Challenges in Planning for a Burn Disaster

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Objectives

- Understand epidemiology of burn injury
- Describe how burn mass casualty care differs from trauma care
- List the challenges in supplies, personnel, and equipment in burn care
- Describe how the American Burn Association is addressing these needs
Burn Mortality: The Past*

*Rose and Herndon 1997.

What is the Current LD50 for Burns?

American Burn Association National Burn Repository 2012.
# Does Age Make a Difference?

<table>
<thead>
<tr>
<th>Age (years)</th>
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<th>10-19.9</th>
<th>20-29.9</th>
<th>30-39.9</th>
<th>40-49.9</th>
<th>50-59.9</th>
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<th>70-79.9</th>
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</table>

American Burn Association National Burn Repository 2012

# Burn Mass Casualties Differ from Trauma

- **Burn knowledge**
- **Resuscitation**
- **Wounds**
- **Resource utilization**
  - **Acute**
  - **Long term**
- **Cost**
Initial Burn Evaluation

- Initial estimates of burn size inaccurate
  - Average estimate wrong by 20%*
  - Both over and underestimation
  - Impacts both adults and children
- Burn surgery not requirement for training
- Burn care centralized
- Lack of exposure=errors


Resuscitation

- Burns require high fluid volumes in resuscitation
- The good news: we have a formulas
- The bad news: multiple resuscitation formulas

<table>
<thead>
<tr>
<th>Formula</th>
<th>First 24 Hours</th>
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</thead>
<tbody>
<tr>
<td>Parkland</td>
<td>4 ml/kg/TBSA LR;½ in first 8 hr</td>
</tr>
<tr>
<td>Modified Brook</td>
<td>2ml/kg/TBSA LR;½ in first 8 hr</td>
</tr>
<tr>
<td>Warden</td>
<td>4 ml/kg/TBSA 180mEq/L NaCl;½ in 1st 8 hr</td>
</tr>
<tr>
<td>Hypertonic Saline</td>
<td>2 ml/kg/TBSA 250 mEq/L NaCl</td>
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</tbody>
</table>
The Problem: Everyone Has Their Own Way…

Resuscitation

- All formulas rely on burn size and weight estimates
- How can we do this in the field during disaster?
- Knowledge of how to use formula an issue
  - 87% of trained emergency room workers could not calculate fluid rate for a major burn*
- Burns have a variable response to resuscitation; formulas accurate only 30-40% of time

What about the wounds?

History of Burn Wound Excision: The Wait and See Method

- Dressing changes, topical antimicrobial agents until eschar separates
- Grafting with split thickness skin graft after granulation tissue develops (3-5 weeks)
- The problems:
  - Sepsis
  - Long hospital stays
  - Joint contractures
  - Hypertrophic scars
  - Patients were dying (mortality of 50% for 30% burn)
Benefits of Early Excision

- Improves survival*
- Decreases hospital length of stay*
- Decreases bacterial colonization in burn wound and graft site**
- Decreased number of septic episodes
- Attenuates systemic inflammatory response syndrome and release of inflammatory mediators


What Will Be Standard of Care in Disaster?

- Most centers will not be able to perform early excision
- Will need to rely on dressing changes
- We need the ability to care for wounds better than before or mortality will increase
- Dressing changes need lots of resources
  - People to do the work
  - Pharmaceuticals: topical agents, narcotics, antibiotics, sedatives
  - Supplies: bandages, netting
**Problem with Early Excision in Disaster**

- Difficult to determine burn extent
- Lack of excision and grafting expertise
- Resources needed intensive:
  - Cadaveric skin, xenograft, skin substitutes for temporary coverage
  - Blood products
  - Operating room
  - Personnel
  - Equipment: dermatomes, meshers, staplers, tourniquets
  - Supplies: dressings, staples
  - Pharmaceuticals

**So, What Do We Need? To Agree**

- Educate on initial care
  - Burn size, depth determination
  - Resuscitation and ventilation parameters
  - Development of electronic teaching modules/algorithms
- Uniform standard of care
  - Wound management
  - Surgical intervention
- Triage
  - Who and how are going to do it
Resources Needed

- People, people, people
- Equipment
- Dressing supplies
- Pharmaceuticals
- Transport mechanisms

Who is needed to care for a burn patient?

- EMS
- Physician/surgeon
- Bedside nurse
- Respiratory therapist
- Occupational therapist
- Physical therapist
- Dietician
- Pharmacist
- Psychiatrist/psychologist
- ER physician
- Anesthesiologist
- Surgical nurse
- Dressing technicians
- Radiology technicians
- Microbiology technicians
- Janitorial staff
- Physiatrist
- Chaplain
What supplies are needed for a burn disaster?

- Lots….
- Dressings
  - Dry gauze (multiple sizes), non-adherent, antimicrobial
- Something to hold dressings on with
  - Netting, ace wraps, spandex
  - Twill ties for intubated face
- Cleaning supplies
  - Soaps, water, astringents for room cleaning
- Garbage bags
- Linen

What do all those supplies cost?

- One adult burn unit experience
- Inpatient burn unit: 12 beds
  - >$1 million/year
- Outpatient supplies/year
  - $330,000
Pharmaceuticals

- IV fluids
- Enteral nutrition
- Narcotics
- Sedatives
- Topical antimicrobial agents
- IV antibiotics
- Dvt prophylaxis
- Dressings?
- Benzodiazepines
- Blood and blood products
- Vitamins
- Insulin
- Anabolic agents
- Inhalation agents
- Vasoactive agents

Equipment

- Monitors
  - Pulse oximetry, EKG, blood pressure
- Ventilators
- IV equipment
  - Pumps, tubing, iv catheters
- Wound cleaning/debriding instruments
  - Staple removers, scissors, knives
- Operating room stuff
  - Watson, goulxian, dermatomes, meshers, staplers, donor site dressings
- Therapy equipment
Why should you care about burn disasters?

