Executive Summary

Purpose

The primary purpose of this effort was to develop a Rocky Mountain Regional Care Model for Bioterrorist Events for Federal Region VIII that addressed medical surge capacity needs in the event of a bioterrorist incident. The overarching purpose of this project was to develop an exportable surge capacity model that included exportable tools for regional bioterrorism planners and decision makers at the national, state, local, and provider level.

Background

The Rocky Mountain Regional Care Model for Bioterrorist Events (RMBT) Working Group was established as part of an Agency for Healthcare Research and Quality (AHRQ) task order through the Integrated Delivery System Research Network (IDSRN). The RMBT Working Group was composed of members as listed in the following illustration:

Methodology

The Working Group met four times during the period November 2002 to October 2003 to address medical surge capacity issues/needs for Federal Region VIII (Colorado, Montana, North Dakota, South Dakota, Wyoming, and Utah). During the first meeting, the members of RMBT identified surge capacity issues that were considered important and where solution development was necessary. These issues were used to guide future meetings. The members also provided the RMBT investigators and staff with documents and resources during the weeks between the RMBT meetings. Through this collaboration and the extensive experience of the RMBT members, surge capacity products and tools were developed as described in this report.

Results

The members of the RMBT working group were very knowledgeable and enthusiastic concerning the development of a surge capacity model for Region VIII that could also be exported to other regions of the country. The products and tools that were developed during the 12-month project period are presented in the following chapters:

- Profile of Regional Medical Resource Capacity
- Potential Additional Medical Resources to Meet Surge Needs
- Measures of Regional Bioterrorism Preparedness
- Isolation/Quarantine Issues
- Other Surge Capacity Issues (risk communication, vulnerable populations, and the distinction of bioterrorism from an all–hazards approach)
- Example of a Regional Exercise

A bibliography of bioterrorism preparedness resources is also provided.

1. Profile of Regional Medical Resource Capacity (Chapter 3)

Region VIII represents 3 percent of the country's population, yet comprises 16 percent of the land area. This region is the most rural region of the country with a significant portion classed as frontier. The medical resources profiled included hospitals, medical staffing, and a summary of supply, equipment and infrastructure resources and needs as obtained from the Health Resources and Services Administration (HRSA) Hospital Preparedness Surveys for the six states.

There are 28,100 community hospital beds in the region, representing about 3 percent of the nation's hospital beds; 46 percent of these beds are located in non-metropolitan areas compared to 21 percent nationwide. Almost half of the beds are located in Colorado and Utah, which comprise 70 percent of the region's population.

Medical care provider staffing resources in the region are highly variable between each of the states and between many of the medical professions. The region as a whole has 182 physicians

per 100,000 population, where in the United States overall there are 198 physicians per 100,000 population. Utah and Wyoming have the lowest rates per 100,000 population at 156 and 150, respectively, and Colorado and North Dakota are the highest at 201 and 189 respectively. The region as a whole has higher rates of physician assistants and nurse practitioners than the rest of the country; these individuals could be utilized to extend physician effectiveness. Numbers of registered nurses per population unit are consistent in this region with the national average. There are fewer licensed practical nurses and respiratory therapists per unit population in this region compared to the nation as a whole.

The HRSA hospital preparedness surveys revealed that 54 percent of hospitals in the region had a plan for bioterrorism response in 2002. In terms of equipment, this region's hospitals own more than 996 ventilators; 65 percent of hospitals have personal protective equipment (PPE) available. For bioterrorism infrastructure, 54 percent of the region's hospitals that responded have negative airflow isolation rooms and the region has up to 1,049 isolation beds available. Roughly one third of the region's hospitals have decontamination capability (based on 50 percent of states that reported this figure).

