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THESIS

**PREPARING SOUTH CAROLINA EMERGENCY
DEPARTMENTS FOR MASS CASUALTIES WITH AN
EMPHASIS ON THE PLANNING PROCESS**

by

Colleen Mary Donovan

March 2013

Thesis Advisor:
Second Reader:

Nadav Morag
Michael Petrie

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Colleen Mary Donovan
State WIC Director, Department of Health and Environmental Control,
Columbia, South Carolina
M.S., Eastern Kentucky University, 1988
B.S., University of Wisconsin-Stout, 1987

Submitted in partial fulfillment of the
requirements for the degree of

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March 2013**

Author: Colleen Mary Donovan

Approved by: Nadav Morag
Thesis Advisor

Michael Petrie
Second Reader

Harold A. Trinkunas, PhD
Chair, Department of National Security Affairs

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ABSTRACT

This thesis addresses the role of the emergency department in planning for mass casualties during an emergency. The demand on hospital emergency departments has stretched the capacity for normal operations beyond their original design. Hospital surge capacity is not only complex, but affects every hospital emergency department in the country. Factors, such as hospital bed capacity, surge levels, staffing and the use of volunteers in time of emergency, all play a critical role in the ability and accessibility of the hospital to react during time of need.

The recommendations provided are based on the analysis of county, state and federal plans along with case studies that provide a varied approach to emergency preparedness and the role of the hospital, focus on some of the facets of preparedness and the immediate need for emergency planning, training/exercising and communication in hospitals across America, and specifically, in hospitals in South Carolina.

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LIST OF ACRONYMS AND ABBREVIATIONS

ACC	Acute Care Center
ACF	Alternate Care Facility
ACS	Alternate Care Site
AHR	All-Hazards Planning Regions
AHRQ	Agency for Healthcare Research and Quality
CCS	Community Care Station
CDC	Center for Disease Control
ED	Emergency Department
EMS	Emergency Management System
ESAR-VHP	Emergency Systems for Advanced Registration Volunteer Health Professionals
ESF 8	Emergency Support Function
HAZMAT	Hazardous Materials
HFSA	Healthcare Facility Surge Area
HHS	Health and Human Services
HICS	The Hospital Incident Command System
HVA	Hazard Vulnerability Analysis
MCI	Mass Casualty Incidents
MOU	Memorandum of Understanding
MRC	Medical Reserve Corps
MSA	Metropolitan Statistical Area
MSCC	Medical Surge Capacity and Capability
NDMS	National Disaster Medical System
POD	Points of Dispensing
PPE	Personal Protective Equipment
RCC	Regional Coordinating Committees
RMBT	Rocky Mountain Bioterrorism
SNS	Strategic National Stockpile
U.S.	United States
WVREDI	West Virginia Responder Emergency Deployment Information

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I. INTRODUCTION

A. PROBLEM STATEMENT

Hospital emergency departments (ED) throughout the United States (U.S.) serve as the first stop for millions of patients per year. They provide an extraordinary service on an all-day and year-round basis. It is imperative, therefore, that those hospitals know how to best deal with the large numbers of victims entering their facilities via the emergency departments within a short period of time.

As a result of the Madrid bombings of 2004, and the large number of casualties in that attack, a survey was developed by the U.S. House of Representatives to ask Level I trauma centers in seven major cities in the United States to determine whether they have the capacity to respond to the level of casualties that Madrid experienced during the bombings.

The survey found that emergency rooms across the nation were terribly overcrowded on a daily basis. Many are already diverting patient to other hospitals to try to alleviate this issue. The nation is not adequately prepared for a medical surge on the scale of a Madrid bombing or a Hurricane Katrina.

South Carolina hospitals mimic the nation's dismal national findings. South Carolina ranks 32nd in the number of emergency departments per one million people;¹ however, in reality, is not prepared to accept large numbers of patients in its emergency departments. In 2005, Hurricane Katrina struck the Gulf Coast and caused catastrophic wind damage and flooding, and is listed as one of the worst disasters in the nation's history.² The healthcare system was desperately unprepared for the influx of patients and other serious problems. Other problems encountered included patient flow issues,

¹ Roger Jay Lewis, "Statement," American College of Emergency Physicians, Department of Emergency Medicine, UCLA Medical Center, House Committee on Oversight and Government Reform, May 5, 2008.

² U.S. Library of Congress, Congressional Research Service, *Hurricane Katrina: The Public Health and Medical Response*, by Sarah A. Lister, CRS Report RL33096 (Washington, DC: Office of Congressional Information and Publishing, September 21, 2005).

medical record access, access to other departments, such as laboratory, billing, and others during all hours of the day and night, the lack of nursing staff in particular, and lack of healthcare staff, in general. Other issues can include the volunteer's role and how to use volunteers during an emergency, needed equipment, storage of personal protective equipment (PPE), pharmaceutical caches, and legal issues. These issues have affected emergency departments across the nation.

Over 114 million patients seek treatment in EDs nationally each year. Some are rushed there with severe illnesses and others need immediate care, but many others arrive with less acute issues. For many people in the country, the ED is their primary healthcare entry point, although they know it may take hours to be seen by a doctor. The result is EDs stretched to their capacity on a daily basis, and often they are ill prepared for large-scale disasters. Most EDs were not built to hold 120 to 140 patients at a time. At the same time, most hospitals in the nation have chosen not to invest funds to expand their EDs, or cannot obtain approval for expansion from regulatory agencies.

An area of deep concern regarding mass-casualty events is the decontamination of patients prior to their entry in EDs. "OSHA Best Practices for Hospital-Based First Receivers of Victims from Mass Casualty Incidents Involving the Release of Hazardous Substances," from January 2005³ explains the hospital's role in decontamination and makes practical recommendations for factors that play a role in the decontamination of patients. This document serves as the best practice for decontamination for first receivers, and is used by hospital associations and hospitals across the country as the leading document for the decontamination of patients. The basic principles and concepts from this document can also apply to mobile facilities and to temporary shelters, and serve as a guideline for an incident that involves thousands of victims. Hospitals around the country rely on this document as their major planning tool for decontamination, since the Joint

³ Occupational Safety and Health Administration, "OSHA Best Practices for Hospital-Based First Receivers of Victims from Mass Casualty Incidents Involving the Release of Hazardous Substances," January 2005, http://www.osha.gov/dts/osta/bestpractices/html/hospital_firstreceivers.html.

Commission does not require hospitals to have a medical surge plan, or specifically, a decontamination plan for their facility. Many times, the facility's emergency operations plan or emergency preparedness plan briefly covers this topic.

Several elements that play a role in mass casualty readiness include incident command and control, legal issues, personnel, use of volunteers, security, budget for department, equipment, patient monitoring systems, overcrowding, and a lack of qualified individuals to run the decontamination capability around the clock.

Although numerous elements involve hospitals and their capacity to deal with mass casualties, decontamination is the one element that can clearly shut down a hospital faster than any other element. Exposure to chemical, biological, or radiological materials when hospitals receive patients contaminated with these substances during mass-casualty incidents is the threat that affects hospitals the majority of the time, rather than the decontamination of patients with infectious diseases. The group of individuals who are first responders, such as firefighters, and law enforcement, as discussed in the problem statement section of this proposal, face many concerns regarding hospital EDs and their ability to serve patients who arrive during a mass-casualty event. Hospitals are increasingly worried that the sheer numbers of patients that could arrive for treatment may overload the system enough to not be able to provide safe, quality service. South Carolina hospitals have the same problems as hospitals nationally experience concerning a number of issues EDs face.

Hazardous materials (HAZMAT) teams and ambulance personnel are the first line of defense when transporting patients to hospital EDs. The assumption is that patients ideally are decontaminated prior to arriving at the local ED, which limits the quantity of substance arriving at the hospital. First receivers are the personnel in the following roles: clinicians other than ED personnel, and hospital staff from a number of areas: security, housekeeping, food service, and so forth.

As hospitals struggle with the issues of overcrowding and how to decontaminate large numbers of patients during a mass-casualty event, the significant challenge of this thesis is to recommend strategies for South Carolina hospital EDs specific enough to be incorporated into hospital emergency plans, and yet, remain flexible enough to be utilized by any size hospital in the state.

Although the next incident may not be predicted, or planned, it is the responsibility of hospitals to have available the tools to ensure the best healthcare possible to all victims. The consequence of not having strategies in place for hospitals is ultimately the loss of life due to not being prepared. Hospitals do not have the luxury to imagine what to do IF another disaster occurs, but rather be prepared to treat large numbers of casualties in their EDs.

B. RESEARCH QUESTIONS

How should hospitals determine which needs a facility has for dealing with mass casualty events and how do they assess their risk level for their facility?

Which policy recommendations for the decontamination process can be put into place for South Carolina hospital EDs to prepare actively for a mass-casualty event?

II. LITERATURE REVIEW

The literature available on the thesis topic is varied and broad. The sub-literatures or categories are: 1) government documents, especially since 2001, which focus on preparedness as a whole, 2) hospital best practices that have emerged in the last 10 years, 3) research on large-scale events that have shaped hospital preparedness and response beginning with SARS, the Tokyo Sarin attacks, the Oklahoma City bombing , 9/11, and Hurricane Katrina, and 4) GAO reports and OSHA recommendations for the decontamination of patients prior to entering hospital EDs.

A. NATIONAL REPORTS, STRATEGIES, AND OTHER GOVERNMENT DOCUMENTS

The *Hospital Emergency Surge Capacity: Not Ready for the “Predictable Surprise”*⁴ document published by the U.S. House of Representatives Committee on Oversight and Government Reform illustrates the snapshot in time survey of hospital preparedness at a given time in the United States. The survey represents what many people had suspected: hospitals across the nation are not prepared to accept a large number of casualties through their EDs at any given time. This survey was based on the numbers of casualties experienced in Madrid, Spain and is an example of how U.S. hospitals are not ready for a medical surge through their EDs at any point in time, under normal circumstances. The estimated number of casualties that could report to an ED at any one point is staggering, and this report is a wake up call for hospitals across the nation.

⁴ Committee on Oversight and Governments Reform, *Hospital Emergency Surge Capacity; Not Ready for the “Predictable Surprise”* (Washington, DC: U.S. House of Representatives, 2008).

Other government documents including the *9/11 Commission Report*,⁵ and the U.S. Department of Homeland Security, “Target Capability List,”⁶ describe preparedness as an essential capacity for the United States. The “Target Capability List” takes aspects of preparedness and defines the capability, and then breaks down preparedness measures into statements with metrics to answer yes/no to, and then drills down to critical tasks that need to be accomplished to complete the task.⁷

In the *9/11 Commission Report*, the document speaks to the evolution of counterterrorism, and although does not specifically mention hospital capability, does speak to other terrorism events and how agencies have had to adapt to the new terrorism.⁸ These government reports and strategies lay the groundwork for preparedness in the United States post 9/11, which has also impacted the manner in which hospitals have had to prepare to accept patients in their facilities. Planning for hospitals has been partly based on the recommendations from the government reports and strategies. Flaws in the literature include recommendations that are generally vague in nature, and seem to be removed from the real life of hospital EDs across the nation.

