Mass Burn Event Overview

Current as of November 7, 2023

Purpose: This document provides guidance for healthcare coalitions, burn centers, state public health preparedness professionals, healthcare entities, and other stakeholders planning for a burn mass casualty incident (BMCI). An event that exceeds the resources of a single jurisdiction will require the use of a tiered approach beginning with the local community hospital and engaging a broad array of regional and national stakeholders depending on the scope of the incident. This document identifies the key roles of state and local responders, and those of the American Burn Association (ABA) and the U.S. Department of Health and Human Services (HHS) Administration for Strategic Preparedness and Response (ASPR) during a BMCI. For more information, access ASPR's Technical Resources, Assistance Center, and Information Exchange's (TRACIE) Burns Topic Collection.

Caveats: This document is intended to support, not replace, existing policies or plans by providing uniform response considerations in the case of a BMCI. It is a resource document and does not constitute policy or impose any obligations. Each jurisdiction and entity will require internal documents and policy that address the specifics of their organizational response.

Scope: The broad functions of hospitals, healthcare coalitions, local and state government (including tribal and territorial) healthcare entities, the ABA, and HHS ASPR during a response to a BMCI are as follows:

1. Provide appropriate scene triage, treatment, and transfer to appropriate hospital destination by EMS according to community resources.
2. Provide stabilizing care to burn patients at community hospitals until adequate resources become available to allow for transport to a facility with appropriate burn care resources.
3. Promote safe burn patient transfer decision-making. Determine the most appropriate location of care based on the transportation, resources available, patient condition, and number of patients.
4. Obtain burn surgeon / subject matter expertise to inform the transfer decision-making either in person or via remote support (e.g., telemedicine, telephone).
5. Assure a consistent level of care within the community and coalition by moving patients and resources and by requesting resources from private and public partners (e.g., emergency management [EM]) as needed.
6. Support the tracking of burn patients throughout the incident.
7. Coordinate transfer of acutely ill/injured burn patients.
8. Ensure necessary communications and coordination processes are in place to support the above functions.

Key Points/Assumptions

1. Emergency medical services (EMS) should have protocols specifying destination hospitals for burn patients including contingencies to monitor capacity at the preferred receiving facility. Protocols should identify preferred secondary facilities when the hospital of first choice is overwhelmed in a BMCI.
2. All hospitals providing emergency care may receive burn patients and should be able to provide initial assessment and stabilization.
3. Burn centers and Level 1 and Level 2 trauma centers should plan for a major role in the receipt and care of burn patients and understand their role in a BMCI in their community or state as dedicated burn beds are very limited.
4. EMS, local healthcare coalitions, public health (PH) departments, and EM agencies will have primary responsibility for initial response including casualty distribution and triage of patients for forward movement.
5. State PH departments and EM agencies will have primary responsibility for support of the response and should assure coordination with the closest burn center in accordance with established regional protocols. Responsibility for patient movement activities including matching patients to available resources in a BMCI should be specifically spelled out on the regional/state burn plan.
6. Awareness of ground and air resources in the region is critical to successful movement of seriously burned patients.
7. Secondary triage of patients to an appropriate center for continued care will be critical – this function may have to be delegated to burn experts outside the immediately affected area, due to competing demands for direct patient care. Additionally, triage decisions about expectant management for patients with catastrophic burns will require expert input.
8. The ABA has a regional structure that can poll for available beds and assist matching patients with available resources (see Table 1).
9. The ABA can also provide subject matter expertise during a burn event of national consequence. This could include telemedicine and telephone support to the affected jurisdiction(s).
10. Care of critical burns is extremely resource-intensive and requires specialized staff and transportation assets.
11. Combined injury—burns with trauma or radiation injuries—markedly increases mortality and these patients may be better served at trauma and other centers depending on the severity of each injury. Expert clinical input will be needed to support decision-making. Initial triage by EMS should always focus on traditional trauma triage guidelines when trauma is present. Secondary triage providers will need to consider the combined injury.
12. Preparedness is dynamic and this planning document may not reflect current resources. This document will be updated to reflect new, changed, or evolving capabilities.