2. Potential Additional Medical Resources to Meet Surge Needs (Chapter 4)

Using existing infrastructure was considered the best potential solution to address hospital surge capacity needs, by either augmenting hospitals' capabilities or establishing alternative care sites. U.S. Northern Command identified a need to develop a tool to assist planners in selecting an alternative care site for providing medical care to victims of a bioterrorist incident. A tool was created through collaboration between the RMBT Working Group members and facility engineers that can assist planners in ranking and scoring alternative care sites based on adequacy of facility characteristics such as ventilation, plumbing, and food supply and preparation areas. Potential alternative care sites could include schools, motels, recreation centers, churches, National Guard facilities, and stadiums.

In order to address supplying and staffing these alternative care sites, the RMBT group discussed several alternatives. The group's solution to address bed, supply and equipment needs was the creation of medical caches that are stored for use in a fixed location or that can be transported to a remote site in a trailer. Three cache levels were developed: Level I, Hospital Augmentation Cache ($20,000); Level II, Regional Alternative Care Site Cache ($100,000); and Level III, Comprehensive Alternative Care Site List (no cost estimate currently available). Each of these lists includes cots and other supplies, but does not include a "facility". These caches are to be used in conjunction with an existing structure: either hospital or alternative care site. Pharmaceuticals are not included in the caches as this need is addressed by the Strategic National Stockpile (SNS). Deployable oxygen solutions are also addressed as a separate issue due to complexity and cost. This resource is considered critical if the agent has an impact on the respiratory tract, such as smallpox, anthrax, pneumonic plague, hemorrhagic fevers, or ricin.

Another potential resource presented that could assist in addressing surge need was the use of 18-wheel semitrailer trucks modified to serve as medical facilities and stocked with medical

equipment. This alternative would facilitate a higher level of care at an alternative site, but was considered cost prohibitive with the current regional funding limitations.

Staffing levels necessary for an alternative care site in 50 bed increments were also refined. The Concept and Operations for the Acute Care Center developed by the U.S. Army Soldier and Biological Chemical Command (SBCCOM) was used as a starting point. This list was augmented by addressing staffing levels for non-infectious and quarantine patients. Health care licensing issues are addressed through an example of draft gubernatorial orders developed by the Colorado Department of Public Health and Environment (CDPHE) that would set aside specific aspects of state health professional licensing requirements (TAB 4).

3. Measures of Regional Bioterrorism Preparedness (Chapter 5)

Measures of preparedness were developed for hospital beds, staffing, equipment, and infrastructure. Data from the regional profile (in Chapter 3), HRSA state workforce profiles, and the National Disaster Medical System (NDMS) hospital bed availability reporting system were used to assess current patient care capacity. Resource need was based on HRSA benchmarks and the staffing requirements for a 50-bed alternative care site discussed in Chapter 4.

Based on the HRSA benchmark for the need of 500 beds per million population during a surge event and NDMS hospital bed availability data, the Colorado Front Range region would need to add 1,012 beds and the Salt Lake City Utah region would need to add 1,269 beds. Without consideration of unused bed capacity, the region would need to add 4,664 beds based on this benchmark.

In order to staff these 4,664 alternative care site beds at the current level of care, the region would need approximately 14,777 personnel, including 464 physicians, 928 registered nurses, 1,865 licensed practical nurses, 1,865 health technicians, 464 respiratory therapists, and 464 laboratory technicians and others. When considering the demand on current staffing resources, the region may require additional physicians, RNs, LPNs, respiratory therapists, clinical laboratory workers, and nurse assistants. This region has a surplus of nurse practitioners and physician assistants when compared to the national average; these medical personnel may be useful as extenders or substitutes for this staffing need.

The regional supplies of ventilators and personal protective equipment were evaluated using the HRSA hospital preparedness surveys. HRSA has not yet developed a benchmark for ventilators, and this data was not reliable from the hospital surveys. The HRSA benchmark for PPE was not well defined, and there are many different types of PPE that provide different degrees of protection.

The HRSA benchmark for decontamination facilities is that there should be adequate portable or fixed decontamination capacity for 500 patients per 1 million population. Based on that benchmark and the population of Federal Region VIII, decontamination capacity would be needed for 4,664 patients.

