area (TBSA)



Note: It is the recommendation of Children's Hospital of Wisconsin that pediatric burn patients, who meet the above criteria, be transferred to Children's Hospital of Wisconsin or to the American Family Children's Hospital, or, if this is not possible, to a state adult Burn Center or hospital with a Pediatric Intensive Care Unit.

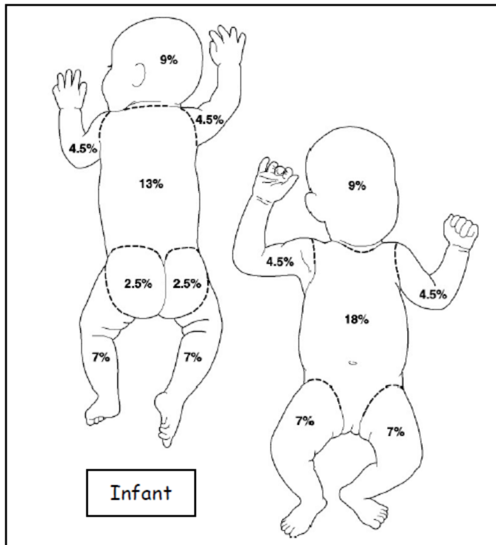
BURN DIAGRAM, ESTIMATE (Lund & Browder)

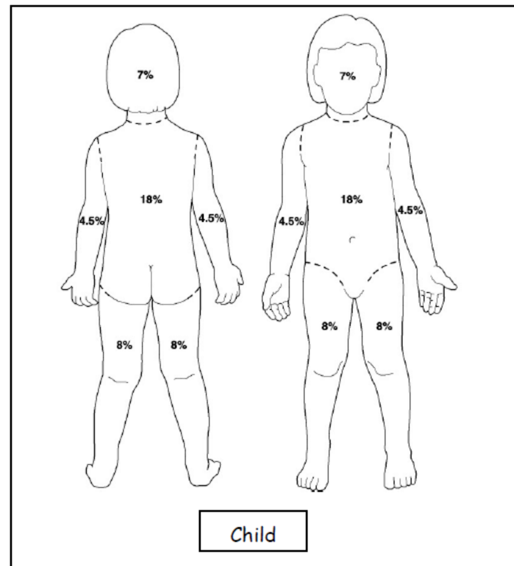


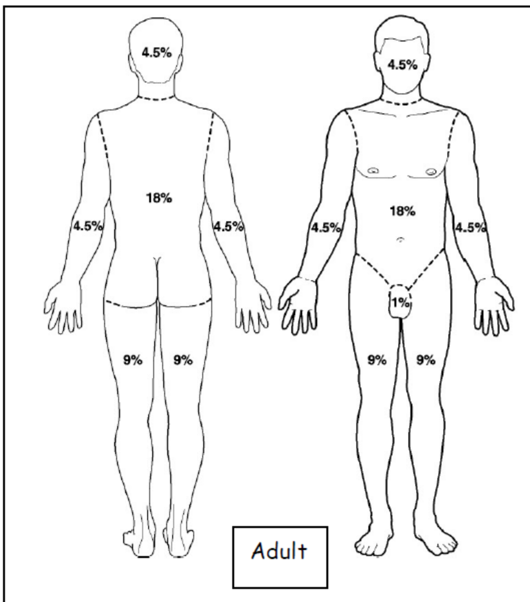
	AGE						BURN ASSESSMENT	
AREA	infant	1-4	5-9	10-14	15	adult	PARTIAL THICKNESS	FULL THICKNESS
head	19	17	13	11	9	7		
neck	2	2	2	2	2	2		
ant. trunk	13	13	13	13	13	13		
post. trunk	13	13	13	13	13	13		
r. buttock	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2		
l. buttock	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2		
genitalia	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 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2		
l. hand	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2		
r. thigh	5 1/2	6 1/2	8	8 1/2	9	9 1/2		
l. thigh	5 1/2	6 1/2	8	8 1/2	9	9 1/2		
r. leg	5	5	5 1/2	6	6 1/2	7		
l. leg	5	5	5 1/2	6	6 1/2	7		
r. foot	3 1/2	3 1/2	3 1/2	3 1/2	3 1/2	3 1/2		
l. foot	3 1/2	3 1/2	3 1/2	3 1/2	3 1/2	3 1/2		
						TOTAL:		