Table 1: Key Roles in Response

Agency/ Entity	Primary Roles	Secondary Roles
EMS Local Healthcare Coalition PH EM	• Rescue, transport, and distribute casualties to appropriate local facilities in accordance with established burn center MCI protocols. • Request / mobilize any coalition/regional caches of burn supplies. • Activate coalition coordination mechanisms and any burn-specific plans. • Coordinate local lists of victims and clinical information. • Triage/prioritize victims for forward movement to specialty centers in accordance with established BMCI protocols and /or expert input. • Coordinate with burn experts to determine appropriate destinations for patients that cannot be accommodated in the local healthcare system with assistance from state and ABA. • Assure that appropriate clinical information is relayed between the referring and receiving facilities during the transfer process.	• Coordinate information with state/federal/ABA partners.
Closest ABA Burn Center	• Provide patient care. • Activate facility and regional surge capacity plans to accommodate multiple patients. • Liaison between local response and regional ABA coordinating center.	• Assist with patient triage for forward movement. • Support facilities providing care for burn patients in the area via telephone or telemedicine, or request outside support from more remote ABA / other sources.

Agency/ Entity	Primary Roles	Secondary Roles
ABA Regional Coordination Center	• Serve as the point of contact (POC) for the ABA system. • Conduct bed polling within ABA region (and request assistance from adjacent regions as required). • Facilitate requests for tissue bank products, as well as graft equipment and other specialized supplies.	• Provide expertise to affected area. • Assist with bed matching (right patient to right bed/facility). • Facilitate exchange of patient transfer information between referring and receiving facilities once patients are matched to destinations.
State PH/ EM	• Support local jurisdiction with state-level coordination and requests for assistance (e.g., federal declarations). • Assure that patient triage, tracking, and transport needs are addressed. • Make request for burn care assets, including dressings and other materials from the Strategic National Stockpile (SNS). • Engage Emergency Management Assistance Compact (EMAC) assets to provide inter-state support for transportation, staff, or other logistics.	• Liaison between local and federal resources. • Support bed polling and matching functions as required in coordination with ABA regional center.
ABA National Headquarters	• Provide expertise and advice on request from a member center.	• Provide expertise and advice to inform the federal response.
HHS/ ASPR	• Provide federal support to local and state activities as requested/ authorized under the National Response Framework including supplies, staff, and	• Coordinate information and access to burn expertise during BMCI.

Agency/ Entity	Primary Roles	Secondary Roles
	transportation assistance through the Federal Coordinating Officer (FCO) appointed to the State for the incident. • Coordinate approved use of National Disaster Medical System (NDMS) personnel or transportation assets.	• Support/ assist states and ABA information and system needs (e.g., bed polling / data management).

Background

Due in part to the successes of public health efforts to reduce burn injuries, the number of burn centers and available beds has been decreasing over time. While the national capacity is significant, the available beds within a region for a BMCI may be extremely limited and there is a high risk of local and regional assets being overwhelmed. In August 2020, the United States had 133 designated burn centers with approximately 300 burn surgeons on staff; as of June 2023, 59 adult and 43 pediatric centers had been verified by the ABA (other centers self-designate). These centers have approximately 2,000 beds, most of which are occupied at any given time. The expectation is that surge capacity plans include a 50% increase in capacity but given that the average number of burn beds is 15, there are many scenarios under which this capacity will be inadequate to meet demand. Many other hospitals provide burn care, but generally accept patients with limited burns. Further, many areas in the U.S. are hundreds of miles from the closest burn center and transportation costs can add to costly burn care. Therefore, a regional tiered approach to planning for and responding to a BMCI is critical to success. This tiered system should be familiar to healthcare coalitions that have planned for tailored responses (e.g., for pediatric patients) where specialty centers provide a significant proportion of victim care.