A recent GAO report indicated states are planning for medical surge, but may need to share medical resources. The report focused on the Hospital Preparedness Program 2006 Mid Year Reports to chart some of the sentinel indicators of the program to help determine the hospital capacity for EDs in time of surge.⁹

⁵ National Commission on Terrorist Attacks, *The 9/11 Commission Report: Final Report of the National Commission on Terrorist Attacks Upon the United States* (New York: W.W. Norton & Company, Inc., 2004).

⁶ Office of State and Local Government Coordination and Preparedness, Office of Justice Programs, “United States Department of Homeland Security, Target Capability List: Version 1.1.,” May 23, 2005, http://www.ojp.usdoj.gov/odp/docs/TCL1_1.pdf.

⁷ Ibid.

⁸ National Commission on Terrorist Attacks, *The 9/11 Commission Report*.

⁹ U.S. Government Accountability Office, *Emergency Preparedness: States are Planning for Medical Surge, but Could Benefit from Shared Guidance for Allocating Scarce Medical Resources* (GAO-08-668), Washington, DC: GPO, 2008.

B. BEST PRACTICES

EDs throughout the nation are dangerously overcrowded. Delays in being treated and in being dispatched speedily to the intensive care units means patients are less likely to survive. The chronic shortfall of funds has also been an impediment the last few decades for EDs. One possible solution to these problems is a new project called, “Project ER One,” a model for EDs based on 10 years of planning from input from top national and international experts. Washington Hospital Center is one of the hospitals that received and treated victims of the 9/11 attacks and the anthrax scare. Components of the project include digitizing medical records, and mounting computer screens in locations to have patient information available that assist with reducing waiting times significantly in the hospital studied. Hospital space must be utilized both inside the walls and outside hospital walls by having decontamination areas, ambulance ramps, and triage areas set aside for treatment. Hospitals are transforming their space to better prepare for medical surge and large numbers of patients entering their doors. Some hospitals are proposing unique solutions to complicated space and many are expanding their hospital surge capacity without spending millions of dollars.

As stated in Chapter I, decontamination is of deep concern. OSHA’s document “OSHA Best Practices for Hospital-Based First Receivers of Victims from Mass Casualty Incidents Involving the Release of Hazardous Substances,” from January 2005 addresses this topic.¹⁰

C. LARGE-SCALE WORLD EVENTS

Events, such as SARS, the Sarin gas attacks in Japan, the Oklahoma City bombings, 9/11, and Hurricane Katrina, have shaped and reshaped the healthcare system internationally. In these specific attacks, healthcare workers and the healthcare system were tested. As these events unfolded, healthcare was stressed to the maximum primarily through the arrival of large numbers of patients at hospitals EDs within a short period of time. In the case of the Madrid, Spain bombings, over 2,000 patients presented

¹⁰ Occupational Safety and Health Administration, “OSHA Best Practices for Hospital-Based First Receivers of Victims from Mass Casualty Incidents Involving the Release of Hazardous Substances.”

themselves to 15 local hospitals. Similar stories emerged from other large-scale world events. SARS impacted healthcare workers and the system became crippled due to the lack of healthcare workers able to work, as well as due to sickness.

Then Hurricane Katrina hit the Gulf Coast of the United States and left unprecedented devastation along the coast that affected not only healthcare, but also caused economic destruction. One year after the hurricane, a White House report was released with lessons learned and how the nation will be better prepared for future disasters. Hurricane Katrina was the stimulus for the federal government to take action regarding resources in the form of tax relief, FEMA providing grants to the areas, relief to homeowners and businesses in the area and money for the levees, and floodwall protection. Federal response was heavily criticized for the lack of emergency meals, and ice, and staff to take care of injured patients. Evacuation to hospitals was also criticized along with the lack of medical care by hospitals to deal with medical issues. *The Federal Response to Hurricane Katrina: Lessons Learned*, February 2006,¹¹ states how this event prompted responses from local, state and federal response partners. The extreme devastation of this one hurricane has changed the U.S. views, preparedness efforts, and response mechanisms to disasters in this nation.

The Joint Commission requires hospitals to conduct a hazard vulnerability analysis to identify events that could affect demand for their services or ability to provide those services, the likelihood of those events occurring, and the consequences of those events. Hazard vulnerability analysis should be reviewed annually by hospitals. The tool developed by the American Society for Healthcare Engineering analysis includes hazard, threat and hospital vulnerability in three factors.

1. Probability of Occurrence: based on the known risk, historical data, presence of threat within the geographical community and expert input.
2. Risk: based on interruption of services, potential for death or injury, and property impact.

¹¹ *The Federal Response to Hurricane Katrina Lessons Learned* (Washington, DC: The White House, February 2006).

3. Preparedness Status: based on current level of facility preparedness, history of response for similar threats, and the need for the use of outside resources.

All these events have brought a unique set of issues, and challenges to the healthcare system, especially patients who enter the healthcare system (hospital) via the ED. Medical surge and the expansion of surge are multifaceted, but the focus of this thesis is the overcrowding of EDs and the role of the decontamination of patients prior to entering the ED.

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III. ARGUMENT

Hospitals should utilize grant monies provided by the U.S. Department of Health and Human Services that allots states funds to improve public health preparedness and help healthcare facilities respond to emergency situations in which mass casualties occur. These funds may be utilized to assist in the cost of effectively managing large numbers of patients during these incidences. They may apply the money to preparedness planning, personal protective equipment purchases, exercises and education, and training efforts to advance the preparedness and capabilities of hospitals to respond to such threats where mass casualties are involved.

Although mass casualty events involve multiple elements at the individual hospital level, such as legal issues, personnel roles, use of volunteers, equipment and budgetary goals, it is imperative that the focus be on the role of decontamination and the initiation of a standardized approach for hospitals to use to ensure an effective patient flow through the healthcare system.

The decontamination procedure of patients entering EDs is a critical function in a facility's ability to manage mass casualties. If not appropriately addressed, it is the single most deteriorating element to the flow of patient care in the ED that could potentially present cross-contamination issues with healthcare staff, other patients, and equipment. Through the evaluation of multiple decontamination approaches from local, state and military jurisdictions, it will be evident that this topic is a key facet in the management of mass casualties in the ED.

Literature supports the claim that having hospitals prepared to deal with contaminated patients prior to entering the ED will help expedite seeing large numbers of patients, without having to stop or slow down their delivery of healthcare to patients, and to avoid a preventable closure of the hospital at the time it is most needed.

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IV. SIGNIFICANCE RESEARCH

A. LITERATURE

An analysis of existing research from multiple decontamination plans will lend itself to tangible practices for hospital EDs to apply to their emergency preparedness plans. The responsibility hospitals have to balance managing quality healthcare of patients and managing large numbers of patients entering EDs during a mass casualty event will be enhanced by employing recommendations provided in this thesis. The application of fine-tuned research will increase South Carolina's decontamination capabilities in order to meet the demands of threats to this nation's healthcare system.

Two guidance documents are well known for a common sense approach to the decontamination of patients. The "OSHA Best Practices for Hospital-Based First Receivers of Victims from Mass Casualty Incidents Involving the Release of Hazardous Substances" document¹² focuses on protection for first receivers during releases of chemical, radiological and biological agents that produce victims who may need to be decontaminated prior to entry in a hospital ED. The document does focus on mass-casualty incidents but can also guide hospitals for other events, such as decontamination in mobile facilities or shelters. This guidance does not cover situations in which the hospital is the site of the release, and it also does not cover decontamination for infectious outbreaks.

The other highly recognized guidance document in the United States, is the Veteran's Administration Hospital Decontamination course¹³ designed to provide a footprint to hospitals on how to evaluate the source of the contaminate, and all the elements of a decontamination unit, such as personnel, security, decontamination lines, and how to physically decontaminate a person, and so forth.

¹² Occupational Safety and Health Administration, "OSHA Best Practices for Hospital-Based First Receivers of Victims from Mass Casualty Incidents Involving the Release of Hazardous Substances."

¹³ Department of Veteran's Affairs, "VHA Decontamination Training Program, Employee Education System," updated August 2008, CD.

B. FUTURE RESEARCH EFFORTS

The significance research will assist South Carolina hospitals plan and prepare their individual facilities for mass-casualty events that may occur within the borders of the state. This thesis will also outline recommendations that may influence other state hospitals to implement more stringent guidelines for decontamination during mass-casualty events. The knowledge gained through this research will be used to identify recommendations on the issues of decontamination to other healthcare facilities in the author's state of South Carolina. She anticipates that these recommendations may also be requested by other states around the nation to help prepare their hospitals for the same issues facing EDs. This research is just the beginning on the work that needs to be done throughout the nation, but it is a starting point for planning for this nation's vital healthcare system.

C. IMMEDIATE CONSUMER/CUSTOMER

The immediate consumer or customer of this research will be South Carolina hospitals that participate in the Hospital Preparedness Program, sponsored by the Assistant Secretary of Preparedness and Response, under the umbrella of Health and Human Services.

D. HS PRACTITIONERS AND LEADERS NATIONALLY

The research will assist practitioners in homeland security and hospitals to understand the need to have a solid Emergency Preparedness Plan for their hospital and for Joint Commission requirements. In addition, hospitals that receive patients from other states will have a united method for dealing with overcrowding and decontamination of patients who enter their EDs.

V. METHODOLOGY

Case study methodology is utilized for this thesis, which explores best practices because they offer a good cross-section of the methods and types of emergency plans and guidelines that address decontamination practices of EDs. By using best practices and national guidelines, these practices may be able to be translated into recommendations for South Carolina EDs.

The state of Connecticut has designed a decontamination plan¹⁴ that addresses chemical, biological, radiological agents and how best to decontaminate patients affected by these agents. Its plan focuses on how to mobilize decontamination trailers throughout the state to decontaminate a large number of patients at one time.

The Bridgeport Hospital Emergency Preparedness Decontamination Plan¹⁵ is a real world example of how a leader in hospital preparedness has taken a proactive approach to decontamination for a facility. This thesis reviews its plans for mass-casualty events as it relates to the influx of patients in the ED and ways to solve some of the issues across the nation's hospitals. The variable in these plans is personnel used during this process and team composition. Each facility determines its standards of decontamination including personnel involved in the process. Each plan is evaluated on its specific approach to team membership, number of staff on each shift, and the level of protection each team member is provided. These best practices illustrate several tactics used by hospitals to help prevent, and protect the employees and facilities in this nation's hospitals. They represent a cross section of facilities in this nation that are all facing the same issues of how to deal with large numbers of patients entering an ED, and they also provide a broad view of the nature and type of threat that they represent and shed a glimmer of hope for the facilities in this nation.

¹⁴ *State of Connecticut Mass Decontamination Mobilization Plan*, March 10, 2005.

¹⁵ *Bridgeport Hospital Emergency Preparedness Decontamination Plan*, State of Connecticut, Bridgeport, February 2007.

This research analyzes and synthesizes data from existing decontamination plans to reviewing national GAO reports on the subject to help determine the shortcomings of each of the plans.

