

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

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# Wisconsin Hospital Emergency Preparedness Program (WHEPP)

- A program of the Wisconsin Division of Public Health
- Funding from the U.S. Department of Health and Human Services
  - Assistant Secretary of Preparedness and Response (ASPR), Hospital Preparedness
- State Expert Panel on Burn Surge

# State Expert Panel on Burn Surge

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# ASPR Benchmark for Trauma and Burn Care Surge Capacity

## Minimum Burn Bed Capacity Benchmark for WI

| 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           |

Trauma & burn care to at least 50 severely injured patients (pediatric & adult) per million of population from a mass casualty incident

# Burn Training and Resources

- “WI EMS Mass Casualty Incident Response Planning Guide”\*
- “Guidelines for the Stabilization of Burn Patients for 72 Hours until Transfer to a Burn Center” and associated consensus guidelines for both EMS and Hospitals
- Michigan Burn Resources: <http://www.michiganburn.org>
- ABLS Now© currently available through WHEPP
  - Nursing trained on each shift
  - 24/7 ABLS –trained physician consultation
  - Other patient care staff
  - Paramedics and Advanced EMTs

\*[http://www.dhs.wisconsin.gov/ems/Prevention\\_safety/prevention\\_index.htm](http://www.dhs.wisconsin.gov/ems/Prevention_safety/prevention_index.htm)

# Purpose

- Limited burn beds available in WI and in border state areas
- Stabilization of burn patients for 72+ hours when immediate transfer to a Burn Center is not feasible
- **Any hospital can be the site closest to a burn surge incident.**

# Limited Number of Burn Centers

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

# Pediatric Patients in a Burn Incident

- Should be sent to burn centers
- If not possible, send children < 2 yrs with TBSA\* >15% or > 2 yrs with TBSA >20% to a PICU:
  - **WHEPP Region 2:** Ministry Saint Joseph's Hospital, Marshfield
  - **WHEPP Region 3:** St. Vincent Hospital, Green Bay
  - **WHEPP Region 4:** Gundersen Lutheran Med Center, LaCrosse
  - **WHEPP Region 5:** St. Mary's Hospital, Madison or American Family Children's Hospital, Madison
  - **WHEPP Region 7:** Children's Hospital of WI, Milwaukee

\*Total Body Surface Area

# Burn Care Assumptions

- ASPR goal of preparing for 50 victims/million will easily overwhelm WI Burn Centers & border areas
  - 282 beds needed in WI
- National burn bed capacity is limited
  - Current out-of-state transport plans to Burn Centers likely to be inadequate for large-scale trauma & burn incident
- Federal resources for transport, portable facilities, burn team support and medical equipment (such as ventilators) may take 12 hours - 7 days to arrive
  - May not be available, depending upon demand in other areas of the country

# Burn Care Assumptions (continued)

- Federal resources from Strategic National Stockpile or its Managed Inventory assets could take 12 hours to arrive
  - Governor requests; must be approved by federal government
- Trauma Level I and II hospitals have resources to stabilize & treat burn patients if unable to transfer to Burn Center
- Level III and IV hospitals should be capable of stabilizing burn patients, especially w/guidance from Burn Centers
  - 1 - 2 patients w/severe burns may overwhelm these hospitals