Careful planning and coordination are needed to maximize these highly specialized resources. Even with the best triage and coordination, many events are possible that will simply overwhelm available capability for specialized care, accenting the need for a planned approach.

Initial Burn Care and Stabilization

Every hospital that receives trauma patients should be prepared to provide stabilizing care for burn patients including airway management, initial fluid resuscitation, and pain management. These needs can be substantial—a single 100kg patient with 60% body surface area (BSA) thermal burns will be predicted to need 24 liters of intravenous (IV) solution over the first 24 hours and approximately 250 mg equivalent of morphine.

At times, weather, overwhelming demand, and other conditions may require that the initial receiving facility hold the patient awaiting transfer, in which case specialty consultation should be obtained. Care of major burn patients is extremely resource intensive and this consultation should be obtained as soon as possible. Patients with major burn injuries will require critical care transport. Their intensive fluid and medication needs and their susceptibility to cold mean that most methods of mass patient movement (e.g., military airlift) will be of limited utility. Fixed wing, rotor-wing, and ground transportation assets (including the use of ambulance buses) will be critical components of a successful BCMI response plan.

After the initial resuscitation, burn surgery can be deferred for a few days while appropriate triage and transportation occurs. During this time, basic antimicrobial burn dressings must be applied (e.g., bacitracin and petrolatum-impregnated gauze or silver impregnated dressings if

available). Assets from the SNS, such as silver-impregnated dressings, medications, and other supplies, may be of critical value and should be requested as early as possible. It should be noted that after the first few days, complications are likely to increase if the patient is not transferred to a specialty facility.

Triage and Transport Considerations

After casualties have arrived at their initial receiving facilities and received stabilizing care, information must rapidly be gathered such as:

- Age of patient.
- Clinical stability.
- Extent (BSA) and location of burns.
- Associated trauma.
- Associated inhalational injury.
- Past medical history (e.g., diabetes, heart disease, respiratory disease).
- Current treatments and how they impact transport needs (e.g., mechanical ventilation, multiple IV medication drips).

The coalition should consider having a worksheet or electronic system to facilitate and track the triage and transport process; this system may also serve a patient tracking and accountability function.

One of the key functions that may not be present in a regional system is the ability to rapidly gain access to subject matter experts to assist with transfer/transport decision-making in a BMCI. This type of integration is important in other specialty situations such as pediatric, radiation, and other events – therefore a function should be created at the coalition/regional level to allow for clinical input into transfer decision-making in a mass casualty event.

In certain BMCI, the majority of casualties will be deceased or critically burned (e.g., Station Nightclub Fire). In others, there may be many patients with burns appropriate for outpatient care or care at a non-burn center. It is imperative that coalition plans include a mechanism to involve local or regional burn experts, who can help determine priority for movement and whether certain patients are stable enough to be moved as a group. For example, selected trauma/emergency medicine providers, retired burn surgeons, or staff from a burn center in an adjacent region can be included in this process to support the local burn staff, when required and according to coalition plans.

Certain patients should be prioritized for early movement. Examples include: burns > 50% of BSA (on salvageable patients who will nearly always be intubated); patients with inhalational injury (which can progress rapidly to acute respiratory distress syndrome and require advanced Intensive Care Unit [ICU] management and interventions); and patients with coincident trauma and burns. Information on mass burn prioritization and care is available from several resources, including those listed in the ASPR TRACIE Burns Topic Collection (also see appendix).

Some patients may have catastrophic burns and an expected outcome that does not justify transfer, particularly in the setting of advanced age, comorbid conditions, and combined injury. These patients will still need analgesia and ongoing care at the receiving facilities. Burn care experts should generally be involved in these triage decisions. Note that the burn triage table, which correlates age, percent BSA burned, and mortality developed by Saffle and others should not be used in isolation, but can contribute to triage decisions made by experienced providers with other injury and illnesses factored in. The use of experienced burn care providers in making decisions about priority for transfer is important to the successful management of such events.