VI. ANALYSIS CHAPTER

Measuring emergency preparedness can be difficult, especially since many of the parameters to measure these specific elements of preparedness have been developed in within the last few years, after 9/11 and Hurricane Katrina. Events, such as these, have exposed the inadequacies in the nation's public health and medical capability to respond to terrorist attacks. Within the last several years, the Department of Health and Human Services has begun to develop a strategy and parameters improve the nation's surge capacity.

Healthcare surge capacity refers to the ability to expand medical surge rapidly beyond normal operating levels to meet increased demand following an emergency. Surge capacity encompasses so many factors that this thesis primarily focuses on the hospital beds.

This chapter focuses on parameters that can be utilized for hospital EDS to use for planning for mass casualties. Since the Hospital Preparedness Program is the source of funding for hospitals for bioterrorism and all hazards planning, it is important to describe how it has changed, modified, and evolved since 2002 when the grant program began the cooperative agreement with states. The natural progression of changing emphasis has required measuring the parameters differently many years. For instance, in 2005–2006, the general obligations of the grantees revolved around developing systems to either allow for the registration and credentialing of clinicians to volunteer during an increased surge capacity need, develop a system to ensure a sufficient supply of pharmaceuticals to provide prophylaxis for three days to hospital personnel, to have enough personal protective equipment for healthcare staff, or to ensure that hospitals have the capacity to maintain in negative pressure, one case of a highly infectious disease.

The last section of this portion of the thesis examines the use of volunteers during an emergency in three settings since the volunteer program nationally is greatly varied and diverse. The American Red Cross has traditionally been the volunteer agency that responded to emergencies and has a rich history internationally, and of course, in the

United States. After 9/11, the Surgeon's General Office initiated a volunteer program administered by states to recruit, train and credential medical volunteers actively with the goal that they could deploy locally, regionally or possibly nationally, to a disaster of any magnitude.

Hospital surge capacity is a complex set of parameters that affect every aspect of the hospital. Applications of the Hospital Preparedness Program funding were reviewed based on the extent to which the plan relates to identified needs, and how the prioritized benchmarks addressed the needs of staffing, equipment and capital improvements. Program goals, objectives and activities must show a progression of the program from year to year, while having measurable, achievable and sustainable goals and activities. As part of this parameter, the federal government required states to build a system that could provide triage treatment and initial stabilization, for the following classes of adult and pediatric patients requiring hospitalization within three hours in the wake of a terrorism incident or other public health emergency. As part of the parameter for states to receive federal funding, they had to address and document action steps that addressed Parameter 1. Some of these actions steps include high-risk scenarios based on a hospital Hazard Vulnerability Analysis (HVA) that must be applied to regions to determine if higher levels of surge capacity will be necessary, as well as intra-state or multi-state regional work plans that must be developed to address mutual aid agreements. Off-site facilities (alternate care facilities) must be addressed to include options to minimize the burden of hospital facilities. These sites could include mobile facilities, large convention halls, armories, and State Fairgrounds. Another action step includes planning for a pediatric specific mass casualty event. Parameter 1 specifically addresses hospital bed capacity as it relates to specific conditions.

A. PARAMETERS

- 1. Parameter 1: Hospital Bed Capacity: Minimal Level of Readiness: Specific Conditions**
 - 500 cases per million population for patients with symptoms of acute infectious disease, especially smallpox, anthrax, plague, tularemia, and influenza

- 50 cases per million population for patients with symptoms of acute botulism intoxication or other acute chemical poisoning—especially resulting from nerve agent exposure
- 50 cases per million population for patients suffering burn or trauma
- 50 cases per million population for patients manifesting the symptoms of radiation–induced injury, especially bone marrow suppression.

This parameter has not been revised or adjusted since 2005, and is still used when reporting to the federal government. This parameter does include the measurement for patients affected with acute infections, burn or trauma, and radiation exposure. All states that received Hospital Preparedness Program funding had to develop bed tracking capability systems that captured current daily-staffed bed capacity for a variety of bed types prior to 2001. Hospitals did not track surge capacity beds in detail as there no established system existed to capture this information on a daily basis from hospitals across a particular state. Although incidents involving many patients arriving at hospital EDs occurred, it was not deemed a high priority locally or nationally. It was not until 2005 that a parameter for measuring hospital preparedness was introduced by the Health Resources and Services Administration (HRSA). As part of the Hospital Preparedness Program, it required states to build a system that could provide triage treatment and initial stabilization.

As a result, states are now required to report an inventory of total surge beds, by region, and had to reflect beds for patients suffering from specific conditions, including pediatric and adult beds. At this time, the focus for bed capacity, surge capacity was based on chemical, biological, radiological, nuclear and explosive attacks. Beds had to be identified to handle these patients specifically. Since 2007, the national focus has turned toward an all hazard approach to planning, and not specifically focus on these few risks.

2. Parameter 2: Surge 15–20% Above Baseline Service Levels During a Public Health Emergency

A surge bed ratio consists of 500 adult and pediatric patients per 1,000,000 above the current daily-staffed bed capacity. The surge bed ratio was derived from several sources: National Disaster Medical System (NDMS) projections, data from trauma

regions/systems, systems developed for Mass Casualty Incidents (MCI) and other countries (i.e., Israel). This ratio is an extrapolation of several of these models, but seems to represent the best ratio for hospitals to follow for planning purposes.

Although the other planning ratios are important in overall emergency preparedness, the surge definition and ratio described above is most pertinent to EDs.

Although this parameter does focus on current daily bed capacity, it is critical for hospitals to consider several additional factors relating to the ability of the hospital to meet human resources including staffing needs, patient flow, clinic flow, physical layout of the hospital and others.

Another element in surge capacity often overlooked is the emergency training for all medical staff in hospitals. In 2005, another critical benchmark appeared based on competency-based education and training programs for adult and pediatric pre-hospital, and outpatient healthcare personnel responding to a terrorist incident or other public health emergency.

During this time frame and continued until today, competency-based trainings are required and particular attention is given to the two most populated regions of a state for which a predictable high-risk scenario has been identified through the HVA. The number of personnel in other regions of the state also has to be identified with training given to healthcare staff through competency-based programs. Encouraged are elements that address the needs of special populations, those that emphasize a regional approach, and are coordinated with other state, local and federal drills, and exercises.

Israel is a good example of how training should be conducted. Individual healthcare providers are required to participate in regular training. All paramedics, physicians, and nurses have to train at least once each year on convention and non-conventional mass casualty events. Hospital physicians are required to work emergency departments regardless of their area of practice. Physicians from all areas of the hospital are called upon in time of emergency to work the ED.

Hospitals also must make a plan to share resources with other hospitals in a geographic region, through Memorandums of Understanding (MOU) and contractual

arrangements. The Hospital Preparedness Program has focused the efforts on partnership/coalition development including the plan to share assets, personnel and information. This MOU should be tested through tabletop exercises to help unify the ESF-8 management of healthcare during a public health emergency, and integrate jurisdictional command in the area.

3. Parameter 3: Staffing of Healthcare Facilities, Alternate Care Facilities, and Other Medical Facilities

Facilities will have a written response system in place that allows the immediate deployment of additional patient care personnel in support of surge bed capacity that addresses surge 15–20% above baseline services.

One computer-staffing model being used is the AHRQ (Agency for Healthcare Research and Quality) Staffing Model for Bioterrorism Response¹⁶ that describes each of these human elements included in hospital surge capacity. The model does provide a framework from which to adjust staffing scenarios according to the factors associated with the scenario. For instance, a staffing model may look different for a mass prophylaxis campaign and a chemical spill at a nearby factory. User input is adjusted according to the various features of the event, such as patient flow, people processed through the clinic area, and process times.

B. PLANS

The analysis of the following medical surge plans provide a framework for hospitals to use when writing or revising their emergency plans. Each plan has been developed with emergency response partners in mind since all disasters are local, but depend on other assets to aid in the response of a mass casualty event. Each medical surge plan provides guidance on how public health, the health care system and preparedness partners can work together to provide medical surge and response during a disaster or catastrophe.

¹⁶ AHRQ, Agency for Healthcare Research and Quality, “Computer Staffing Model for Bioterrorism Response,” June 2011 (archived), <http://archive.ahrq.gov/research/biomodel.htm>.

Several plans were selected as models of medical surge planning. These plans were chosen a) because they were published and easily assessed on the Internet, b) provide a cross section of state and local plans that represent the jurisdictions in the United States, and c) individual hospital medical surge plans are generally not published for security reasons.

Each plan is evaluated on the above parameters and scored on a scale of One to Five (1–5). A score of 1 means the plan did not address the parameters at all, a score of 3 means some of the parameters were met but not fully addressed, and a score of 5 means the parameters were addressed and the plan is cohesive.

1. **Maryland Department of Health and Mental Hygiene Emergency Support Function 8: Public Health and Medical Surge Capacity and Capability Incident Response Annex**

- a. *Analysis*

The draft plan is only a few months old (July 2009) and uses assumptions to first help define the limits and scope of their plan. The first assumption is that the healthcare facilities are reporting extremely large numbers of patients, with either a sudden increase in patients arriving at the hospital, or a gradual increase that may peak quickly like in the case of a pandemic. The second assumption is that healthcare entities and local health departments are reporting high staff absenteeism that could occur either in a very short period of time in the case of a mass casualty event, or in the case of a pandemic, employees could be exposed early from either persons who are ill, or people they come in contact with during the pandemic. In the next assumption, healthcare systems are requesting assistance from the state, which means that the incident is moving up the tiers and requires more resources. The fourth assumption is the state is moving toward requiring additional assets from neighboring states and/or the federal government, and is relying on the prior planning assumption tiers. Moreover, the last assumption is that the governor or designee has declared a catastrophic health emergency, which would require this plan to be activated. It is only in the case of a major disaster or catastrophe that the plan would be activated. This state plan also addresses medical surge, and is

listed under the section called public health and medical surge. The plan focuses on the roles and responsibilities of the Department of Health and Mental Hygiene as triggered by specific tiers. The responsibilities can be added or modified depending on who the response partners are during the scenario. The plan for medical surge focuses on the local health departments to provide guidance to individual hospitals and to disseminate public health guidance for triage and treatment protocols, sample collection and reporting requirements. Communication and collaboration between all partners is the focus of the plan, while working closely with the hospitals to assist in the activation and public messaging to direct individuals to the appropriate locations to receive care.

Maryland does describe clearly the difference in capacity and capability. Their definitions are as follows, medical surge capability: ability of the system to expand rapidly the capacity of the exiting healthcare system to manage patients requiring unusual or highly specialized medical evaluation and care.¹⁷ The plan does then continue to state that most of the events or incidents that Maryland has seen in the past have not tested its capability to respond to the maximum capability. A mass casualty incident or influenza pandemic would require the support and buy in from the community to develop systems to respond effectively.

- Capability is then described as being more dependent on the nature of the incident and the specific resources required to respond. Medical surge capability involves issues pertaining to the need for special intervention to protect medical providers, patients and the integrity of the medical care facility during a public health emergency.¹⁸ Healthcare workers provide the range of specialized medical services needed in excess of what is normally available at the location where the emergency is located. Resources needed to consider with medical surge capability are the following.
- Equipment
- Expertise
- Incident Management Practices
- Information

¹⁷ “Maryland Department of Health and Mental Hygiene Emergency Support Function 8: Public Health and Medical Surge Capacity and Capability Incident Response Annex, Draft,” July 2009, 10.