This region has 828 isolation beds to support a population of 9.3 million people. The HRSA guidance benchmark is unclear as to whether this meets the need they predict, although this would clearly be inadequate in any significant bioterrorism event.

4. Isolation/Quarantine Issues (Chapter 6)

The Working Group concluded that the ability to provide adequate quarantine and isolation facilities presents many difficult challenges and mandates close cooperation between public health and acute medical care sectors at local, state, regional, and federal levels. Financial compensation may be an issue in establishing these facilities and would best be dealt with in advance. Advance institutional and alternative site evaluation should be performed to determine abilities/weaknesses for the facility to support quarantine and patient isolation issues.

5. Other Surge Capacity Issues: risk communication, vulnerable populations, and the distinction of bioterrorism from an all-hazards approach (Chapter 7)

It is important for any surge capacity system to incorporate risk communication and health information components to more efficiently and effectively communicate with the public and hopefully minimize the institutional impact of any surge-producing event through decreasing population anxiety and directing patient flow to available resources. Although surge capacity planning and resources will still be needed for health emergencies, the objective of providing the public with accurate, consistent and up-to-date information is to reduce the overall surge demand.

Addressing the special needs of vulnerable populations during the event of a bioterrorist incident may be difficult with fixed resources and time constraints. The medical needs for these patients may need to be addressed on a case-by-case basis at the time. Developing and implementing guidelines for new and separate programs for these special populations may be costly and unrealistic.

6. Example of a Regional Exercise: Mobilizing Medical Resources Across State Lines (Chapter 8)

The Working Group found that dealing with governmental, quasi-governmental, and private assets creates many issue areas that should be discussed in planning. There are still many issues to resolve to facilitate cooperation between non-traditional partners. The Emergency Management Assistance Compact (EMAC) is very helpful for inter-state cooperation.

The bibliography of bioterrorism preparedness resources is a resource for planners, responders and researchers and includes the following topic areas:

- Defining a Region for Medical Response to Bioterrorism
- Profile of Regional Medical Resource Capacity

- Additional Resources to Meet Surge Needs
- Measures of Preparedness
- Staffing and Resources
- Infrastructure
- Isolation/Quarantine
- Risk Communication, Transportation, and Coordination
- Vulnerable/Rural Populations
- Example of a Regional Exercise (Plans, Orders and Exercises)
- Department of Defense
- Roles: Federal, State, and Local
- Emergency Management
- Hospital Plans
- General Bioterrorism.

Limitations

Some of the limitations relate to the data that are presented in the profile of the region and measures of preparedness. The HRSA surveys used in profiling regional resources (Chapter 3) provided limited data on hospital equipment and infrastructure capacity. Since the surveys were not standardized instruments, the ability to profile the region and compare states was restricted. As state bioterrorism preparations are ongoing and dynamic, the data from the survey may not reflect current preparedness status. The hospital response rate for the surveys was less than 100 percent, which may have resulted in selection bias. The concern for hospital data confidentiality varied from state to state. This did limit the amount of data that was received from some states.

In Region VIII, the NDMS periodically gathers available bed data from hospitals in two geographic areas of the region. These data have been very helpful is evaluating day-to-day bed availability in these areas; however, this type of data collection is not occurring in four of the states in this region.

When developing measures of bioterrorism preparedness (Chapter 5), staffing needs were defined by available healthcare personnel compared to national averages. The assumption that the national average for medical staffing is adequate to meet current needs may underestimate or overestimate the measures, although this is useful for relative comparisons between states and between regions. This is further complicated by the HRSA recommendation of being able to create and staff 500 surge capacity hospital beds per one million population. This recommendation represents a good starting point, but the justification for the 500 bed number is unclear, untested, and may be overly optimistic depending upon the biological agent and the scenario of exposure of a bioterrorist event.

