

**Category:**

Medical surge capacity, community mitigation strategies, emergency healthcare delivery, alternative sites, workforce education and safety, business community and private sector involvement.

**Community Description:**

The combined populations of Maine, New Hampshire, and Vermont approximate just over 3 million with 52.6 percent of residents residing in rural areas. Major population centers and seasonal tourist attractions can increase local populations significantly and represent additional vulnerabilities for terrorist attack. Furthermore, all three states share borders with Canada, necessitating close cooperation across an international boundary. Maine and New Hampshire also have active seacoasts, with busy ports and commercial and leisure traffic.

In addition to direct threats to northern New England, the region must be concerned with a surge of patients from incidents occurring in nearby urban areas, including Boston, Providence, Hartford, New York City and Montreal, Canada. While injured or ill patients may be formally transported to hospitals within Northern New England, it is likely that tens of thousands of individuals minimally affected by the event might flee the urban areas, overwhelming resources in the northern states and potentially spreading disease. Alerts from urban BioWatch programs may also trigger a mass exodus from the affected city.

The State level Public Health structures are typically administrative in nature and not able to provide significant planning or response capacity. There are small demographic areas that are covered by sub-state regional or local public health networks, but again these are usually very focused on typical public health epidemiological duties or simply fledgling networks and not well suited for large scale preparedness activities.

The healthcare delivery systems in these states are very similar. There is one Level 1 trauma center in each state, clearly acting as the state tertiary care and referral center. The remaining hospitals vary in size and specialty with the majority of rural areas being served by critical access hospitals. In addition to the international boundary each state shares with Canada, two of the three states have coastline with international shipping ports and cruise ship destinations.

**Planning Process:**

The New England Center for Emergency Preparedness (NECEP) at Dartmouth Medical School orchestrates regional research, policy and legislative review, academic outputs and other products within the realm of preparedness and response. Other significant

responsibilities include technical assistance and expert guidance in local, sub-state regional and multi-state response and community-based medical surge planning and implementation strategies. NECEP is dedicated to improving emergency preparedness through the regionalization and coordination of disaster and mass casualty planning and response for Northern New England.

Specifically the Center facilitates regional collaboration of State and local agencies, non-governmental organizations and academic institutions across the disciplines of Emergency Management and Preparedness, Homeland Security, Fire, EMS, Law Enforcement, Health Care and Public Health. The Center currently provides coordination within the region through HRSA and NNE MMRS regional meetings, the International Emergency Management Group (IEMG) and regional DHS and DHHS resources. Together with all six New England States and New York, NECEP has developed a common platform for community-based medical surge capacity and capabilities, and realistic surge projections for hospitals. NECEP has developed or enhanced common platforms such as the *Health Care Standard* resource management software, Acute Care Center, community planning and sub-state and interstate regionalization guidelines. NECEP promotes multi-agency planning groups, sub-state and interstate regionalization, memoranda of understanding (MOU), and drills and exercises which accurately assess a region's ability to effectively respond to a mass casualty event.

NECEP is also home to the Northern New England Metropolitan Medical Response System (NNE MMRS), which is the nation's first jurisdiction to regionalize the MMRS program to a multi-state area with a significant rural population. The NNE MMRS functions as a coordinating resource for Maine, New Hampshire, and Vermont in preparing for and responding to the health and medical consequences of a mass casualty event in the tri-state region.

NECEP and NNE MMRS also coordinate emergency preparedness activities for:

- Meeting coordination with all states within FEMA region 1 and New York State and New York City for Medical Surge coordination.
- Centralized support and technical planning assistance throughout the region for medical surge capacity and related activities.
- Coordination of education, regional trainings and exercises, to ensure the interoperability of the region as a whole.
- Improved interdisciplinary communications between Emergency Management and Public Health and other agencies, NGOs and Faith based groups to facilitate planning and response.
- Centralized support and facilitation of sub-State and inter-State cross-border disaster planning activities.
- Facilitation of information sharing through the effective use of multi-media access including internet-based public health and emergency management systems. This effort ensures ongoing information and resource sharing during pre-event planning and mitigation activities, event response, notification and activation of resources, and post event review and planning.