¹⁸ Ibid., 11.

- Personnel
- Procedures and Protocols
- Supplies

This plan does follow the National Response Framework document and flow chart to coordinate Emergency Support Function 8 resources during a disaster or catastrophic incident. Since the National Response Framework is used to design this plan, then it naturally is divided into three parts: Prepare, Respond, Recover.

Section II, which is Respond, has a very strong description of participating agencies and their role in the ESF8 function. This section determines roles and responsibilities of the Department of Health and Mental Hygiene, local health departments, Hospitals,¹⁹ and other partners. The plan offers a guide for activities that need to be accomplished under each agency to respond effectively to a disaster or large-scale emergency.

b. Parameters

Although this plan does not specifically address all the medical surge capability parameters, the parameters can be analyzed as they relate to individual facilities and healthcare institutions.

(1) Parameter 1: Hospital Bed Capacity: Minimal Level of Readiness: Specific Conditions.

- 500 cases per million population for patients with symptoms of acute infectious disease, especially smallpox, anthrax, plague, tularemia, and influenza
- 50 cases per million population for patients with symptoms of acute botulism intoxication or other acute chemical poisoning—especially resulting from nerve agent exposure
- 50 cases per million population for patients suffering burn or trauma

¹⁹ “Maryland Department of Health and Mental Hygiene Emergency Support Function 8: Public Health and Medical Surge Capacity and Capability Incident Response Annex, Draft.”

- 50 cases per million population for patients manifesting the symptoms of radiation-induced injury, especially bone marrow suppression
- Maryland's population is 5,633,597 as of 2008, and its licensed bed size is 10,323 as of 2006. Therefore, using the parameter of minimal level of readiness, the state would have to plan for a range of an additional 1,548–2,064 patients with symptoms of acute infectious disease, especially smallpox, anthrax, plague, tularemia, and influenza to be seen through the hospitals. An individual hospital would then have to determine the population it serves, the counties or the population of the region and take a percentage of this number to determine its planning needs. The other parameters are based on 50 cases per million, so the same process would apply for these parameters. Maryland's medical surge plan does not specifically address surge bed needs per hospital, but hospitals within the state of Maryland could easily plan for additional surge beds/facility by taking the percentage of the population they serve and apply this to the range of additional surge beds needed to address their potential surge.

(2) Parameter 2: Surge 15–20% Above Baseline Service Levels During a Public Health Emergency. A Surge Bed Ratio of 500 Adult and Pediatric Patients per 1,000,000 Above the Current Daily Staffed Bed Capacity. Maryland's licensed bed capacity is 10,323 as of 2006. Therefore, planning for 15–20% above this baseline number would be an additional 1,548–2,064 patients that would need to be treated in hospitals across the state during an emergency. Again, an individual hospital could take its licensed bed size and then add 15–20% above this number for possible surge levels. Although most hospitals do not have the rooms and beds available for this type of surge, the need for an alternate care site (ACS) or off-site location is needed. These plans include the doubling of patients/room, using cafeterias, hallways, or other hospital owned buildings for housing patients during a surge. ACSs or off-site treatment centers have different definitions based on the state; thus, it is crucial that hospitals within a state clearly understand the meaning of these definitions.

In the case of Maryland, it has identified alternate care sites in relation to purpose of the site, types of patients and scope of care. The purpose of the ACS might be for primary triage point, community ambulatory clinic, or a low acuity patient care site. The plan also describes the types of surge hospitals:

facilities/buildings—non medical buildings that can adapt to surge hospitals and proximity to a medical center, mobile medical facilities—hospitals on tractor-trailer platforms with surgical and intensive care capabilities, and then portable facilities—that are fully equipped, self contained, systems usually stored in a container and based on military medical contingency planning.

(3) Parameter 3: Staffing of Healthcare Facilities, Alternate Care Facilities, and Other Medical Facilities. Facilities Will Have a Written Response System in Place That Allows the Immediate Deployment of Additional Patient Care Personnel in Support of Surge Bed Capacity That Addresses Surge 15–20% Above Baseline Services. Although the Maryland Public Health and Medical Surge Capacity and Capability Incident Response Annex did not specifically address how many staffing of what discipline would be needed to cover a response, it does discuss assumptions during a large-scale emergency. For instance, the assumption is that during a pandemic, up to 20–25% healthcare professionals would be absent from their positions due to sickness. The plan also addresses the tools currently available through the AHRQ that has developed tools to assist in identifying resources during a hospital surge. The state plan then describes the workforce, and methods for enhancing surge through the process of activating the Maryland Medical Reserve Corps volunteer and the local medical reserve corps. A revision of the clinical model is suggested as one method for expanding surge to help reconstruct day-to-day schedules and staffing patterns. A list of other alternative solutions that hospitals could use is also provided that includes staff willing to work extra shifts, re-deploy clinicians, cross train staff, and so forth. Again, this plan does address several of the staffing needs, resources, documentation and communication plans that need to be in place especially when addressing alternate care sites. It also lists available resources, including federal medical stations, the U.S. Air Force medical support package, and tractor trailer units. Maryland has addressed alternate care sites in an appendix of the Medical Surge Plan.

Activating mutual aid agreements to request additional resources through the State Emergency Operations Center or the Maryland Department of Health and Mental Health Emergency Operations Center is also provided in this annex.

The Maryland Medical Surge Capacity and Capability Incident Response Index does address scenarios to national planning scenarios. Many of these scenarios do plan for large-scale medical emergencies that would require a significant increase in hospital admissions and maximize available resources and the increased need for surge capacity before and during an event. Using the parameters of minimal levels of readiness does fit into its current assumptions in the plan. Individual hospitals within Maryland could take the parameters and dovetail them with the medical surge plan to form a comprehensive plan that would assist hospital EDs with their planning for mass casualties. All five planning assumptions made by Maryland impact hospitals either directly or indirectly. Thus, they help define the limits and scope of the plan. The overall metric score would be a 3.5.

2. New Hampshire Plan

The State of New Hampshire Medical Surge Guidelines from October 2006 describes medical surge capacity and capability, and provides guidance for medical surge planning in the state of New Hampshire. The plan is to be prepared for emergencies that generate victims requiring medical treatment that surpass the normal resource capacity and/or capabilities of the state of New Hampshire.²⁰

a. Capability and Capacity

This plan also addresses all-hazards and defines hospital surge capability and capacity as the following.

- *Hospital Surge Capability:* Ability of hospitals to use the physical and human resources necessary efficiently and appropriately to meet an increased demand for medical care. Hospital surge capability is described in Tier 1.
- *Hospital Surge Capacity:* Quantifiable amount of hospital resources and services (i.e., staff, equipment and space) available to meet an increased demand for medical care. Hospital surge capacity is described in Tier 1.

²⁰ New Hampshire Department of Health and Human Services, “The State of New Hampshire Medical Surge Guidelines,” October 2006, 4, <http://www.nhha.org/index-nhha.php?nhha>.

The plan then continues to describe medical surge capability and capacity as the following.

- *Medical Surge Capability*: Ability of an affected community or region to use physical and human resources appropriately in emergencies that overwhelm the normal medical infrastructure. It entails augmenting both non-ambulatory and ambulatory care.
- *Medical Surge Capacity*: Quantifiable amount of community or regional resources and services available for providing medical care in emergencies that overwhelm the normal medical infrastructure (through numbers or types of patients or loss of infrastructure). Medical surge capacity encompasses both hospital and community-based surge capacity efforts and, as such, entails augmenting both non-ambulatory and non-ambulatory care.²¹

The state of New Hampshire uses the Medical Surge Capacity and Capability (MSCC) principles of emergency management and the National Incident Management System. New Hampshire has adopted the tier system for providing structure to the guidance and also outlines responsibility among response agencies. Several considerations for planning at all tiers entails including the diverse population density, from dense urban areas to rural areas, including the borders of Canada, Maine, Massachusetts, and Vermont, as well as including a portion of the state into the Boston Metropolitan Statistical Area (MSA) for planning, seasonal population changes, and special needs populations. The tiered system ranges from Tier 1 that is the individual healthcare facility to Tier 6, federal support to the state. The state is also divided into All-Hazards Planning Regions (AHR), in conjunction with Regional Coordinating Committees (RCC) that oversees planning efforts. The RCC also propose changes to the alignment of the AHR, as well as oversee a process for municipalities to demonstrate their commitment to process by signing a MOU.

b. Analysis

The New Hampshire plan does make recommendations specific to surge for both hospitals and other acute facilities. For example, each region will build and

²¹ New Hampshire Department of Health and Human Services, “The State of New Hampshire Medical Surge Guidelines,” 7–8.

maintain a capacity to surge 50 community-based beds using the Acute Care Center (ACC) design. In a region that has 75,000 residents or more, the recommendation is to build and maintain a capacity based on the ratio of 1 community surge bed per 1,000 populations by 25 bed increments. The New Hampshire plan also recognizes that hazards differ from region to region, which are listed as the minimum standards for extra medical care capacity. The plan also does a nice job of refinancing terms with medical surge capacity, such as altered standards of care, volunteers and credentialing and information technology. Each tier describes the work of the agencies involved and the assignments of what should be accomplished through this tier. Although the New Hampshire plan does focus on the roles and responsibilities of the agencies involved in response, it also lists the statutes, agency and authority for each law or regulation, which is very helpful to have these listed in one location.

c. *Parameters*

(1) Parameter 1: Hospital Bed Capacity: Minimal Level of Readiness: Specific Conditions.

- 500 cases per million population for patients with symptoms of acute infectious disease, especially smallpox, anthrax, plague, tularemia, and influenza
- 50 cases per million population for patients with symptoms of acute botulism intoxication or other acute chemical poisoning—especially resulting from nerve agent exposure
- 50 cases per million population for patients suffering burn or trauma.
- 50 cases per million population for patients manifesting the symptoms of radiation-induced injury, especially bone marrow suppression

Again, using the state of New Hampshire population statistics from the United States Census Bureau, 2008,²² 1,315,809 residents live in New Hampshire. For this parameter, take the population and divide by 500 for the infectious diseases, and divide by 50 for the other elements, and the state capacity is easily determined. Actually,

²² United States Census Bureau, State Rankings—Statistical Abstract of the United States State Rankings, “Resident Population—July 2008,” (n.d.), <http://www.census.gov/statab/ranks/rank01.html>.

the New Hampshire Medical Surge Guidelines²³ use the statistics from the 2005 population per region and determine the bed capacity for each region. The planning has already been done and published. Therefore, it would only be necessary to update this plan, since it already addresses the parameters of medical surge planning.