# Burn Care Assumptions (continued)

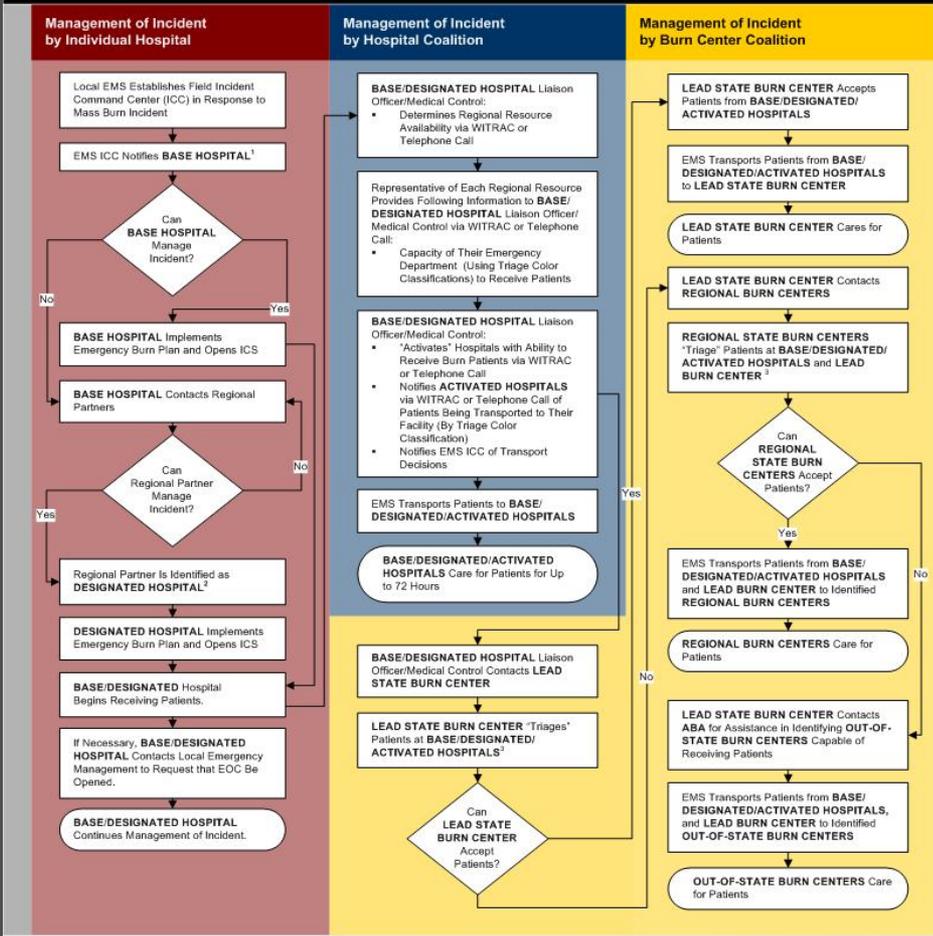
- Burn Centers have plans to manage surge of burn patients:
  - Creating additional bed capacity to existing and available burn beds
- Treatment of burn patients is resource intensive & may last for weeks after the incident
- Burn victims, as other patients, prefer to be treated locally
- Hospitals usually have supply items necessary to care for burn victims

# Burn Surge Incident Flowchart

- Overview of Plan for WI Hospitals in a *Burn Incident*:
  - victims w/severity of burns that cannot be managed by local hospital resources and/or
  - number of burn victims cannot be managed by transfer to the Burn Center(s)
- Other Terms Defined:
  - *Base Hospital*
  - *Burn Center*
  - *Designated Hospital*
  - *Hospital Coalition*
  - *Medical Control*

# Burn Surge Incident Flowchart

State of Wisconsin  
**Burn Treatment Plan**  
 Process Flow Chart – Mass Burn Incident



**Notes**

1. **BASE HOSPITAL** is the hospital closest to an incident.
2. **DESIGNATED HOSPITAL** is the hospital assigned 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

- First agency on scene establishes field Incident Command Center (ICC); may activate local Emergency Operations Center
- EMS follows State Trauma Advisory Council Triage and Transfer Protocols; may triage by RED, YELLOW, GREEN, BLACK
- Field ICC notifies “Base Hospital” that a burn incident has occurred; estimates # of victims
- If Medical Control at Base Hospital can manage => no other hospitals may need to be involved (except Burn Centers)
  - Base Hospital may activate Emergency Operations Plan & Incident Command System, stabilize burn victim(s), & consult w/Burn Center

# Management by a Hospital Coalition

- If Medical Control at Base Hospital cannot manage incident alone=> alerts other hospitals via WI Trac (or other method) that it needs assistance (including Burn Centers)
- “Designated Hospital” is determined; Only hospital to communicate w/field Incident Command
- Designated Hospital communicates to Liaison Officer in field:
  - which coalition hospitals prepared to receive victims and which Burn Centers have been notified
  - # of patients by triage status that can be accepted by each hospital

# Management by a Hospital Coalition

## (continued)

- Coalition Hospitals activate Emergency Operations Plans & Incident Command System:
  - Communicate activation & patient acceptance status (via WI Trac)
  - Post MCI Patient Capacity by triage color on WI Trac
  - Contact Burn Centers for treatment guidance
- Medical Control at Base or Designated Hospital assists EMS Transport Group Supervisor w/triage to Coalition Hospitals
  - Medical Control manages transport of triaged victims to coalition hospitals; includes # of victims and triage status
  - Hospital Command Center of coalition hospital advises Medical Control of their capability to accept victims

# Management by the “Lead” Burn Center\*

- Burn Center closest to the incident considered the “lead” unless otherwise specified
- Coalition Hospitals work w/“Lead” to help triage/transport victims to appropriate Burn Centers from Coalition Hospitals
- “Lead” communicates with other appropriate Burn Centers and State Emergency Operations Center (SEOC) if activated
- “Lead” communicates w/Coalition Hospitals; provides estimate # of hours/days that the hospitals may need to care for victims until transport /transfer to Burn Center