The larger the burn event, the farther that patients may have to be transferred to obtain an appropriate burn center bed. Patients from rural areas will likely need to travel long distances to the nearest burn center. This may require using transportation assets from the destination facility for pick-up, rather than the usual method of using local assets to deliver the patient and return. Closer burn facilities may be more easily reached by ground units, potentially utilizing ambulance buses where this capability exists and when patient stability allows. Thus, ground referral to closer centers and air referral using resources from the destination facility (or close by) to retrieve victims requiring long-distance transfer may be optimal when local air resources are inadequate to meet the demands of the incident.

In some situations, facility leaders may choose to supplement staff with outside healthcare providers with burn treatment experience. This should be carefully planned, as HHS no longer rosters Federal Burn Support Teams and inter-state staff sharing would need to be in concert with applicable licensure laws. Supplemental employee privileging, malpractice protection, orientation, supervision, and related issues should be pre-planned. In general, unless an overwhelming number of patients are too unstable to transfer, supplementing with outside staff should be a last resort as there are many potential staff and safety issues associated with using this strategy. Finally, hospitals with burn centers may wish to discuss and/or develop agreements with nearby facilities that would be willing to take non-burn patients to expand burn capacity at the burn center.

Local Planning and Response (Community/Coalition)

The jurisdiction should assure that the following partners are engaged in planning for a BMCI and that a community or coalition-level plan and state plan are developed and exercised, optimally as part of the Hospital Preparedness Program (HPP) grant activities:

- Jurisdictional PH agencies.
- Jurisdictional EM agencies.
- Local healthcare coalition partners.
- Local/regional acute care hospitals (particularly trauma-receiving facilities).
- Local/regional burn centers.
- Local/regional EMS.

The following issues should be addressed in the community/healthcare coalition plan:

- Alerts and notifications following a BMCI.
- EMS triage and distribution (e.g., preferred destinations for major burns and thresholds for numbers of initial victims to a given facility).
- Expectations of the healthcare facility to provide initial care to burn victims and associated supply and training needs.
- Understanding of surge capacity at any local/regional burn centers.
- Community/healthcare coalition coordination of:
    - Patient lists and referral/forward movement needs.
    - Triage of patients with referral/forward movement needs; assistance with this function may be obtained from the regional burn centers or via the state.
    - Burn surge facilities (BSF) that are prepared to continue caring for select burn patients while awaiting transfer. These may be trauma centers or other facilities with appropriate staff/training/resources.
- Liaison with closest ABA burn center or ABA Regional Burn Coordinating Center to determine capacity and begin patient matching.
- Liaison with state EM /PH agencies and the process for resource requests.

Following plan development, the plan elements should be exercised, ideally progressing from workshops to full-scale/ functional exercises. Planners should regularly update their documents with lessons learned from these exercises.

State

The state BMCI plan should be developed with the participation of the following stakeholders:

- State PH health.
- State EM.
- State EMS agency.
- Coalition representatives.
- State burn centers.
- ASPR Regional Emergency Coordinator (REC).
- ABA regional coordinating facility.

The following issues should be addressed in the state plan:

- Threshold for state involvement.
- Alerts and notifications at the state level following a mass burn event.
- EMS resources for transport (state and inter-state capabilities, including ground critical care, rotor-wing, and fixed wing – with contact information).
- Expectations of burn centers – and potential supply and training needs.
- Understanding of surge capacity at all local/regional burn centers.
- State coordination of:

    - Declarations as required.
    - Management of requests for assets and available state assets and process for release and distribution.
    - Request for assets from SNS (e.g., ventilators, burn dressings, medications, and other supplies), staffing, and transportation assets as required. Note that federal assets do not include significant critical care transport. EMS units are available under a federal contract, but minimal critical care ground or air support is available. A national database of EMS rotor-wing assets can help states with this planning component.
    - Patient lists and referral/forward movement needs (if not done at local level).
    - Prioritization strategy for patient transfer (if not already done).
    - BSF that are prepared to continue caring for select burn patients while awaiting transfer – these may be trauma centers or other facilities with appropriate staff/training/resources.
- Liaison with closest ABA burn center or ABA Regional Burn Coordinating Center.
- Liaison with state EM/PH agencies and process for resource requests.
- Identifying specific regulations (such as licensure) that may need to be relaxed/suspended to allow for an effective response (e.g., permitting a burn surgeon from out-of-state to practice in emergency situation).
- Provide information to HHS or the Federal Emergency Management Agency (FEMA) related to incident and resource requests and integrate operations/communications with FEMA Disaster Coordinating Official and Health Coordinating Official once appointed after a Federal Declaration of Disaster is obtained.

Federal – ASPR

Planning: ASPR works closely with the ABA and state and local partners on a number of initiatives to enhance response to a BMCI including:

- Through the Biomedical Advanced Research and Development Authority (BARDA) several new and experimental burn care products have been reviewed with subject matter experts and are being researched or fielded (including new silver-impregnated roller dressings being purchased for the SNS). BARDA will continue to engage stakeholders to assure rapid availability of effective treatments from federal assets and to foster research and development of new treatment modalities.
- HPP grant activities encourage planning, training, and exercising mass burn plans within and between healthcare coalitions and jurisdictions.

Response: Following notification of a BMCI, the ASPR REC will:

- Act as the initial liaison for the jurisdiction with HHS Secretary's Operations Center (SOC) in Washington, DC.
- Gather incident information and potential resource needs.

- Initiate contact with involved ABA Regional Burn Coordinating Center(s) to determine actions being taken as well as bed availability and any initial needs. (See Table 2 for contact information).
- Support and assist local efforts to find appropriate available beds and transportation for patients as appropriate for the level of disaster declaration including non-ABA burn and trauma center destinations.
- Facilitate regional or federal support including but not limited to:
    - Supply support (e.g., inter-facility, SNS).
    - Staff support (e.g., NDMS personnel, sharing between facilities; note that HHS no longer rosters Burn Support Teams).
    - Transfer (e.g., burn and non-burn center destinations appropriate for the patient).
    - Transport (e.g., identify available resources within region).
    - Expertise support (e.g., federal subject matter experts, ASPR TRACIE Team, others).
    - Mental health support.

RECs work for ASPR in each of the 10 FEMA regions with stakeholders to ensure effective federal planning and response integration with state, local, tribal, and territorial entities. REC personnel should be involved in planning and exercising for mass burn events. The most current REC contact information is available at ASPR Regional Emergency Coordinators.

The HPP grant administered by ASPR facilitates disaster preparedness through grant awards to each of the states. HPP encourages the development of healthcare coalitions that are well-positioned to serve as a coordinating function during mass casualty events, particularly when regional responses are required. Community and burn center stakeholders should assure they are working with healthcare coalition and state partners in their planning. HPP funds may be available to support training, exercising, and purchasing of burn care supplies depending on the state's specific program language. Further information is available at: Hospital Preparedness Program (HPP).

American Burn Association

ABA – Local/Primary Burn Center: The center closest to the incident/receiving the most casualties (in conjunction with local coalition/burn surge plans) will plan for:

- Notifications of burn unit personnel.
- Burn surge capacity plan at burn center (at least 50% expansion over usual capacity is target).
- EMS triage and transport guidelines including destination facilities if burn center is overwhelmed.
- Identification of any local BSFs that are equipped to provide initial resuscitation and ongoing care awaiting transfer when the burn unit surge capacity is overwhelmed.

Expectations for these facilities relative to numbers of patients, supplies, and training should be developed and implemented prior to an event.

- Mechanism for coordinating burn patient information including demographic and clinical.
- Mechanism for obtaining clinical input to assign transfer/transport priority for victims.
- Process for coordinating local transport assets.
- Process for contacting and maintaining communication with ABA Regional Burn Coordinating Center.