(2) Parameter 2: Surge 15–20% Above Baseline Service Levels During a Public Health Emergency. A Surge Bed Ratio of 500 Adult and Pediatric Patients per 1,000,000 Above the Current Daily Staffed Bed Capacity. The New Hampshire Hospital Association published its updated report in December 2009²⁴ listing 3,020 licensed beds in New Hampshire. Using the surge model of 15–20%, an additional 453–604 beds would be required to be available during an emergency. Since the state plan addresses bed capacity of hospitals, another column could be added to cover the 15–20% surge for future planning. Since this plan addresses both medical surge capacity and hospital surge capacity, the plan is an excellent example of how a state or healthcare facility uses data to determine medical surge needs in times of an emergency. It also addresses the needs of the community, rather than just bed capacity of hospitals, which is a forward way of thinking that other states could adopt. This plan also identifies an aspect of medical surge planning that has not yet been mentioned specifically. The relationship with the hospital association in each state can be varied and unique. For instance, in some states, the hospital associations are really the conduit of funding between the state agency receiving funds and the individual hospitals. In some states, the relationship is slightly different, in which they are really the liaison between the state agency and hospitals while not controlling the money for individual hospitals. The hospital associations in this case published very useful data that both the state and individual hospitals could use for state medical surge planning, as well as individual hospitals planning. The hospital associations must meet standards related to emergency planning, and emergency

²³ New Hampshire Department of Health and Human Services. “The State of New Hampshire Medical Surge Guidelines,” 20.

²⁴ Foundation for Healthy Communities New Hampshire Hospital Association in Collaboration with National Center for Rural Health Works, “The Economic Impact of Hospital Systems in New Hampshire,” December 2009, 15.

management for hospitals within their states. Therefore, it is advantageous for state agencies to develop, foster and maintain a close working relationship with their respective hospital associations.

(3) Parameter 3: Staffing of healthcare facilities, alternate care facilities, and other medical facilities. Facilities will have a written response system in place that allows the immediate deployment of additional patient care personnel in support of surge bed capacity that addresses surge 15–20% above baseline services.

The staffing of healthcare facilities is also addressed. The New Hampshire plan does include a table that identifies the class of employee, i.e., physician, RN, case manager, social worker, etc and indicates staffing levels per 12-hour shifts for a 50-bed alternate care center. This planning scenario has used 50-patients/hour in 12-hour shifts within the ACC. The model used for this planning scenario was based on the Rocky Mountain Bioterrorism (RMBT) working group. This model was developed in 2002 as a beginning for surge planning. The model is not without flaws. This published model does fail to consider additional staff that would be vital to sustain operations within an ACC and may not directly participate in medical aspects of patient care. These providers would include dietary, housekeeping, and others who provide support as ancillary services. The other piece of this parameter that New Hampshire addresses in its plan is the need to have job action sheets, or job descriptions for each staff member, which is an extremely critical aspect of staffing, since each individual needs to know specifically what role to assume during an emergency.

This plan, like the New Hampshire plan, also focuses on the tier response system, along with clearly explaining hospital responsibilities in each of the tiers. This plan is also easy to read and describes the role of the hospital. It probably works well, since the state is small and does not have hundreds of hospitals to coordinate. Using the three parameters, the plan would receive 4 out of 5 for a metric score. This plan really addresses the needs of the community and does an excellent job on defining terms used in the plan. The state plan leaves flexibility for individual hospitals to expand their capability, while including the community needs through medical surge capacity. This unique approach to planning is one that can be used by other states for emergency

preparedness, and particularly, surge capacity. This plan highlights the relationships made in a smaller state with both private and public entities including the hospital association. The strong-tiered approach to planning is evidenced by the local, state and regional approach to planning.

3. The Arlington Public Health and Medical Services (PHMS) Surge Plan

The Arlington Plan has a slightly different approach in its surge plan compared to the two state plans of Maryland and New Hampshire.

a. Analysis

Arlington County is located in close proximity to Washington, DC and serves as a joint planner and responder to events, especially in large-scale events. This surge plan includes large appendices that include best practices, legal authorities, operational tools, and contact lists. Also integrated is a listing of surge facilities including their bed capacity during non-emergency situations, additional resources available in a surge situation, and the plan for each healthcare facility to surge and to what percent above normal staffed bed capacity. Each healthcare facility has a surge plan, summarized in one paragraph, to indicate what steps the facility will take during a surge situation. The surge plan is applicable to any type of mass casualty, natural disaster or emerging infectious disease incident with actual or anticipated casualty numbers or types that challenge the regular medical infrastructure of the county. This plan is based on a partnership between relevant government and community agencies with all their resources combined. Neither sector has the resources or surge capacity to respond to emergencies of large magnitude. The purpose of the medical surge plan is to provide operation level, all hazards guidance for the Emergency Operations Center where public health and medical surge events would happen. The scope of the plan is to prepare for response assumptions for incidents that involve large numbers of patients, strategic and tactical considerations for Public Health and ESF-8 partners, resource management considerations, mutual aid guidance, and integration considerations with other state and federal entities and other emergency operation plans related to medical surge.

The Arlington Surge Plan does not include the tiered structure, since it is focused on the response area and relevant response partners surge plans, which is an example of how a local public health plan can be very effective in its response to a natural or man-made disaster affecting the local jurisdiction. The plan does not address the parameters described in this chapter, but hospitals can take the valuable information from the plan and incorporate their data into these parameters. For instance, Arlington County has organized its plan into operational areas of readiness, such as roles for surge command and control staff, triage system and protocols, and equipment and supplies, which is not normally addressed in state medical surge plans. This county plan also addresses the telephone triage system model, which is valuable to hospitals and other first responders. To utilize the parameters in this chapter, individual hospitals must analyze their numbers and plan accordingly. Again, this plan does address the emergency/disaster related authorities including the law number and a brief description of each law as it relates to emergency/disasters. It also defines the types of surge capacity by levels Level I facility (internal surge), Level II lateral or inter-district mutual aid and mobilization, Level 3 inter-state mutual aid, and Level 4 state request for federal support. The plan provides specific staffed bed capacity for each of these levels of surge capacity.

The Virginia Hospital System, Arlington Health System has a total bed capacity of 2,493 as of 2008, which includes Arlington County's 342 licensed beds, the City of Alexandria's 355 licensed beds, Fairfax County's 1,343 licensed beds, and then Loudoun and Prince William Counties' 453 licensed beds.

b. Parameters

(1) Parameter 1: Hospital Bed Capacity: Minimal Level of Readiness: Specific Conditions.

- 500 cases per million population for patients with symptoms of acute infectious disease, especially smallpox, anthrax, plague, tularemia, and influenza
- 50 cases per million population for patients with symptoms of acute botulism intoxication or other acute chemical poisoning—especially resulting from nerve agent exposure

- 50 cases per million population for patients suffering burn or trauma
- 50 cases per million population for patients manifesting the symptoms of radiation-induced injury, especially bone marrow suppression.

The population of Arlington County as of 2008 is 209,969, according to the United States Census Bureau, from 2008.²⁵ Therefore, using the parameter for infectious disease, the county would have to plan for 419 infectious patients in its local hospitals to be seen during a public health emergency. Just like the state plans, an individual hospital would then look at the population it serves, its current bed size, and then determine what percentage of the 419 patients would be seen per hospital. This planning ideally would be done in conjunction with public health and other hospitals to help determine the needs of the county.

(2) Parameter 2: Surge 15–20% Above Baseline Service Levels During a Public Health Emergency. A Surge Bed Ratio of 500 Adult and Pediatric Patients per 1,000,000 Above the Current Daily-Staffed Bed Capacity.

Arlington County uses the upper range of medical surge in its plan as it uses 20% of the staffed bed capacity in Virginia to plan for surge. The plan involves the redistribution and maximization of staffed hospital beds in the Commonwealth, it incorporates the activation procedures to provide a rapid in-patient intake capability through the utilization of vacant, staffed beds, and the expedited discharge of patients who meet the criteria for discharge, and includes a timeframe of 0 to 4 hours to activate its Level I surge.

Using the Hospital Preparedness Program data from the last several years, each state has the baseline numbers of hospital beds licensed for each facility, as well as the surge beds expected through the state. This number should be 15–20% surge above normal daily bed count. Since the total licensed beds for the Virginia Hospital System, Arlington Health System is 2,493, its surge numbers would range from 374-499 surge beds needed during times of an emergency.

²⁵ United States Census Bureau, State Rankings—Statistical Abstract of the United States State Rankings, “Resident Population—July 2008.”

(3) Parameter 3: Staffing of Healthcare Facilities, Alternate Care Facilities, and Other Medical Facilities. Facilities will have a written response system in place that allows the immediate deployment of additional patient care personnel in support of surge bed capacity that addresses surge 15–20% above baseline services.

Although the Arlington Public Health and Medical Surge Plan does not specifically address numbers of medical staff needed for surge, an Appendix does describe surge response partners' surge plans and descriptions of partners' capabilities. This parameter is the strength of this plan, as each of the response partners have a detailed plan of their assets, and what they bring to medical surge related to services, hours of operation, contact information and responsibilities of the healthcare center. The plan also identifies a situational assessment tool that refers to staffing needs of various professions, as well as a notification to community human services agencies.

The metric score for this plan would be a 3.0 since actual parameters for this analysis were not identified, but the plan does detail the response partners' responsibilities and contact information. Arlington includes a great amount of detail with its Appendix, and especially concerning the operational tools, and the three surge models. This plan is an excellent example of how to reach both the public and healthcare workers and public health using different tools. Sometimes one model is not the best for all scenarios or group of individuals. Arlington is part of the National Capitol Region that has a very robust medical surge plan. Therefore, the best practices, models and contacts for the geographic region are the focus.

Each of these plans, whether state or county, is an example of how parameters can help with strategic planning for individual hospitals and public health in their jurisdiction. The parameters for surge capacity may change in the future, as the needs of the nation change, but using specific numbers and percentages in specific surge elements, provide an individual facility the tools it needs to plan effectively. These plans also have some common themes discussed in the recommendation section.

c. *Alternate Care Sites*

Arlington has taken another approach to identifying surge beds through alternate care sites. They use several models utilized by a hospital in an emergency surge situation: a Telephone Triage system, a Community Care Station (CCS), and an Alternate Care Facility (ACF).

(1) Telephone Triage System. The telephone triage system is a public health interactive mechanism that assists the public with understanding health related messages and allows them to ask questions about family and personal circumstances.

Table 1. Telephone Triage System Service Functions²⁶

Health Information	Provides disaster and/or disease information to the public and providers during and after the crisis to support their ability to care for themselves and others.
Disease/Injury Surveillance	Collects specific data or utilizes already established databases to identify disease/illness/injury, emerging health trends or sentinel events.
Triage/Decision Support	Utilizes clinical algorithms or decision trees to support the management of caller reported symptoms. Levels of clinical decision support depend on the scope of practice of the person answering the phone. Non-clinicians may provide information to callers to allow them to make their own healthcare decisions.
Quarantine and Isolation Support	Monitor the compliance, health status and resource needs of those assigned to home quarantine and isolation. Quarantine applies to those exposed to a contagious illness and who may be infected but are not yet ill. Quarantine is an effective way to protect the public and stop the spread of illness. Isolation is the separation and restriction of movement of ill people to stop the spread of that illness to others. Care can occur in homes, hospitals or at designated health care facilities.
Outpatient Drug Information/Adverse Event Reporting	Provides drug information, e.g., pill identification, as well as the collection of adverse drug events, related to large-scale prophylaxis or immunization without standard medical supervision.
Mental Health Assistance/Referral	Recognizes individuals with mental health needs; provides referrals to community resources where appropriate and incorporates any post-event government agency directives (i.e., surging community mental health status per the Center for Disease Control (CDC)).
Mass Risk Communication	Utilizes general informational messages distributed by government and community leaders via the media (i.e., public service announcements, radio bulletins, television “crawlers,” Emergency Alert System) to alert and inform the public.