BURN ASSESSMENT: Date __________ Time ____________ Signature ________________________

BURN DIAGRAM ESTIMATE
(Rule of 9's: Estimate of TBSA – Total Burn Surface Area)







Area	Infant	Child	Adult	Burn Assessment	
				Partial thickness	Full thickness
Head	18	**14**	9		
Chest (Ant. torso)	18	18	18		
Back (Post. Torso) & buttocks	13 (back) 5 (buttocks)	18	18		
Rt. arm & hand	9	9	9		
Lt. arm & hand	9	9	9		
Rt. Leg & foot (anterior)	**7**	8	9		
Lt. Leg & foot (anterior)	**7**	8	9		
Rt. Leg & foot (anterior)	**7**	8	9		
Rt. Leg & foot (anterior)	**7**	8	9		
Perineum	(include with chest)	(include with chest)	**1**		

Bolded areas ≠ nine or multiple of nine

Burn Assessment Date____________ Time ______ Signature_______________________

Appendix C: Consensus Guidelines for the Initial Management of Burns by Hospitals

Hospitals are to use these Consensus Guidelines only in burn surge incidents.

Signs & Symptoms:

1st degree burns (superficial): Reddened skin that blanches with pressure
2nd degree burns (partial thickness): Moist, red, weeping surface, intact or broken blisters, painful
3rd degree burns (full thickness): Dry, pale, dark red, white, brown or charred skin, may be painless
Airway compromise: Wheezing, dyspnea, hoarseness, stridor
Inhalation injury: Facial burns, singed nares, carbonaceous sputum, enclosed space fire, altered LOC

Obtain History of:

- PMH/Meds/Allergies
- Recent illness or trauma
- History of event, mechanism of injury, other trauma (falls, loss of consciousness, etc), time of injury
- Electrical contact (AC/DC, amps, volts or lightning)
- Enclosed or open space exposure
- Type of chemical or toxic exposure
- Duration & concentration of exposure
- Presence of fire, smoke, or distinctive odors

Notes:

3. Guidelines for children apply for children under age 12 or < 36 kg (Broselow).
4. TBSA = Total burn surface area

General Guidelines

- Stop the burning process (remove clothing).
- Assess ABC's (airway, breathing, circulation).
- Establish IV access if admission is necessary.
- Treat pain.
- Remove jewelry or other potentially constricting items.
- Look for other trauma.
- Keep environment warm.
- Frequent vital signs & assessment of peripheral pulses: *BP can be taken on burn extremities.*
- Limit oral intake to ice chips sparingly.
- Electrical burns: EKG monitoring, look for contact wounds. Consider rhabdomyolysis.
- Chemical burns: Copious irrigation with warm water. *Brush dry chemicals off prior to irrigation. Certain chemicals require special considerations (e.g. hydrofluoric acid).*
- Immunize against tetanus.
- Refer to Burn Center based upon ABA Referral Criteria.
- Transport patients in clean, dry sheet (or burn sheet) – no ointments.
- Method of transport per collaborative agreement of sending/receiving facility.

Airway Control/Inhalation Injury

- 100% high-flow oxygen
- Look for signs of inhalation injury.
  - Consider potential for inhalation injury in all victims of closed-space injury.
  - Consider potential for inhalation injury in all those who inhaled fumes or steam.
  - Carbon monoxide & cyanide are commonly present in closed-space fires.
- Consider intubation.
  - Evidence of airway compromise

    - Significant decrease in mental status
    - Circumferential partial or full thickness chest burns
    - Extensive burns or facial burns
- ABG's & CO level if suspected inhalation injury

Assessment of Injury

- Lund and Browder diagram is preferred for adults and children.
- Alternatives:
    - Rule of 9's for adults
    - Pediatric Specific Rule of 9's for children
    - *Patient's* palm, including fingers = 1%