**Narrative:**

Healthcare surge capacity refers to the ability to rapidly expand medical services beyond normal operating levels to meet increased demand following an emergency (JCAHO 2006). Hospital beds, medical supplies and equipment, medical staff and the technological infrastructure supporting operations must be in sufficient supply and condition to absorb these increases. Additionally, contingencies covering scenarios where demand outstrips hospital capacity or makes surge in place impossible must also be taken into account. Planning for these scenarios must take advantage of off-site community based facilities, known as Alternative Care Facilities (ACFs) and Acute Care Centers (ACCs).

The New England Center for Emergency Preparedness (NECEP) strongly recommends that communities adopt realistic expectations of acute care hospitals and that medical surge capacity be implemented as a community wide/multi-agency response. NECEP further recommends the implementation of a two-layered concept for medical surge capacity planning. Layer I focuses solely on Hospital Based Beds available within a three hour window. Layer II consists of Community Based Beds, located in alternative (alternate) care facilities (ACF) or acute care centers (ACC); facilities that will take longer than three hours to make available once their need has been determined. This community based capacity can be further extended by larger facilities, shuttered hospitals, extended home health care, and the incorporation of federal response capabilities such as DMATs, and the Federal Medical Stations.

**Layer I – Hospital Based Beds**

NECEP's recommends a capability above the current HRSA recommendations of 500 beds per million population. Each hospital is expected to target a surge capacity of 20-30% beyond its current licensed and staffed capability. The final number is decided by the hospital and does not include beds that would normally be utilized in a mass casualty setting such as early discharge of patients, or cancelling elective surgeries. The appropriateness of these numbers should be cross referenced to statistical information such as the Dartmouth Atlas of Healthcare and the United States 2000 Decennial Census which links the population associated with each hospital service area (HSA) and realistic casualty projections which consider the peaks and duration of a catastrophic epidemic event. Limited events within a region must also consider the forward movement of patients as part of their med-surge plan.

A critical limiting factor for all surge capacity planning is the availability of mechanical ventilator support for patients with acute respiratory distress. Using the more robust acute infectious disease benchmark, and more specifically an incident of pandemic influenza, the Centers for Disease Control and Prevention (2006) estimate that 0.25% of the national population will require mechanical ventilation during a severe incident.

## **Layer II – Community Based Beds**

Community based facilities extend the state's surge capacity beyond acute care hospitals. These facilities provide a defined level of care for patients during mass casualty incidents that exceed hospital surge capacity, provide an alternative site for treatment should a hospital be evacuated or otherwise offline, and can be incorporated into isolation and quarantine strategies. There are two different types of community-based facilities: alternative (alternate) care facilities (ACF) and acute care centers (ACC). The clearest delineation between the two types of facilities is one of purpose; ACFs are buildings that serve some medical function under normal operation conditions while ACCs are buildings of opportunity capable of holding large groups of people with no preexisting medical capabilities.

### *Alternative Care Facilities*

Alternative care facilities are typically buildings that serve a medically-related purpose when not requisitioned for use in an emergency to house patients. These facilities are generally located in close proximity to an existing acute-care hospital and many times are already equipped to triage and treat patients with the necessary medical utilities such as oxygen. These two features make them particularly suited to handling patient needs in the event of a hospital evacuation. Examples of ACFs include shuttered hospitals, large medical clinics, and nursing homes.

### *Acute Care Centers*

Acute care centers are located in what is best described as buildings of opportunity. These are community facilities that do not necessarily provide a medical function outside of an emergency, but have the space and access needed to house patients. Examples include armories, auditoriums, conference centers, firehouses, and gymnasiums. It is essential that public health leaders work closely with community leaders to identify these facilities, draw up the necessary MOUs, and determine what supplies and resources are needed to effectively triage and treat surge patients. Because use of these centers is most likely associated with a mass casualty event or infectious disease outbreak, isolation and quarantine issues must be considered.

### *Patient Flow*

Each facility type outlined above can be used individually or in any combination depending on the specifics of the surge plan and scenario. In a highly infectious pandemic, isolation of confirmed infected individuals may be a top priority. In this case, isolating cases in an ACF or ACC to limit exposure to the hospital population may be a prudent strategy. Other circumstances may see stable inpatients moving to ACFs and then ACCs as patients overflow hospital capacity.