²⁶ Arlington County Health and Medical Services Surge Plan, Telephone Triage System Model, Appendix 6, March 2009.

(2) Community Care Station (CCS) Model. The CCS model is designed as a first-level surge response to an expanding emergency incident. The purpose is to create a community-based response to complement health care that may be occurring within the community through private physicians, urgent or clinical care centers or other non-profit health care groups. In addition, in a surge response situation, hospitals will be looking for a community resource to manage the less infirm. Depending on the severity of the public health event, the CCS can initially be established mainly as an information center. It can offer a safe venue for public information, as well as address questions and concerns specific to the local community.

A unique feature of the CCS is that the ideal structure for this low acuity care service system will reflect the composition of the community. It will be a public-private partnership whereby appropriate staffing from both the government and the community will staff and operate the center in partnership with the public health division.

(3) Alternate Care Facility (ACF). The ACF model is designed as a surge response to an expanding emergency incident. A major purpose of the ACF is to free up space and decrease demand at the Virginia Hospital Center once it has maximized the use of its existing bed capacity and available resources within its Healthcare Facility Surge Area (HFSA) and the surrounding region. Therefore, the hospital can more effectively care for the most seriously ill or injured.

The ACF is designed as a community-based, modular inpatient care system to receive triaged patients from the Virginia Hospital Center (VHC) and the Community Care Station (CCS) that meet standardized criteria for admission.

The ACF, as a supplementary medical care facility, will provide low acuity inpatient care. The ACF will not be able to treat patients who require an advanced level of care that includes critical/intensive care or life support. The ACF will not have access to the necessary equipment or trained staff to provide this level of care. Patients with needs that require advanced care will be triaged and transferred to the

Virginia Hospital Center. Detailed plans for establishment, activation, staffing and operating the ACF are presented in Appendix 8. Tables 4 and 4a provide a list of potential services offered at the CCS and ACF.

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VII. USE OF VOLUNTEERS DURING EMERGENCIES

Over the last decade, two major volunteer programs emerged at the federal level: Emergency Systems for Advanced Registration of Volunteer Health Professionals (ESAR-VHP),²⁷ and the Medical Reserve Corps (MRC). Both these programs are a direct result of 9/11 when thousands of spontaneous volunteers also known as unaffiliated volunteers, merged on the disaster scene and area hospitals in an effort to assist victims of the 9/11 disaster. The overwhelming number of spontaneous volunteers complicated an already overburdened response system, which caused health officials to focus efforts on providing housing, sanitation, and food for the volunteers.

Prior to 9/11, no systems of coordination existed across the nation to verify the identities, license, and credentials of spontaneous health volunteers willing to work within the hospital structure.

Although the American Red Cross existed as the premier of volunteer organizations in humanitarian aid and disaster relief, it served as a conduit of donor funds and blood products in the aftermath of 9/11.

The aftermath of 9/11, and more recently, Hurricane Katrina, revealed a gap in hospital preparedness. The need to identify, recruit, credential and train health care volunteers prior to an emergency became a focus of Congress.

A. BACKGROUND

Experience has shown that in an emergency, overwhelming numbers of health care workers are eager to volunteer their services. However, hospitals and emergency officials have found it difficult to utilize services of volunteers quickly due to the inability to verify identities, license and credentials of the volunteers. As a result, volunteers are turned away and services, although sorely needed, are not utilized.

²⁷ U.S. Department of Health and Human Services, Assistant Secretary of Preparedness and Response (ASPR), *ESAR VHP Grant Program, ESAR-VHP Technical and Policy Guidelines, Standards and Definitions-CFDA 93.089*, Version 2, June 2005.

In 2002, Congress passed the Public Health Security and Bioterrorism Preparedness and Response Act, Section 107²⁸ that mandated that all states and territories develop an emergency system for an ESAR-VHP credentialing database system. Each of the 60 states and territories received funding under the administration of the U.S. Department of Health and Human Services, Assistant Secretary of Preparedness and Response. ESAR-VHP systems were to be built to a single set of emergency credentialing standards and definitions for mutual aid purposes as set forth under the ESAR-VHP Interim Technical and Policy Guidelines, Standards, and Definitions.



The goal was to resolve, in advance, the significant challenges faced when seeking to utilize the services of health care volunteers in response to a complex emergency situation.

1. ESAR-VHP Objectives

- Develop a uniform set of standards across the states to enable the use of volunteers for mutual aid
- Develop a volunteer cadre in support of public health activities
- Assist hospitals in hospital surge capacity needs by providing lists of identified and credentialed volunteers
- Identify, register and verify the credentials of medical, behavioral health volunteers and other professionals prior to an emergency
- Assign volunteers to one of four resource typing levels based on the type of verified credentials

Although ESAR-VHP is a federal program under the administration of the Assistant Secretary of Preparedness and Response, the program does not receive federal liability protections. Each state is responsible for securing liability insurance for its volunteers.

²⁸ South Carolina Department of Health and Environmental Control, Office of Public Health Preparedness, *Medical Reserve Corps Volunteer Handbook* (Columbia, SC, October 2010). References the Public Health Security and Bioterrorism Preparedness Response Act, Section 107, 2002.

2. ESAR-VHP Funding

In 2005, Health and Human Services (HHS) allocated funding to the states and territories in three phases. The first phase funded pilot programs in 10 states. By 2006, South Carolina received funding to begin the development of the ESAR-VHP database system under the Assistant Secretary of Preparedness and Response Hospital Preparedness Program.

While states were beginning the development of the ESAR-VHP database system project, the Medical Reserve Corps program was well underway.

Secretary of Health and Human Services Tommy G. Thompson officially launched the MRC program in July 2002. The MRC is a nationally recognized program headquartered in the Office of the Surgeon General and administered by the Division of Civilian Medical Reserve Corps. The Division of Civilian Medical Reserve Corps serves as a clearinghouse that provides guidance, technical support, and best practices to the local MRC unit. MRC units are housed under separate entities at the local level.



In 2006, South Carolina applied for Hospital Preparedness funds to develop the Medical Reserve Corps. By 2007, South Carolina registered eight MRCs located in each of the state health department's eight public health regions. South Carolina was the first state in the nation to provide statewide coverage of the MRC encompassing all 46 of its counties. South Carolina utilizes the ESAR-VHP database system to register and credential the MRC volunteers. South Carolina's ESAR-VHP and MRC programs are fully integrated under the state agency's Office of Public Health Preparedness. The state health department administers the ESAR-VHP/MRC program. The eight MRCs are provided standards of operations, policy structure, and technical assistance at the state level under the direction of the Office of Public Health Executive Director and state ESAR-VHP/MRC Volunteer Coordinator.



Figure 1. SC MRC Low Country Fall 2009²⁹



Figure 2. SC MRC Midlands Drive Through POD Fall 2009³⁰

Volunteers receive training in the incident command structure and augment public health staff in Emergency Support Function (ESF 8) health and medical emergency response activities. South Carolina is in the process of expanding the ESAR-VHP/MRC program to facilitate South Carolina acute care hospitals' ability to utilize ESAR-VHP/MRC volunteers for hospital surge capacity needs. Volunteers are provided tort liability coverage through the state health department. However, the state health department is unable to provide worker's compensation coverage due to state laws.

²⁹ Deborah Derrick, SC State Coordinator of ESAR-VHP and Medical Reserve Corps, "South Carolina Department of Health and Environmental Control," Medical Reserve Corps Promotional Slides, Fall 2009.

³⁰ Ibid.

In 2010, the Division of Civilian Medical Reserve Corps and national ESAR-VHP programs partnered to encourage and promote the integration of state ESAR-VHP programs and local MRCs across the nation for the registration, verification, and credentialing of volunteers.

B. OVERVIEW OF THE MEDICAL RESERVE CORPS

The MRC is a national network of local groups of volunteers committed to improving the health, safety and resiliency of their communities. The administration of a MRC unit varies and is based on the housing organization and community partners. MRCs are housed in a variety of settings including hospitals, local health departments, and emergency agencies. MRCs can also register as a 501 c (3). MRCs receive financial support through federal, foundation, and business grants, donations and fund-raisers, and from the housing agency. Each MRC unit is responsible for providing liability protections/insurance for the unit's volunteers. Over 900 MRC units are registered nationwide. Although each unit is unique to the community in which it serves, all units share a common criterion: the need to recruit volunteers, train members, create policies, procedures, and conduct unit evaluations.

MRC units are managed by a MRC Unit Coordinator, and operate and deploy as a self-contained unit within the Incident Command Structure response system. MRC volunteers include medical health professionals and paraprofessionals interested in strengthening public health infrastructure and improving the preparedness response capabilities of their local jurisdiction. MRC units identify, screen, train and organize the volunteers and utilize them to support routine public health activities, community health initiatives, and preparedness and response efforts.

The Division of Civilian Volunteer MRC provides technical assistance in the registration and establishment of a unit. Each unit must adhere to a set standard of criteria to become a registered unit. The Division of Civilian Volunteer MRC promotes adherence to the Surgeon General's Core Competencies, which is a suggested training

guide for the local MRC volunteer. The office's activities include strategic planning, policy development, program operations, grants management, contract oversight, and deployment operations.

- Mission: MRC Nationally. Engage volunteers to strengthen public health, emergency response and community resiliency
- MRC Vision: Public Health Resiliency

C. CASE STUDIES

Three MRC's operation plans were reviewed to analyze the differences between the organizational structure, administrative functions, recruitment, training plans, and liability protections. The first MRC program reviewed is located in the Hampshire County Medical Reserve Corps.

Hampshire County MRC belongs to a coalition of Medical Reserve Corps and Public Health and Emergency Preparedness Departments serving the western Massachusetts counties of Berkshire, Franklin, Hampshire and Hampden. Key partners include the Hampshire County Health Department, the Local Emergency Planning Committee, and Hampshire Memorial Hospital. Three MRC units are located within Hampshire County, which adhere to a uniform standard of operations as set forth under the Hampshire County Massachusetts MRC Policy and Procedure Manual.³¹

1. Hampshire County Massachusetts Medical Reserve Corps Policy and Procedure Manual—March 2008

The plan is developed into four main sections: 1) program overview, 2) volunteer relations, 3) volunteer activation, and 4) administration.³²

The program overview section describes the history, mission and purpose of the policy and procedure manual. The purpose of the MRC units revolves around three key areas.

³¹ Medical Reserves Corps, *Hampshire County, Massachusetts Medical Reserve Corps Policy and Procedure Manual*, March 2008.

³² Ibid.