*\*In this phase, all patients have been transported from the field to hospitals.*

# Management by “Lead” Burn Center in Collaboration with the ABA\*

- “Lead” Burn Center contacts ABA and SEOC if state and border state Burn Centers have no capacity to manage burn victims
- ABA provides directives to “Lead” about out-of-state burn bed availability and when these Burn Centers can receive victims
- “Lead”, in collaboration with the ABA and SEOC, works with Coalition Hospitals regarding transport of victims to out-of-state Burn Centers

\*American Burn Association

# Factory Explosion in Weston, WI

- Explosion at Universal Garment Factory
- 22 burn victims
- EMS Triage: 4 RED, 8 YELLOW & 10 GREEN patients
- St. Helen's Hospital designated as Base Hospital; first notified by EMS
- Base Hospital activates Incident Command
  - Notifies 6 other hospitals via WI Trac
  - Notifies 5 Burn Centers

# Weston Incident (continued)

- All contacted hospitals (11) can accept patients and become Coalition Hospitals
- Burn Centers post updates to WI Trac of contact info for consultation with Coalition Hospitals
- Of these, University of Wisconsin Hospital, Madison designated as Lead Burn Center (closest to scene)
  - Collaborates with other Burn Centers
  - Communicates estimation of available transfer from Coalition Hospitals to Burn Centers
  - Notifies ABA of incident

# Weston Incident (continued)

- St. Helen/Base Hospital is critical access; cannot serve as Designated Hospital
- St. Camillus (Level II) becomes Designated Hospital
  - Communicates with field Incident Command
  - Coordinates patient transfer to hospitals based on triage designation
  - Coalition Hospitals post MCI capacity on WI Trac

# Weston Incident (continued)

## Current Status

- 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
- (See MCI WI Trac Graphic to the right.)*
- St. Mary: 2 YELLOW, 2 GREEN
  - St. Joseph: 1 YELLOW

## Burn Centers:

- University of Wisconsin: 2 RED
- Columbia/St. Mary's: 2 RED
- Children's Hospital of WI: 1 RED, 1 YELLOW

## Status Overview

| Location  | Open | Caution | Closed |
|-----------|------|---------|--------|
| Regional  | 3    | 0       | 0      |
| Statewide | 645  | 0       | 0      |

## MCI Listing



Update MCI

# Weston Incident (continued)

- Medical Control at Designated Hospital communicates with each coalition hospital; advises them of # of patients by triage color they are likely to receive
- St. Helen Hospital and St. Camillus Hospital (closest to the scene)~ beginning to see patients self-presenting with minor injuries and burns
- “Lead” Burn Center contacts coalition hospitals and instructs them on when their burn patients can be transferred and to which Burn Center

# **Consensus Guidelines: Initial Management of Burns by EMS**

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

# Consensus Guidelines: Initial Management of Burns by EMS

## SIGNS & SYMPTOMS:

- 1<sup>st</sup> degree burns (superficial): Reddened skin that blanches with pressure
- 2<sup>nd</sup> degree burns (partial thickness): Moist, red, weeping surface, intact or broken blisters, painful
- 3<sup>rd</sup> 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

# Consensus Guidelines: Initial Management of Burns by EMS

## 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

# Consensus Guidelines: Initial Management of Burns by EMS

## General Guidelines

- Stop the burning process (remove clothing)
- Assess ABC's (airway, breathing, circulation)
- Establish IV access
- Treat pain
- Remove jewelry/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*

# Consensus Guidelines: Initial Management of Burns by EMS

## General Guidelines (continued)

- 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

# Consensus Guidelines:

## Initial Management of Burns by EMS

\*Consider Transport to nearest Burn Center.\*

### Airway Control/ Inhalation Injury:

- 100% high-flow oxygen
- Look for signs of inhalation injury:
  - Victims of closed-space injury; those who inhaled fumes or steam
  - Carbon monoxide 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

# Consensus Guidelines: Initial Management of Burns by EMS

## Assessment of Injury

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

# Consensus Guidelines: Initial Management of Burns by EMS

## Fluid Resuscitation

- *Adults and children > 30 kg*: Parkland formula: 2-4ml/kg/TBSA % with Lactated Ringers with burns  $\geq 15\%$  for partial or full thickness burns
- Normal saline acceptable pre-hospital, but prefer use of LR (or balanced salt solution)
- *Children < 30 kg* Parkland formula + maintenance fluids
- Parkland formula: 3-4ml/kg/TBSA % with Lactated Ringers with burns  $\geq 15\%$  for partial or full thickness burns

# Consensus Guidelines: Initial Management of Burns by EMS

## 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 medications (especially in children).



Courtesy of the

## American Burn Association

Advanced Burn Life Support (ABLS)

Learn more about the ABA and ABLS at [www.ameriburn.org](http://www.ameriburn.org)

### Burn Center Referral Criteria

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

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

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

### Severity Determination

#### First Degree (*Partial Thickness*)

Superficial, red, sometimes painful.