During a response, the receiving Burn Center will:

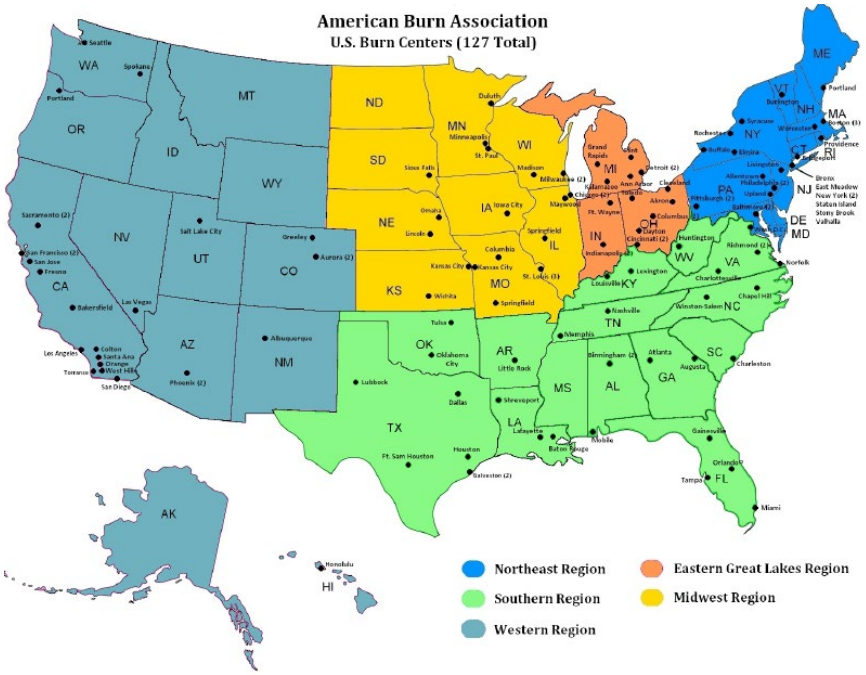
- Determine the number of patients requiring hospitalization.
- Determine the nature of injuries/burns and general care requirements.
- Contact the ABA Regional Burn Coordinating Center with this information (note that ABA and FEMA regions are different – See Figures 1 and 2 below).
- Work with local health system stakeholders/healthcare coalition to determine which patients may be cared for safely at local BSF (pre-identified non-burn centers which can safely care for minor burns/inhalation/plastics issues as noted above).
- Provide or request assistance from the state and the ABA to provide clinical advice and support to BSFs.
- Develop final list of patients requiring transfer.
- Arrange transfers in coordination with State and local partners, and as identified in the State BMCI plans, with assets available locally/regionally.

ABA – Regional Burn Coordinating Center:
During an incident, the ABA Regional Burn Coordinating Center will:

- Determine available beds in the ABA region (immediately upon notification) and will engage adjacent regions for bed polling if required by the scope of the event.
- Assist the affected local burn center with arranging transport if required.
- Assist the affected local burn center by providing expert advice to BSFs that are boarding/treating burn patients.
- Circulate / facilitate additional staff and supply needs as possible (e.g., notify regional facilities of specialized resource / staff requests that they may be able to assist with) in conjunction with affected community and ASPR REC.
- Assist the primary ABA burn center with tracking of patient movement and arrival to destination centers and keep updated lists.

Figure 1: Map of FEMA Regions

Figure 2. Map of ABA Regions



ABA and FEMA Regions Comparison

- ABA Centers
  - 127 individual centers – access this listing of verified burn centers
  - Regional Burn Coordinating Centers (Table 2)