1. Public Health Emergencies—events that threaten public health, such as a disease outbreak, or toxic chemical release
2. Mass Casualty Incidents—disasters that cause injury or threats to large numbers of people that can include a building collapse, fire, storm, flood, or other events that displace groups of residents who must be moved to emergency shelters
3. Community Service Activities—opportunities to foster the well-being of local residents; such as health fairs, blood pressure clinics, or training programs³³

The goals of this MRC plan are similar to many MRC plans across the nation. They primarily want to recruit, enroll and train medical and paraprofessionals volunteers while maintaining a database of volunteers. The Hampshire County MRC provides web-based registration and hard-copy applications. It does not utilize the state-based ESAR-VHP database credentialing system but hopes to integrate with it in the future.

The other goal is to provide training and volunteer opportunities on a regular basis, so that the volunteers can stay committed and involved in the volunteering process. The protocol of operation is structured under the National Incident Management System and Incident Command System. Volunteers are required to take ICS 100 and 700 in accordance with the Surgeon General's core competencies.

The next area of volunteer relations describes different levels of involvement described in a Tier 1-3 system: basic, active, and a team leader level. Eligibility of readiness of service usually involves background checks, license and certificate verification, MRC identification badge, specialized training, and confidentiality forms.

The administrative section of the plan includes accountability, volunteer management, conflict management, performance standards, disciplinary procedures, and volunteer dismissal.

The plan emphasizes the fact that the volunteers are NOT a first responder organization and do not have the capability to respond within minutes of an event. The MRC is structured to support local response efforts after the initial assessment has been

³³ *Hampshire Co Mass MRC P and P Manual*, 2008.

conducted by the Incident Commander and needs identified. Activation of the MRC can be in response to a large-scale emergency or for a non-emergency activity and is up to the discretion of the MRC Unit Coordinator.

The Hampshire County MRC provides a list of state and federal laws prescribing different liability protections, most of which are immunity from liability for negligence protections. However, it is unable to offer worker's compensation coverage for volunteers.

Volunteers are used in several avenues in the Hampshire County MRC. Recent activities in the last several years indicate that they have participated in a statewide disaster drill and utilized the West Virginia Responder Emergency Deployment Information (WVREDI) to contact volunteers and to test response time. They have also exercised their call down list, and have participated in county/regional tabletop exercises, as well as drive through flu clinics in their counties.³⁴

2. Central Georgia Medical Reserve Corps

The housing agency for the Central Georgia Medical Reserve Corps is the North Central Health District—one of 18 public health districts in Georgia. The Central Georgia MRC is under the governance of an Executive Committee. A larger steering committee provides oversight to the executive committee. The Central Georgia MRC Unit Coordinator is under the direction of the executive committee.

The *Volunteer Handbook* for Central Georgia³⁵ describes the goal and mission of the organization, which is locally based healthcare personnel and whose purpose is to augment, assist, and support the existing medical and public health systems during disasters and public health emergencies. The MRC includes volunteers from various

³⁴ Hampshire County Health Department, "Welcome," March 2012, <http://www.hampshirecountyhealthdepartment.org>.

³⁵ Medical Reserve Corps, Central Georgia Medical Reserve Corps, *Volunteer Handbook* (North Central Health District: Public Health for Middle Georgia, November 2007).

disciplines and paraprofessional volunteers as well. The Central Georgia MRC utilizes the state's ESAR-VHP database system as the registration and credentialing system for the verification of the volunteers.

The Central Georgia MRC may be deployed to assist in large scale—complex emergencies or smaller incidents in a single jurisdiction. Volunteers may be assigned to a hospital, public health or a mass care facility to assist and support the facilities staff. The intent of the MRC is not to replace or supplant emergency medical response systems, but to provide surge capability and to support functions, and help during staff shortages at local medical or emergency facilities.

The Central Georgia MRC is organizationally structured into two divisions: the Medical Operations Division, responsible for clinical operations, and Support Services Division, responsible for non-clinical support functions. Volunteers are assigned to each of the divisions and assigned position descriptions for response and training purposes.

A physician oversees the operations of the Medical Operations Division. The division is comprised of eight units: medical, nursing, dental, allied health, veterinary, pharmacy, emergency medical services, and mental health. The leader of each of these units must be a licensed professional, and registered and assigned to a specific unit.

The Support Services Division includes the administrative/finance unit responsible for the administration, clerical and financial areas of the division. Also included is a logistics unit that covers supply, communication, and transportation.

Administrative protocol in the *Volunteer Handbook*³⁶ includes processes for volunteer recruitment and selection, identification and badges, volunteer safety, and training. A few pages are also included on the liability coverage for volunteers. Like many MRC units throughout the nation, Georgia cannot provide the following protections.

³⁶ Medical Reserve Corps, Central Georgia Medical Reserve Corps, *Volunteer Handbook*.

1. Personal or bodily injury/workman's compensation
2. Damages to the personal property of the volunteer to include wearing apparel, prescription glasses and automobiles
3. Damages from fraudulent or criminal acts for verdict, plea of guilty or a pleas of nolo contere

The Georgia Department of Human Resources provides liability coverage to individuals who volunteer to assist in an emergency. The insurance policy covers volunteers who work without compensation in a volunteer program organized and run by a state entity. The volunteer must complete forms for each deployment that describes specific duties the volunteer will be performing for that particular response activity.

Activities from the Central Georgia MRC unit include assisting with school-based flu clinics, conducting executive committee meetings, and for 2012, volunteers have presented the "Emergency Preparedness for Special Needs"³⁷ to district senior centers, as well as have participated in the Basic Life Support for Healthcare Provider Course and Heartsaver First Aid Course.³⁸

3. Mesa County, Colorado "Blueprint Toolkit"³⁹

The Mesa County Health Department utilizes MRC volunteers in a slightly different way than many MRC's across the country by developing tools and processes for using volunteers in hospitals. The Mesa County Health Department, in collaboration with Family Health West Hospital and the Mesa County Medical Reserve Corps, has developed a program for volunteers to actively match up with rural hospitals during times of disaster. An entire toolkit has been designed and published to the web to assist hospitals and public health agencies integrate volunteer support into hospital inpatient, emergency department, and incident response operations.

³⁷ North Central Health District, Public Health for Middle Georgia, "Emergency Preparedness for Special Needs," August 2010, <http://www.northcentralhealthdistrict.com>.

³⁸ North Central Health District, "Welcome to North Central Health District," March 2012, <http://www.northcentralhealthdistrict.com>.

³⁹ *Volunteer Policies and Procedures Handbook, "Blueprint for the Use of Volunteers in Hospitals and Rural Medical Centers"* (Mesa County, Colorado: Mesa County Advanced Practice Center, 2010).

The Mesa County Medical Reserve Corps is housed under the Mesa County Health Department. The MRC unit provides support to the health department in public health related emergency and non-emergency activities, and to area hospitals to augment staff to increase surge capacity. The Mesa County MRC utilizes the state's ESAR-VHP database as the registration and credentialing tool.

The Mesa County Toolkit is divided into four main sections: 1) identifying and organizing partners into a planning team, 2) hospital emergency operations plan orientation, 3) establishing a training and exercise program, and 4) just in time training for volunteer integration. Each section includes templates designed to assist in establishing operations and procedures.

The toolkit carefully describes administrative procedures, registration and training requirements, liability waivers, and dress code recommendations. The toolkit provides templates for the development of confidentiality agreements, volunteer legal coverage, and incident command structure.

Volunteers in this MRC have assisted with health fairs, participated in strategic planning meetings, and discussed the past present and future mission, goals and activities. Volunteers have also assisted with providing basic first aid to the public attending the Mesa County Fair, and have assisted with flu clinics in conjunction with health departments, and even assisted with blood draws at the Mesa County Health Department. An exercise is scheduled with a rural hospital later this spring at which MRC volunteers are either players or observers in the exercise. A planned workshop with the rural hospitals is also planned, and volunteers will assist with the workshop.⁴⁰

Each of the MRC units provide medical and non-medical assistance to the public health departments, to the public during large events, such as fairs and flu clinics, and in some cases, are paired up with rural hospitals to augment services or exercises as needed.

⁴⁰ North Central Health District, "Welcome to North Central Health District."

4. Metric

The following charts indicate the Office of the Surgeon General Core Competencies Matrix that describe competency, knowledge, attitude, suggested training/tools, and assessment to help MRC units evaluate their degree of success in their units. Besides training and licensure verification, the other measure that defines success is whether volunteers are deployed during emergency and non-emergent incidents. For instance, a train derailment may require more volunteers who have specific skills, and if the MRC in the jurisdiction has volunteers ready to deploy, then this situation is defined as a successful MRC. The three specific MRC units in this thesis also list activities they have been involved in for the last several years, and are required to update this list annually. Since training is such a critical element in deploying a volunteer, it makes sense to review the Office of the Surgeon General metric with the three specific MRC cases, and identify their strengths and weaknesses of each plan.

Figures 3–5 present the MRC Core Competencies from the Office of the Surgeon General.⁴¹ Table 2 shows the assessment of the evaluation of success for the three case studies.

⁴¹ Medical Reserve Corps, “MRC Core Competencies Matrix,” April 2007, https://medicalreservecorps.gov/File/MRC%20TRAIN/Core%20Competency%20Resources/Core_Competencies_Matrix_April_2007.pdf.

MRC Core Competencies Matrix

Domain #1: Health, Safety, & Personal Preparedness

Specific Competency	Knowledge		Attitude	Suggested Trainings/Tools	Assessment
Describe the procedures and steps necessary for the MRC member to protect health, safety, and overall well-being of themselves, their families, the team, and the community.	- Identify the key components of a personal and family preparedness plan. - Identify and recognize the potential barriers to executing the plans and identify contingencies - Identify key components of a variety of preparedness kits (e.g., home kit, Go-Kit, work kit) - Identify key components to keeping one's self, family, team and community safe from environmental and incident hazards and risks.	- Prepare a personal and family preparedness plan - Review it with family, neighbors, and friends - Set up occasions to implement the drill and measure its efficacy or need for revision. - Utilize recognized methods of protection (e.g., hand washing hygiene, cough etiquette, masks and other personal protective measures)	Embrace and promote the value of personal, family, and work life preparedness	- ARC Introduction to Disaster www.redcross.org/flash/course01_v01/ - FEMA Independent Study Program: IS-22 Are you Ready? An In-Depth Guide to Citizen Preparedness http://training.fema.gov/EMIWeb/IS/is22.asp - CERT-Module 1, Lesson 2: Family and Workplace Preparedness www.citizencorps.gov/cert/IS317/ - Ready.Gov www.ready.gov/america/index.html - Standard Precautions and Respiratory Hygiene MRC-TRAIN Course ID: 1007977 www.mrc.train.org	- Document that the MRC member has a personal and family preparedness plan in place. (Yes or No) - Document that the MRC member possesses a disaster kit (Yes or No)

MRC Core Competencies Matrix

Domain #1: Health, Safety, & Personal Preparedness (continued)

