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Purpose and Scope

The Disaster Available Supplies in Hospitals (DASH) Trauma Supply Module (TSM) is intended to help hospitals mitigate supply shortages when seriously injured trauma patients present after a mass casualty incident (MCI). It is intended for pre-disaster supply planning, not to determine supply needs in the midst of a disaster. Note that effective use of these supplies depends on practiced hospital disaster response and the staff, space, and policies that support use of the supplies. Capacity expansion plans must include surgical or inter-facility transportation depending on the services provided by the hospital.

Trauma levels correspond to the hospital services described by the American College of Surgeons (ACS) for Levels I-IV and the American Trauma Society (ATS) for Level V. Facilities in states that do not follow these levels should choose the level that most closely aligns with the services they provide. The TSM is designed for trauma program managers to work with their emergency management, sterile supply, and central supply to ensure that target quantities of supplies are available. The trauma program manager and trauma medical director should agree on goals and integrate these with community and regional disaster planning. Supply chain leaders at the hospital should understand sources and timeline of re-supply.

The TSM is designed to work in conjunction with other DASH modules. To avoid duplication across modules, supplies with crossover use are only listed in ONE module (for example, scalpels for escharotomy are listed in the Trauma Supply Module, not the Burn Supply Module). Thus, users will need to complete the Hospital Pharmacy Module to determine pharmaceutical needs and the Burn Supply Module to calculate dressings and topical treatments that may be needed for trauma patient care in addition to completing the TSM to fully estimate their needs during an MCI. The TSM does NOT include diagnostic or monitoring equipment (e.g., CT or ultrasound machines, cardiac monitors) nor does it include oxygen tanks or planning.

To enable alignment across all DASH modules, the TSM estimates minimum supplies needed based on the hospital's trauma services with consideration for other factors including the size of the emergency department, the hospital's role in the community, and the potential isolation of the facility for long periods of time by a natural disaster. Note that a hospital's hazard vulnerability analysis is important to consider both these factors as well as others that may prompt the hospital to increase supplies beyond DASH recommendations. The DASH tool is designed to meet the needs of the "90%" of hospital needs, including mass penetrating trauma incidents. However, catastrophic incidents may generate demand exceeding these recommendations and a community/regional plan to support additional supply needs should be in place.

This module was designed to have general applicability and thus may not meet the needs of all facilities, particularly specialty hospitals (e.g., pediatric centers). Hospitals should note that additional supplies and replenishment may be needed beyond 48 hours and should have a clear understanding with their vendors of timelines and availability of product to support ongoing needs.

In consultation with subject matter experts and review of mass trauma incidents (with a focus on penetrating trauma that generates a higher degree of severe injuries and surgical volumes compared to "conventional" mass casualty incidents), the following assumptions for *seriously injured* casualties (i.e., Injury Severity Score 15 or higher) are applied:

Hospital Trauma Level	Default Number of Patients
Level 1 and Level 2	50 seriously injured patients
Level 3	20 seriously injured patients
Level 4, Level 5, and Not Designated hospitals	10 seriously injured patients

The following modifiers may be applied:

- IF the hospital identifies as a Level 4, 5, or undesignated trauma status BUT has 20 or more ED beds (20 is the mean number of beds in US emergency departments), this suggests the hospital is likely to receive more patients than the trauma designation suggests, and the hospital defaults are adjusted to Level 3 numbers.
- IF the hospital is the primary regional trauma-receiving hospital, the predicted casualties and needs are doubled.
- IF the hospital is at high risk of being isolated by a natural disaster (e.g., flood, earthquake) and cut off from transfer capability and supply lines, the estimated supply needs are doubled. (Note that the casualty planning numbers will double when this is selected because of the dangers if re-supply is not rapidly possible. All of the modules include this variable though the trauma module has less continuously needed supplies compared to other modules like burn (re-dressing) and pharmacy (ongoing medication needs).
- IF the user indicates their facility is the primary receiving hospital in the area AND is at risk of isolation, the patient numbers cap at twice the initial value and do not increase four-fold. Hospitals may decide to stock additional supplies depending on their role and perceived risk.

Assumptions

- The supplies primarily address the needs of seriously injured patients. In some cases, such as for IV catheters and sutures/staplers, increased numbers are included to accommodate treatment of outpatients.
- The tool assumes that 50% of seriously injured trauma patients require intubation and an average of 1 chest tube is placed per patient.
- Based on the Pulse nightclub, New Zealand mosque, and other recent mass penetrating trauma incidents, a laparotomy rate of 30% is assumed with 20% of patients requiring an amputation and 10% requiring vascular, thoracic, or surgical airway intervention. Note that additional trays for emergency department thoracotomy are not included. If your hospital uses trays for this and not an emergency clamshell technique, consider adding additional trays to usual stock.
- Pediatric supplies are included roughly in proportion to their age group/population. Note that a specific incident, such as one at a pre-school, may result in the recommended resources being exceeded if a large number of pediatric victims present to the hospital.

Other Trauma Supply Considerations

The DASH TSM includes trauma supplies commonly found in most hospitals, but it is not meant to be an all-inclusive list of available trauma-related products. Hospitals may also want to consider other supplies during their internal planning efforts including the following:

1. **Blood products:** The TSM does not include blood products. A massive quantity of blood may be required following an MCI, depending on the nature of the incident. Hospitals should consider what a reasonable amount is to have on hand and be aware of how to rapidly acquire additional quantities from blood centers and other regional partners.
2. **Disaster surgical trays:** All hospitals should have supplies to perform a chest tube insertion or laparotomy during a disaster. Facilities may opt for simpler trays depending on their capabilities, but all should have adequate supplies to perform the required number of procedures without sterilization cycling. Hospitals should plan for disaster sterile supply processing.