Table 2: FEMA/ABA Region Comparison Chart

FEMA Region	ABA Region	States by ABA region (if >1)	ABA Regional Burn Coordinating Centers - Contact Point
I	NE	CT, ME, MA, NH, VT, RI, NJ, NY, PR, VI	NE Region Burn Medical Coordination Ctr. Saint. Barnabas - NJ 866-778-3659 (24 Hour Burn Hot-Line) Burn Center 973-322-5920 Kathe Conlon, Disaster Coordinator KConlon@barnabashealth.org
II			
III	NE	PA, DE, MD,DC	
	S	VA, WV	Southern Region Burn Medical Coordination Center, UAB 800-359-0123 Sue Vanek, Disaster Coordinator sue.vanek@yahoo.com
IV	S	AL, FL, GA, KY, MS, NC, SC, TN	
V	MW	MN, WI, IL	Nebraska Medicine 800-995-2876 (24 Hour Burn Hot-Line) Judy Placek, Disaster Coordinator juplacek@nebraskamed.com
	EGL	MI, IN, OH	Eastern Great Lakes Region Coordinating Center State of Michigan Burn Coordinating Center/University of Michigan Burn Center 734-936-2876 (24 hour response line) Anne Fast, Disaster Coordinator afast@med.umich.edu
VI	S	TX, OK, LA, AR	Southern Region Burn Medical Coordination Center, UAB 800-359-0123 Sue Vanek, Disaster Coordinator sue.vanek@yahoo.com
	W	NM	Western Region Burn Medical Coordination Ctr. University of Utah 866-364-8824 (24 hour burn hotline) Annette Matherly, Disaster Coordinator annette.matherly@hsc.utah.edu
VII	MW	IA, KS, MO, NE	Nebraska Medical Center 800-995-2876 (24 Hour Burn Hot-Line) Judy Placek, Disaster Coordinator juplacek@nebraskamed.com
VIII	MW	ND, SD	
	W	MT, WY, CO, UT	Western Region Burn Medical Coordination Ctr. University of Utah 866-364-8824 (24 hour burn hot line) Annette Matherly, Disaster Coordinator annette.matherly@hsc.utah.edu
IX	W	CA, HI, Marshall Islands Palau, Northern Marianas	
X	W	OR, ID, AK, WA	

Conclusion

Planning for a BMCI carries specific challenges. Major burn patients have unique resuscitation needs, have a high risk for death and complications (particularly if initial management is sub-optimal), and require dedicated specialty care for their injuries. Limited resources exist nationally for burn patients, necessitating a tiered system of response that prioritizes the identification of patients that can benefit most from burn center care and getting them to specialty centers. Limitations on patient movement for these highly complex injuries will require sophisticated planning to understand how far the patients must be safely moved to obtain a specialty care bed. Healthcare coalitions and burn centers must work closely with state, local, tribal, and territorial partners to assure that operational plans are developed an exercised for these contingencies.

Related Resources

American Burn Association. (n.d.). Disaster Response. (Accessed 11/3/2023.)

This webpage provides burn center contact information and disaster preparedness information.

American Burn Association. (n.d.). Advanced Burn Life Support (ABLS). (Accessed 11/3/2023.)

This one-page sheet outlines the criteria in which burn patients should be referred to a burn center.

ASPR TRACIE. (2022). Burns Topic Collection. U.S. Department of Health and Human Services, Administration for Strategic Preparedness and Response.

The resources in this Topic Collection can help health care facility staff plan for burn casualties as a result of structural fires, blast emergencies, or chemical burns caused by terrorist attacks or hazardous materials incidents. Select articles provide a review of emergency burn care (including care of patients that may have to remain at non-burn centers while awaiting transfer), but this collection is not a comprehensive review of burn care.

ASPR TRACIE. (2021). Step-by-Step Guide to Implementing the Coalition Burn Surge Annex TTX Template (PDF).

Healthcare coalitions can use this guide to enhance operational area awareness and capability in order to effectively address the needs of burn victims as part of a whole community emergency response framework. It can also be utilized to satisfy Funding Opportunity Announcement (FOA) requirements for the Hospital Preparedness Program (HPP) Cooperative Agreement.

ASPR TRACIE. (2020). Healthcare Coalition Burn Surge Annex Template.