- Burn injury likely to be part of terrorist act
  - Cheap, effective way to impact many people
  - Pentagon bombing, 9-1-1
- Burn injury in industrial accidents
  - 0.2-0.3% cause of days away from work*
  - Burn 1.6/10,000; chemical burn 0.5/10,000**
- Burn injury frequent in war
  - Traditionally 15% of battlefield casualties have a burn


In a Disaster, Burns Are Coming to You…and They Will Be There a While

- Injured burn patients brought to ER regularly
- In disaster, combination of “walking wounded” and those transported
- In U.S. only 1800 burn beds, of which 60-80% occupied
- Resource requirement>availability
- Transport delays of at least 72 hours
- Need to engage in burn disaster planning process
How is the ABA Addressing the Needs?

- One step at a time…

National Burn Repository

- Burn registry made available to burn centers for no charge in 1992
- ABA partnered with the American College of Surgeons in 1993 to develop the NATIONAL TRACS®/ABA Burn Registry
- Original data collected in Foxpro™ (DOS based)
- Free to ABA member users on two conditions:
  - users had to complete a tutorial program on data entry
  - must sign a licensing agreement to use the modules solely within their institutions
National Burn Repository History

- Initial emphasis was on obtaining data and maintaining center confidentiality
- Growth of NBR over time: 6,400 patients in 1994 to 54,000 patient admissions reported in 2002
- Currently more than 85 centers have contributed total of >300,000 records

What We Have Done With the NBR

- Multiple papers on burn injury
- Foundation for more than $4 million in Department of Defense funded research
- Development of disaster triage diagram
- Used as the foundation for power calculations for multicenter trials
Advanced Burn Life Support (ABLS)

- National course for the treatment of burn injuries
- Initial burn management/assessment
  - Inhalation injury
  - Resuscitation
  - Wound care
- Special topics in burns
  - Children
  - Chemical injury
  - Electrical Injury
  - Disaster preparedness
ABLS: Three Options

- **ABLS provider course live**
  - Live hands-on course designed to provide the “how to” of emergency care of the burn patient.
- **ABLS NOW**
  - Online course providing burn injury training and education for busy first responders and health care providers
- **ABLS Handbook**
  - CD go-to-reference guide (complete provider course and slides) for comprehensive information on immediate care through the first 24 hours post burn injury.

Benefits of ABLS Provider Course Live

- Immediate care of the burn patient up to the first 24 hours post injury
- ABLS Provider Handbook Material
- Course content appropriate for all disciplines
- Application of concepts through case study discussions and assessment of simulated burn patient
- Written exam and practical test
- CEU and CME credits given upon completion of course
ABLS Now® Benefits

- Knowledge for immediate care of the burn patient up to the first 24 hours post injury
- ABLS Provider Handbook® Material
- Course content appropriate for all disciplines
- Lecture and case study slide modules presented by burn experts
- Self study questions for exam preparation within each module
- Online exam
- CEU and CME credits upon completion of course

ABLS Handbook Benefits

- Knowledge for immediate care of the burn patient up to the first 24 hours post injury
- Course content appropriate for all disciplines
- Quick and handy tool for specific burn injury questions
- Reference guide for immediate burn care up to the first 24 hours post burn injury
ABLS Activity 2011

- U.S.: 162 provider courses
  - 310 physicians; 3137 nurses, PAs, therapists, EMTs, paramedics
- International ABLS: 15 provider courses
  - 125 physicians; 89 non-physicians
- Instructor Courses: trained 700
- Grant funded ABLS: CA, Del, GA, ID, KS, KY, MI, MS, MO, NY, NC, PN, TN, TX, VA, WY
- Military ABLS: 11 provider courses, 3 instructor

ABLS 2012

- New ABLS courses were introduced at the 44th Annual Meeting in Seattle
- Through September 30, 2012:
  - 126 Provider courses with 3,500 participants
  - 11 Provider, 3 Instructor courses in military
  - 5 Provider courses overseas: Greece, Italy, Japan
  - Federal/State grant-funded courses: 16 states
  - $90,000 shared revenue provided to burn centers
ABA Burn Regions

Regional Efforts

- Each region tasked with development of disaster plan
- Yearly tabletop disaster exercises
- Participation in local and regional disaster exercises
- Development of communication lines for disaster
  - Phone trees
  - Points of contact
  - Transfer agreements
Collaboration with the Department of Health and Human Services

- Weekly burn bed availability reporting: BARTS
- Development of burn triage plans
- Collaboration for contents of disaster stockpiles
- Training of non-burn personnel
- Tabletop exercises at annual American Burn Association meeting

What Should We do to Improve the Situation?

- Collaboration
  - Multiple stakeholders: surgeons, pre-hospital providers, emergency providers, Department of Defense, transportation
- Matching needs with those who can meet those needs
- Plan for fulfilling those needs
- Taking action on the plans
Conclusions

- Burns are high intensity, high resource requirements for a long time
- In a disaster will need to modify existing paradigms of burn care
- Development of new treatment strategies, new products for burn care essential for appropriate response
- Collaboration is the key

Questions?