## **Interfacing with a National Surge Capacity Coordination Model**

NECEP recommend the implementation of the Barbera and Macintyre (2004) six-tiered system for administrating surge capacity within a population. Consistent with Layer I of

the NECEP proposed model, Tier 1 represents planning to surge within an individual hospital. Tier 2 of the Barbera and Macintyre (2004) model creates a health care coalition among existing healthcare resources within a constrained area.

Tier 3 of Barbera and Macintyre's administrative model (2004) focuses on integrating the healthcare community's efforts with other key stakeholders at the community level. This most closely equates with Layer II of NECEP's proposed model. The only way to successfully generate surge capacity within the community is to effectively use pre-established partnerships between healthcare providers, first responders, public health, and public safety practitioners. Tier 4 seeks to collaborate among multiple communities at a regional level using coordination efforts occurring at the state level.

In the event that the size of an incident exceeds the management capacity of the state, Tier 5 provides a framework by which interstate assistance through existing Emergency Management Assistance Compact (EMAC) channels can occur. Tier 6 represents the integration of Federal relief efforts with local, regional, and statewide activities. Barbera and Macintyre's proposed coordination system is unique and useful as it is scalable based on the extent of the incident.

Planners should not confuse Barbera and Macintyre's Management System for actual operational surge capacity planning. Rather, their document provides a framework for coordinating surge capacity activities at the correct functional level dependent on incident scale.

## **IMPLEMENTATION STRATEGIES:**

### **Regional Response System**

NECEP has developed a detailed methodology for implementing these strategies known as Regional Response System (RRS). The RRS provides a framework to bring together Local, State, and Federal responders from multiple agencies and private sector and business community partners in order to rapidly and effectively use their expertise in response to all-hazards catastrophic emergencies. The underlying principle of the RRS is the rapid mobilization of the citizenry under a declared state of emergency to participate in and support the emergency response. Through a series of state-level and sub-state regional efforts and recommendations, communities can better prepare for surging care for hospitalized, critically ill patients as well as those needing less acute care which can be provided in community-based centers.

### **Training and Education**

While the much of the focus of health systems readiness for pandemic flu and surging health care has been on space and equipment, precious little effort has been placed on training personnel for these scenarios. Classic CBRNE training to date has focused on event mitigation, recognition of an event or agent, preparation of the response effort,

including decontamination and personal protective equipment (PPE), and initiation of therapy, primarily in the pre-hospital or emergency department environment.

The NNE-MMRS and NECEP have recognized that in contrast to most CBRNE events, surging capabilities for a pandemic flu event or other prolonged mass casualty incident, will require a new knowledge base. As opposed to focusing on care and activities in the pre-hospital environment, these events will require surging critical and inpatient care to an expanded hospital facility, or even buildings of opportunity in the community outside the walls of the hospital. In order to prepare communities for this scenario, facilities will need more personnel specifically trained, or refreshed, to provide hospital-based, critical care.

Given these challenges, NECEP sponsors two courses specifically designed to prepare hospital-based providers with the necessary skill set to care for mass numbers of critically ill patients. The Society of Critical Care Medicine's two-day Hospital Mass Casualty Disaster Medicine Course (HDM) with information on disaster topics as well as basic principles of critical care, and its one-day Fundamentals of Disaster Medicine Course (FDM) for more experienced hospital providers needing disaster training include hands-on training for critical inpatient personal protective equipment (PPE) and mechanical ventilators using systems employed by the Strategic National Stockpile (SNS).

Finally, in order to prepare the community for its support to mass care needs, NECEP has developed a robust workshop to overview of the concept of operations for a community-based ACC and review the Regional Medical Surge Plan for each of the 19 All Health Hazards Regions. The workshop includes feedback, training, and information on the following: how to set up an Acute Care Center for an public health emergency, how to integrate all-hazards planning models into pandemic flu plans specific to each region, and how to identify resources and gaps in the regions' Medical Surge Plan

#### **SUMMARY:**

NECEP and the NNE MMRS have developed broad scale concepts to coordinate multi-organizational, all-hazards regional preparedness. This scope ranges from expansion of community-level minimal health-care needs to expansion of critical care capabilities. Finally, the organization and regions, through a spirit of close cooperation, have translated concepts to practical, operational plans with demonstrated capabilities. Ongoing efforts will ensure not only that regional preparedness is enhanced, but outside state and national organizations can look to the Northern New England region as a resource for both preparedness and response capability and support.

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