The 2019-2023 HPP Funding Opportunity Announcement (FOA) requires Healthcare Coalitions (HCCs) to develop a complementary coalition-level burn annex to their base medical surge/trauma mass casualty response plan. This burn-focused operational annex template can be tailored by coalitions to complement their response plans.

Endorf, F.W., and Dries, D.J. (2011). Burn Resuscitation. Scandinavian Journal of Trauma, Resuscitation, and Emergency Medicine. 11;19:69.

The authors discuss how under resuscitation has become rare with the use of weight- and injury-based formulas, and that over resuscitation is now a concern to prevent organ death and poor outcomes in adult and pediatric patients. They provide practice-based recommendations that use the 2008 American Burn Association consensus statement as a starting point, with noted modifications based on their clinical experience.

Horner, C.W., Crighton, E., and Dziewulski, P. (2012). 30 Years of Burn Disasters within the UK: Guidance for UK Emergency Preparedness. (Abstract only.) Burns. 38(4):578-84.

This article reviews 37 disasters from 1980-2009 that occurred in the UK; only 3 disasters included had more than 5 patients with greater than 10% body surface burned. Findings may be used for surge staff and bed planning and pre-hospital care, as well as to inform exercise planning.

Hughes, A., Almeland, S.K., Leclerc, T., et al. (2021). Recommendations for Burns Care in Mass Casualty Incidents: WHO Emergency Medical Teams Technical Working Group on Burns (WHO TWGB) 2017-2020. Burns. 47(2):349-370.

The authors reviewed the literature on burn mass casualty incidents and developed a consensus on burn care during these incidents. They also identify constraints and challenges during burn mass casualty incidents, discuss patient flow and triage on scene and for receiving hospitals, and provide recommendations for best practices.

Kearns, R., Marcozzi, D., Barry, N., et al. (2017). Disaster Preparedness and Response for the Burn Mass Casualty Incident in the Twenty-first Century. Clinics in Plastic Surgery. 44(3):441-449.

This article discusses planning for burn mass casualty incidents, including planning for where the resources are located, knowledge of where trauma resources are available, considerations for infrastructure damage as may be the case in an earthquake or explosion, and getting input from housekeeping staff to keep rooms clean in the case of rapid discharge.

Kraft, R., Herndon, D.N., Al-Mousawi, A.M., et al. (2012). Burn Size and Survival Probability in Pediatric Patients in Modern Burn Care: A Prospective Observational Cohort Study. Lancet. 379(9820):1013-21.

This article describes a single center, observational cohort study of 952 pediatric burn patients with burns covering at least 30% of their bodies to identify burn size(s) associated with morbidity and mortality. The authors recommend that pediatric patients with burns over more than 60% of their bodies should be transferred immediately to a burn center for care.

Minnesota Department of Health. (2022). Minnesota Burn Surge.

This website contains links to Minnesota's burn surge plan and educational resources on treating burns, including determining burn depth and total body surface area, triage during burn mass casualty incidents, and pediatric resources for burn surge facilities.

Minnesota Department of Health, Office of Emergency Preparedness. (2013). Patient Care: Strategies for Scarce Resource Situations.

This card set can help facilitate an orderly approach to resource shortfalls at a healthcare facility. It is a decision support tool to be used by key personnel, along with incident management, who are familiar with ethical frameworks and processes that underlie these decisions.

Radiation Emergency Medical Management (REMM). (2023). Burn Triage and Treatment of Thermal Injuries in a Radiation Emergency. U.S. Department of Health and Human Services.

This website contains information on emergency burn care, especially in a radiation emergency. Topics covered include inhalation injury and pulmonary considerations, early complications, resuscitation with fluids, determining percent of body surface area burned, and supportive care.

Agencies and Organizations

American Burn Association

State of Michigan State Burn Coordinating Center. Emergency Burn Triage and Management.

University of Utah Healthcare. Crisis Standards of Care. (Note: This site requires registration and login; provides non-public training on everyday burn guidelines in addition to Burn Disaster Crisis Standards of Care guidelines. and other resource documents).