Fluid Resuscitation

***Adults and children > 30 kg*:**

- Parkland formula: 2-4ml/kg/TBSA % with Lactated Ringers with burns ≥ 15% for partial or full thickness burns
- Normal saline is acceptable pre-hospital, but use LR (or balanced salt solution) once at ED.
    - *Half given in first 8 hours; the remainder during the next 16 hours.*

Children < 30 kg: Parkland formula + maintenance fluids

- Parkland formula: 3-4ml/kg/TBSA % with Lactated Ringers with burns ≥ 15% for partial or full thickness burns
    - *Half given in first 8 hours; the remainder during the next 16 hours.*
- Maintenance fluid with D_5LR or D_5/0.2 NaCl with 20 KCl/liter (discretion of receiving facility)
    - 4 ml/kg/hr or 100 ml/kg/day for first 10 kg, plus
    - 2 ml/kg/hr or 50 ml/kg/day for second 10 kg, plus
    - 1 ml/kg/hr or 20 ml/kg/day for all further kg
        - *Important to administer maintenance fluid with 5% dextrose-containing solutions, along with resuscitation due to limited glycogen stores in young children*

Pain Control

- Narcotics as needed: Consider small frequent doses.
- Consider anti-anxiety medications in addition to pain medications (especially in children).

Monitoring Resuscitation

- Adjustments to fluid rate will be dependent upon patient response.
- Foley catheter: 15% TBSA or greater
    - Goal urine output:
        - Children < 30 kg: 1-2 ml/kg/hr
        - Children > 30 kg: 1 ml/kg/hr
        - Adults: 0.5 ml/kg/hr or 30-50 ml/hr
    - The Parkland formula is a guideline: Both over and under resuscitation causes problems. The rate should be adjusted up or down by (10% or by 1/3) to keep the urine output within the above goal range.
    - Foley catheter is needed if Parkland formula is used.

Treatment Priorities for Delayed Transfer to a Burn Center *(up to 24-48 hours)*

Use treatment guidelines as above. *Consult burn center with questions (physician, nursing or therapy).*

Volume Resuscitation

- Resuscitation formula is a starting point for predicting resuscitation needs.
- Volume resuscitation needs to be modified based upon patient response to ensure organ perfusion, but prevent volume overload.
- Monitor urine output according to guidelines, and adjust resuscitation as needed.
- Consult with Burn Center regarding ongoing fluid resuscitation needs.
- Circumferential burns
    - o Assess circulation to extremities.
    - o Consult with burn center physician about need for escharotomies.

Wound Care

- Wound care does not take precedence over life-threatening injuries or resuscitation.
- Assure appropriate pain control and ability to maintain airway.
- Gowns & gloves for all contact with wounds. Add a mask when wounds are open.
- Debride loose epidermis and blisters > 2 cm.
- Cleanse wounds with soap and warm water. Remove topical agents, and provide gentle debridement.
- Apply silver sulfadiazene, bacitracin or double antibiotic ointment (bacitracin/polymixin) into gauze for burn dressings once or twice per day.
- After wound cleansing, use only bacitracin or double antibiotic ointment (bacitracin/polymixin) for facial burns.
- No prophylactic antibiotics should be given.

Appendix

Age/TBSA Survival Grid
Provided by Jeffrey R. Saffle, MD
Director, Intermountain Burn Center
Salt Lake City, UT

CAVEAT: This grid is intended only for mass burn casualty disasters where responders are overwhelmed and transfer possibilities are insufficient to meet needs.

This table is based on national data on survival and length of stay.