3. **Ultrasound machines:** Ultrasound is a flexible, efficient, and non-invasive technology that has wide application in mass casualty settings for diagnosis and procedural guidance. Hospitals should plan to aggressively use this technology for patient assessment and care.

4. **Cardiac monitors:** Cardiac monitors, particularly those with oxygen saturation and other capabilities, are a necessity for critical care. Maintaining additional monitors for disaster situations may contribute significantly to ability to expand capacity.

5. **Oxygen systems/equipment:** Many hospitals ran into limitations of providing oxygen to those who needed it during the COVID-19 pandemic. Planning to accommodate and transport many intubated patients and having the connectors and tanks necessary (as well as understanding flow limitations in different care areas) is an important part of disaster planning. Transport ventilators can be an important contributor to limiting oxygen use (as opposed to bag-valve units) as well as reducing workload (i.e., does not require a person for manual ventilation).

Suggested Next Steps

The DASH modules are intended to be complementary. Therefore, users should complete the Hospital Pharmacy Module in addition to the TSM to estimate their pharmaceutical needs following an MCI. Additionally, some supplies in the Burn Supply Module (e.g., non-stick dressings, topical antibiotics) will be needed in trauma care. Results may be used by the hospital to determine reasonable stock levels of trauma supplies to have on hand should an MCI occur. Facility planning, policies, and education are critical to effective disaster supply utilization. Estimates may also be used in discussion with healthcare coalition members to understand regionally available supplies and expected facility roles in regional plans. Catastrophic incidents may exceed the recommended supply quantities.

Questions and Comments

We welcome questions about the TSM methodology and suggestions to improve its utility at askasprtracie@hhs.gov. Please note that due to the limitations of Tableau, it is not possible to add certain functions to the DASH Tool.

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Additional Resources

American College of Emergency Physicians. (2021). Active Shooter Resources.

> This webpage includes links to various ACEP and national resources on active shooter response, workplace violence, and general hospital disaster preparedness.

ASPR TRACIE. (2022). Mass Violence Resources Page. U.S. Department of Health and Human Services, Administration for Strategic Preparedness and Response.

> Mass violence incidents require efficiency and coordination among multiple response entities. Efforts may need to be directed toward doing the greatest good for the greatest amount of people, which is counter to day-to-day trauma triage. These ASPR TRACIE-developed resources can help stakeholders prepare for, respond to, and help their communities recover from these traumatic incidents.

ASPR TRACIE. (2020). Active Shooter and Explosives Topic Collection. U.S. Department of Health and Human Services, Administration for Strategic Preparedness and Response.

> The resources in this Topic Collection can help emergency medical professionals plan for and respond to the changing nature of mass shootings and explosive events.

ASPR TRACIE. (2022). Drug Shortages and Scarce Resources. U.S. Department of Health and Human Services, Administration for Strategic Preparedness and Response.

> This page highlights resources ASPR TRACIE developed to help stakeholders prepare for and manage drug shortages and the allocation of scarce resources.

ASPR TRACIE. (2015). Natural Disasters. U.S. Department of Health and Human Services, Administration for Strategic Preparedness and Response.

> The resources in this Topic Collection highlights lessons learned from recent events, communication tools and information, and checklists, plans, tools, and templates that can be modified to suit specific threats and needs.

ASPR TRACIE. (2019). Partnering with the Healthcare Supply Chain During Disasters. U.S. Department of Health and Human Services, Administration for Strategic Preparedness and Response.

This document provides an overview of the emergency planning and response considerations of healthcare supply chain owners, operators, and end users, as well as insights for healthcare coalitions working with healthcare supply chain partners on preparedness, response, and recovery. It aims to capture key changes during serious or catastrophic events, compared to normal supply chain operations, as well as planning and response contingencies.

Association for Healthcare Resource and Materials Management, the Health Industry Distributors Association, and the Health Industry Group Purchasing Association. (n.d.). Medical-Surgical Supply Formulary by Disaster Scenario. (Accessed 7/18/2022.)

These formularies were created based on input derived from healthcare system and hospital representatives and can be tailored to suit facility or jurisdictional needs.

Centers for Disease Control and Prevention. (2018). Supply Chain Disaster Preparedness Manual. U.S. Department of Health and Human Services.

This manual can help emergency healthcare planners gain familiarity with the hazards that can affect their facility, system, and community; create related supply chain-specific plans to help address these scenarios; and develop a cache of medical supplies in the event disaster strikes.

Duncan, E., Colver, K., Dougall, N., et al. (2014). Consensus on Items and Quantities of Clinical Equipment Required to Deal with Mass Casualties Big Bang Incident: A National Delphi Study. BMC Emergency Medicine. 14: 5.

British researchers developed an expert consensus regarding the essential items and minimum quantities of clinical equipment necessary to care for 100 patients on the scene of a mass casualty explosion event.

Florida Department of Health. (2012). Hospital Mass Casualty Incident Planning Checklist.

This checklist is rooted in the “whole community approach” and provides step-by-step guidance for those planning for significant increases in demand as a result of a critical incident.

Greater New York Hospital Association. (2013). Integrated Explosive Event and Mass Casualty Event: Response Plan Template.

This template was developed to help hospitals in New York prepare for and respond to explosive and mass casualty events. The templates can help facilitate coordination between various hospital departments and can be customized by healthcare facility emergency planners across the country.