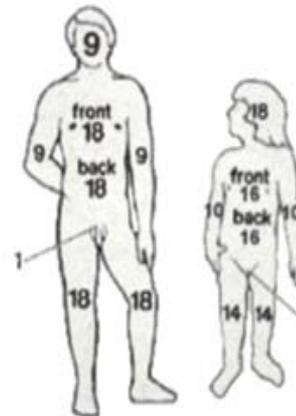
#### Second Degree (*Partial Thickness*)

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)



# **Consensus Guidelines: Initial Management of Burns by Hospitals**

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

# Consensus Guidelines: Initial Management of Burns by Hospitals

As described in the EMS Consensus Guidelines:

- Look for Signs and Symptoms
- Obtain History

# Consensus Guidelines: Initial Management of Burns by Hospitals

Same General Guidelines as EMS in addition to the following:

- Limit oral intake to ice chips sparingly
- Electrical burns: EKG monitoring, look for contact wounds. Consider rhabdomyolysis.
- 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

# Consensus Guidelines: Initial Management of Burns by Hospitals

## Airway Control / Inhalation Injury

- 100% high-flow oxygen
- Look for signs of inhalation injury.
  - In victims of closed-space injury and those who inhaled fumes or steam
  - Carbon monoxide is commonly present in closed-space fires.

# Consensus Guidelines: Initial Management of Burns by Hospitals

## Airway Control / Inhalation Injury (continued)

- 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

# Consensus Guidelines: Initial Management of Burns by Hospitals

## Assessment of Injury

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

# Consensus Guidelines: Initial Management of Burns by Hospitals

## Fluid Resuscitation

- *Adults and children > 30 kg*: Parkland formula: 2-4ml/kg/TBSA % with Lactated Ringers with burns  $\geq 15\%$  for partial or full thickness burns
  - Normal saline 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*)

# Consensus Guidelines: Initial Management of Burns by Hospitals

## Fluid Resuscitation (continued)

- *Children < 30 kg* Parkland formula + maintenance fluids
  - Parkland formula: 3-4ml/kg/TBSA % with Lactated Ringers with burns  $\geq 15\%$  for partial or full thickness burns (*Half given in first 8 hours, the remainder during the next 16 hours*)
  - Maintenance fluid\* with D<sub>5</sub>LR or D<sub>5</sub>/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.*

# Consensus Guidelines: Initial Management of Burns by Hospitals

## Pain control

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

# Consensus Guidelines: Initial Management of Burns by Hospitals

## 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.

# Consensus Guidelines: Hospitals (at 24 hours or more)

## 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
  - Assess circulation to extremities
  - Consult with burn center physician about need for escharotomies

\*When transfer to a Burn Center is delayed beyond 24 hours.

# Consensus Guidelines: Hospitals (at 24 hours or more)

## 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 w/wounds. Add mask w/open wounds.
- 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 1-2 x daily.
- Facial Burns: after wound cleansing, use only bacitracin or double antibiotic ointment (bacitracin/polymixin)
- No prophylactic antibiotics are given.

\*When transfer to a Burn Center is delayed beyond 24 hours.

# Triage Decision Table



## Age/TBSA Survival Grid

Provided by Jeffrey R. Saffle, MD  
 Director, Intermountain Burn Center  
 Salt Lake City, UT

## Appendix

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/<br>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 |

# Summary of Burn Treatment Algorithm

**Step 1: STOP the BURN and SECURE the SCENE**

**Step 2: COMPLETE a PRIMARY SURVEY**

**Step 3: COMPLETE A SECONDARY SURVEY: Evaluate carefully for non-burn injuries.**

**Step 4: DEBRIDE/DIAGRAM the BURNS**

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

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

# Importance of Planning for a Burn Surge Incident

- Any hospital could receive patients from such an incident.
- Encourage appropriate staff to take the ABLS Now<sup>®</sup> course.
- Integrate the planning templates and guidelines into your hospital plans.
- Planning for disaster situations better prepares us for day-to-day patient care.

# Questions?

Contact:

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Documents can be found at:

<http://www.dhs.wisconsin.gov/preparedness/hospital/index.htm>