The caches and site selection matrix lack actual demonstration of their validity in the field (Chapter 8). While the alternative care site matrix was tested via an orientation exercise, further real time testing at the local level will help to validate this tool. The Level I and Level II caches have been purchased and positioned in our region. They will still need to be deployed in the field

to determine their adequacy. There is a need for supplemental oxygen to be available at alternative care sites, although given the current economic environment it is not feasible for states and providers to purchase and store the necessary components. The engineering logistics for installation at an alternative care site are complicated and labor intensive.

Developing a model/tool for isolation quarantine is challenging. There have not been any large-scale isolation or quarantine events in recent history, so providers lack experience in dealing with these issues. It is also unknown as to whether medical and support staff would be willing to work in an isolation/quarantine environment; this issue can not be assessed through an exercise.

Addressing the special needs of vulnerable populations (disabled, elderly, poor, children, immuno-compromised, chronically ill, homeless) during the event of a bioterrorist incident is challenging with fixed resources and time constraints, particularly since the characteristics of these groups widely vary. The medical needs for these patients may need to be incorporated into current preparedness plans.

In developing a model to address medical resource needs in the event of a bioterrorist incident, monetary resources are a constraint when developing practical potential solutions. Exercises and equipment are expensive and are often not a priority for funding by providers or government.

Lessons Learned

The RMBT Working Group brought together a broad spectrum of stakeholders across the region who would not normally have been able to meet and discuss issues under current funding streams. One of the members was quoted as saying "If you ever get the chance to come to one of the RMBT Working Group Meetings, you would be impressed with how all the state and federal agencies, to include the DoD, are working to pull this thing together. I haven't seen this kind of cooperation in the 29 years I've been working…." Civilians were able to draw from the military's extensive history of preparing and implementing surge capacity systems. The group also learned that the military may have limited capability in providing resources to the civilian population during a bioterrorist event. States and providers should not plan on tapping into these resources, since the military may be responding to other events.

From the orientation exercise the RMBT group learned that sharing state and private medical resources across state boundaries is complex.

Conclusion

Participants from all parts of the region benefited from this project by learning through collaboration from those with knowledge and experience in bioterrorism preparedness. The RMBT working group also did not have the solutions to all of the difficult issues that were raised. One issue that was repeated throughout the time frame of this project is that healthcare

providers will need to lower the bar for acceptable care during a bioterrorist event, and the public will not be able to expect "care as usual". Much was gained by the civilian sector and the military joining in information sharing and preparedness planning, resulting in a potent partnership. This project allowed for the development of tools that have applicability and usefulness to others involved in preparedness planning. Region VIII, through the implementation of many of the ideas developed by this project, has improved its preparedness to deal with a bioterrorist event.

Recommendations

The RMBT Working Group recommends the following:

- HRSA and other partners work together to clarify benchmarks for decontamination and isolation infrastructure requirements. The current guidance makes it difficult for states to assess their need.

- Any future hospital preparedness survey should be standardized across states to facilitate regional assessments of preparedness.

- States should investigate the development of an information system to report snapshot or real time hospital bed availability.

- The medical cache and regional assistance concepts should be tested through actual cache deployment across state lines via a real time field exercise.

- State and local bioterrorism planners can use the site selection matrix tool at the local level to identify and rank alternative sites for care and isolation/quarantine facilities in advance of actual need.

- The military should continue to work with the civilian population on bioterrorism preparedness, because they have the knowledge, experience and technology to enhance civilian efforts.

- Relationships between neighboring states should be strengthened through joint planning and exercises.

- Other regions of the country may benefit by applying a similar methodology in developing regional measures of preparedness.

- States should do advanced planning, through state legislation or draft order creation, to enable and facilitate medical personnel crossing state borders to provide care in the event of a bioterrorist event.

- In our region, use of physician assistants and nurse practitioners as physician extenders may assist in dealing with a possible physician shortage during a bioterrorist event.

- Regional advance planning should be encouraged for issues of patient isolation and quarantine.