Triage Decision Table of Benefit-to-Resource Ratio based on Patient Age and Total Burn Size

Age/ years	Burn Size (%TBSA) 0 – 10%	11-20%	21-30%	31-40%	41-50%	51-60%	61-70%	71-80%	81-90%	91+%
0-1.99	High	High	Medium	Medium	Medium	Medium	Low	Low	Low	Expectant
2-4.99	Outpatient	High	High	Medium	Medium	Medium	Medium	Low	Low	Low
5-19.9	Outpatient	High	High	High	Medium	Medium	Medium	Medium	Medium	Low
20-29.9	Outpatient	High	High	High	Medium	Medium	Medium	Medium	Low	Low
30-39.9	Outpatient	High	High	Medium	Medium	Medium	Medium	Medium	Low	Low
40-49.9	Outpatient	High	High	Medium	Medium	Medium	Medium	Low	Low	Low
50-59.9	Outpatient	High	High	Medium	Medium	Medium	Low	Low	Expectant	Expectant
60-69.9	High	High	Medium	Medium	Medium	Low	Low	Low	Expectant	Expectant
70+	High	Medium	Medium	Low	Low	Expectant	Expectant	Expectant	Expectant	Expectant

***Included with permission from the American Burn Association.** *ABA Board of Trustees et al, Journal of Burn Care & Rehabilitation, March/April 2005; p. 106*

These Consensus guidelines were developed by:

- Children's Hospital of Wisconsin Burn Center (Milwaukee)
- Columbia St. Mary's Milwaukee Burn Center (Milwaukee)
- Regions Hospital Burn Center (St. Paul, Minnesota)
- University of Wisconsin Hospital & Clinics Burn Center (Madison)

Appendix D: Advanced Burn Life Support (ABLS) Training

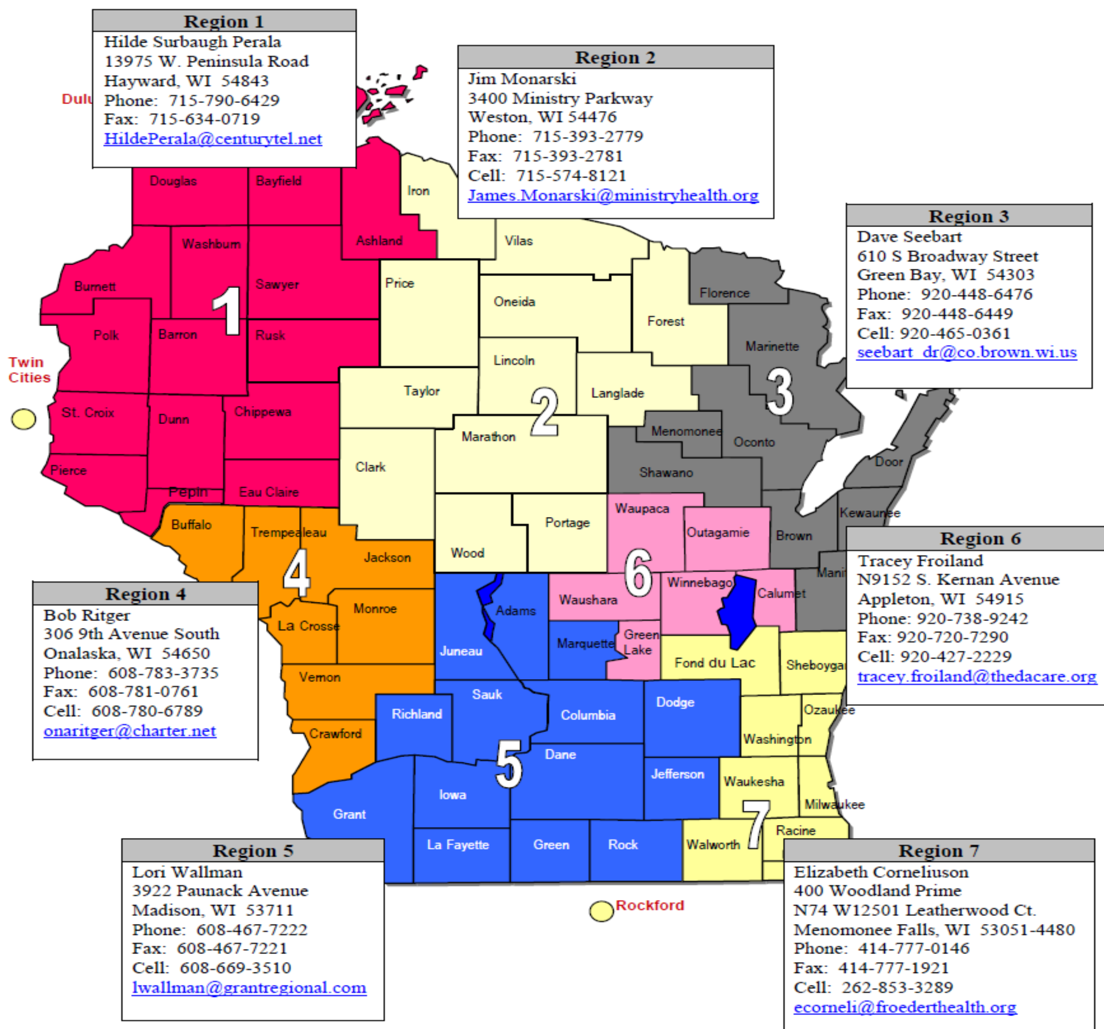
Each hospital may designate those staff persons that are to take ABLS Now© from the American Burn Association. **Recommended participants** at each hospital for this training are:

- Multiple Registered Nurses so that at least one ABLS trained nurse is available per shift
- At Least 1 Emergency Department physician
- At Least 1 General Surgeon
- Other staff involved in the treatment of burn patients
- EMS staff Affiliated with the Hospital
- Paramedics or Advanced-level EMTs

*There is no **Maximum Number** of staff that can be trained under this funding program.*

ABLS Now© is designed to provide hospital staff treating burn victims with the ability to assess and stabilize patients with serious burns during the first critical hours following injury and to identify those patients requiring transfer to a burn center. The course is not designed to teach comprehensive burn care, but rather to provide information that will enable those who only rarely treat burn patients to provide the care needed by a burn patient in the first 24 hours after injury or, in a mass casualty incident, for up to 72 hours.

Please contact your WHEPP Regional Manager for information about this course:



Appendix E: Summary of Treatment Algorithm for Burn Victims

Step 1: STOP the BURN and SECURE the SCENE. Extinguish flames, cool scalds, flush chemicals, and complete decontamination to protect patient and health care providers from further injury.

Step 2: COMPLETE a PRIMARY SURVEY.

Airway: facial burns, facial swelling, singed nasal hair
Breathing: wheezing, stridor, carbonaceous sputum
Circulation: circumferential burns, diminished pulses
Do NOT intubate for facial burns alone; use standard indications for intubation.

Step 3: COMPLETE A SECONDARY SURVEY. Evaluate carefully for non-burn injuries.
Most other injuries take priority over cutaneous burns. Use standard trauma management for other injuries: suture lacerations, splint fractures, etc. IVs placed through burns should be sutured in place. Be sure to rule out all other injuries. Patients who require immediate surgery should have burn resuscitation continued throughout. Burn wounds can be considered very clean for the first 12-24 hours following injury.

Step 4: DEBRIDE/DIAGRAM the BURNS. Debride all burn wounds and diagram/document extent and depth of burns.
BE METICULOUS: Much depends on accurate burn assessment. Use the Lund and Browder Chart if available; otherwise, use Rule of Nines. Remember that the patient's palm (with fingers) is 1% of total body surface. Create a diagram of wounds; consider digital photos.

Step 5: BEGIN RESUSCITATION. Fluid resuscitation is the most important step in initial burn treatment.

1. Formal fluid resuscitation is indicated for any patient with burns $\geq$10% TBSA and for patients with multiple trauma, inhalation injury or chemical or electrical burns.
2. Parkland Formula: Lactated Ringers (or normal saline): 4 mL X weight (Kg) X % TBSA burned. Give half over the first 8 hours after injury, the rest over the next 16 hours. Adjust according to urine output. Add maintenance fluids for children, all patients with burns of 25% TBSA or less.
3. Place a foley catheter. Keep NPO. Consider NG tube.
4. Use IV narcotics for pain control.

Step 6: Triage Disposition: These decisions should be made in consultation with Lead Burn Center.