Specific Competency	Knowledge	Attitude	Suggested Trainings/Tools	Assessment
Describe the impact of an event on the mental health of the MRC member and their family, team, and others.	- Identify the range of anticipated stress reactions experienced by disaster survivors, MRC members, responders, and others in the early aftermath of disaster. - Identify when, how, and where to refer disaster survivors, MRC Team members, and others for additional mental health support and care. - Identify the basic elements of Psychological First Aid and the key ways to provide emotional care and comfort to disaster survivors, MRC Members, and others in the early aftermath of disaster.	- Provide psychological first aid to disaster survivors, MRC team members, and others. - Acknowledge that disasters and other public health emergencies are stressful events. - Acknowledge that MRC members are in a unique role to provide emotional care and comfort to disaster survivors, MRC team members and others. - Embrace the concept that providing emotional care and comfort in the early aftermath of disaster may mitigate short and long-term psychological consequences in disaster survivors, MRC team members and others.	<i>Psychological First Aid: Field Operations Guide (MRC version)</i> www.medicalreservecorps.gov/File/MRC_Resources/MRC_PFA.doc <i>Psychological First Aid: Helping People Cope During Disasters and Public Health Emergencies</i> www.centerfordisastermedicine.org/disaster_mental_health.html <i>Nebraska Psychological First Aid Curriculum</i> www.disastermh.nebraska.edu/psychfirstaid.html <i>Psychological First Aid: Helping Others in Times of Stress</i> Contact your local American Red Cross Chapter <i>Introduction to Mental Health Preparedness for Local Health Department Staff and Community Volunteers</i> https://www.mrc.train.org/DesktopShell.aspx?tabid=62&qoto=browse&browse=subject&lookfor=18&clinical=both&local=all&ByCost=0	Document participation in a Psychological First Aid training (online or classroom)

Figure 3. MCR Core Competencies Matrix-Domain #1: Health, Safety and Personal Preparedness

MRC Core Competencies Matrix

Domain #2: Roles & Responsibilities of Individual Volunteers

Specific Competency	Knowledge		Attitude	Suggested Trainings/Tools	Assessment
Describe the MRC member's communication role(s) and processes with response partners, media, general public, and others.	- Understand the role of the Public Information Officer (PIO) or other authorized agent - Understand an individual MRC member's role and responsibilities in communicating with response partners, media, general public, and others - Understand legislative requirements related to the sharing of protected information (e.g., HIPAA, personal information, etc.)	- Perform your roles & responsibilities in the position you are assigned - Communicate effectively with response partners, media, general public and others	- Respect privacy and confidentiality - Promote consistent and approved messaging - Embrace high ethical standards	<i>IS 100: Introduction to the Incident Command System</i> OR <i>IS 100: Introduction to the Incident Command System for Healthcare Hospitals</i> <i>Hospital Incident Command System (HICS)</i> https://www.mrc-train.org/DesktopShell.aspx?tabid=62&goto=browse&browse=subject&keyword=HIPAA&keyoption=Both&clinical=both&local=all&ByCost=0	- Document the completion of <i>IS 100</i> or equivalent - Document the completion of a HIPAA training or equivalent - Document participation in a interpersonal communication skills training or equivalent
Demonstrate the MRC member's ability to follow procedures for assignment, activation, reporting, and deactivation.	Describe the local MRC's guidelines or procedures for assignment, activation, reporting, and deactivation	Participate in a drill, exercise or public health activity	- Embrace the mission of the MRC - Honor a sense of duty - Develop a commitment to personal accountability	- Local unit-specific training - Drill, Exercise, Training, or actual event - Public Health activities (e.g., participating in health fairs, disease screenings, and community education events)	- Document completion of local unit-specific training - Direct observation of compliance

MRC Core Competencies Matrix

Domain #2: Roles & Responsibilities of Individual Volunteers (continued)

Identify limits to own skills, knowledge, and abilities as they pertain to MRC role(s).	- Identify the physical and emotional challenges for various types of duties, assignments and activities - Identify personal and professional liability. - Identify gaps in own knowledge-base & training needs	- Engage in a self-assessment - Communicate limitations when appropriate or necessary	- Have realistic expectations - Accept one's limitations - Accept responsibility for personal or professional growth and development	- Local Unit Orientation - Drill, Exercise, Training, or actual event	Volunteer Screening
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Figure 4. MCR Core Competencies Matrix-Domain #2 Roles and Responsibilities of Individual Volunteers

MRC Core Competencies Matrix

Domain #3: Public Health Activities & Incident Management

Specific Competency	Knowledge		Attitude	Suggested Trainings/Tools	Assessment
Describe the chain of command (e.g., Emergency Management System, ICS, NIMS), the integration of the MRC, and its application to a given incident.	• Understand NIMS & NIMS Compliance • Understand the Role of the MRC in ICS • Understand how ICS is interdisciplinary & organizationally variable • Identify the 5 ICS Management Functions • Understand the Principles of Span of Control • Identify the Roles & Responsibilities of Key ICS Positions • Identify the Key Facilities and Locations Described in ICS	• Operate within the structure of the incident command system • Notify the Chain of Command when safety action is necessary	• Respect the command structure by relinquishing personal authority to operational authority	• <i>IS 100: Introduction to the Incident Command System</i> OR • <i>IS 100: Introduction to the Incident Command System for Healthcare or Hospitals</i> • <i>IS-700: National Incident Management System (NIMS), An Introduction</i> • <i>Hospital Incident Command System (HICS)</i>	• Successful completion of <i>IS-700</i> or equivalent AND • Successful completion of • <i>IS 100: Introduction to the Incident Command System</i> OR • <i>IS 100: Introduction to the Incident Command System for Healthcare or Hospitals</i> OR • <i>Hospital Incident Command System (HICS)</i> OR • Equivalent for one of the preceding 3 courses

MRC Core Competencies Matrix

Domain #3: Public Health Activities & Incident Management (continued)

Specific Competency	Knowledge	Attitude	Suggested Trainings/Tools	Assessment	
Describe the role of the local MRC unit in public health and/or emergency response and its application to a given incident.	• Understand your community's public health system and the role of the MRC in local public health activities • Understand the public health role of the MRC in emergency response. • Understand who has the authority to activate & authorize the local MRC Unit	• Perform your roles and responsibilities in your MRC as they integrate within the public health or emergency response system	• Respect your role within your Unit's operation.	• <i>Public Health 101 Online Pennsylvania & Ohio Public Health Training Center</i> https://www.mrc.train.org/DesktopModules/learning/CourseDetails/CourseDetailsForm.aspx?tabid=62&CourseID=1000546 • Local unit-specific training	• Successful completion of a local Points of Dispensing (POD) or Strategic National Stockpile (SNS) training • Successful completion of a public health training, where appropriate

- All competencies may be observationally assessed in the context of drills and exercise in which your Unit participates.

Figure 5. MCR Core Competencies Matrix-Domain #3 Public Health Activities and Incident Management

Table 2. Evaluation of Success

Central Georgia Medical Reserve Corps Volunteer Handbook			Hampshire County Medical Reserve Corps Policy and Procedure Manual			Blueprint for the Use of Volunteers in Hospitals and Rural Medical Centers: Volunteer Policies and Procedure Handbook Mesa County, CO		
Assessment	Yes	No	Assessment	Yes	No	Assessment	Yes	No
MRC member has a personal and family preparedness plan in place	x		MRC member has a personal and family preparedness plan in place		x	MRC member has a personal and family preparedness plan in place		x
MCR member possesses a disaster kit		x	MCR member possesses a disaster kit	x		MCR member possesses a disaster kit		x
Participated in a Psychological First Aid training (online or classroom)	x		Participated in a Psychological First Aid training (online or classroom)	x		Participated in a Psychological First Aid training (online or classroom)	x	
Completed IS-100 or equivalent	x		Completed IS-100 or equivalent	x		Completed IS-100 or equivalent	x	
Completed a HIPAA training or equivalent		x	Completed a HIPAA training or equivalent	x		Completed a HIPAA training or equivalent	x	
Participated in a Interpersonal communication skills training or equivalent		x	Participated in a Interpersonal communication skills training or equivalent		x	Participated in a Interpersonal communication skills training or equivalent	x	
Completed local unit-specific training	x		Completed local unit-specific training	x		Completed local unit-specific training	x	

Central Georgia Medical Reserve Corps Volunteer Handbook			Hampshire County Medical Reserve Corps Policy and Procedure Manual			Blueprint for the Use of Volunteers in Hospitals and Rural Medical Centers: Volunteer Policies and Procedure Handbook Mesa County, CO		
Assessment	Yes	No	Assessment	Yes	No	Assessment	Yes	No
Direct observation of compliance		x	Direct observation of compliance		x	Direct observation of compliance		x
Volunteer screening	x		Volunteer screening	x		Volunteer screening	x	
Completed IS-700 or equivalent	x		Completed IS-700 or equivalent	x		Completed IS-700 or equivalent	x	
Completed equivalent of one of the following courses: - IS-100: Introduction to the Incident Command System - IS-100: Introduction to the Incident Command System for Healthcare or Hospitals - Hospital Incident Command System (HCS)	x		Completed equivalent of one of the following courses: - IS-100: Introduction to the Incident Command System - IS-100: Introduction to the Incident Command System for Healthcare or Hospitals - Hospital Incident Command System (HCS)	x		Completed equivalent of one of the following courses: - IS-100: Introduction to the Incident Command System - IS-100: Introduction to the Incident Command System for Healthcare or Hospitals - Hospital Incident Command System (HCS)	x	
Completed Local Points of Dispensing (POD) or Strategic National Stockpile (SNS) training	x		Completed Local Points of Dispensing (POD) or Strategic National Stockpile (SNS) training	x		Completed Local Points of Dispensing (POD) or Strategic National Stockpile (SNS) training		x

Central Georgia Medical Reserve Corps Volunteer Handbook			Hampshire County Medical Reserve Corps Policy and Procedure Manual			Blueprint for the Use of Volunteers in Hospitals and Rural Medical Centers: Volunteer Policies and Procedure Handbook Mesa County, CO		
Assessment	Yes	No	Assessment	Yes	No	Assessment	Yes	No
Completed a public health training, if appropriate	x		Completed a public health training, if appropriate		x	Completed a public health training, if appropriate		x

For purposes of this Evaluation of Success, Yes =Strength and No=Weakness

D. LESSONS LEARNED FROM USE OF VOLUNTEERS DURING EMERGENCIES

These three examples of MRC units from different parts of the county identify the uniqueness and vast way volunteers are trained, organized and utilized at a local and state level. From the inception of the MRC program in 2002, the program has always promoted models that work best for the individual community. No one model of how an MRC should be organized or formalized exists. Since the organization structures are different, some of the units help support sheltering operations in response to local emergencies, while some assist with local school, health clinics, and hospitals to support augment efforts with public health and even hospitals. Some MRC units file for non-profit status, some are based out of county health clinics, while others are based out of community organizations. States or counties even link the volunteers with rural hospitals to help augment medical services, while others are used during public health clinics or response activities. After 10 years of inception, gaps still exist in legal protections, mutual aid agreements, use of volunteers crossing state lines, and the concept of paying for background checks on all volunteers prior to using a volunteer.

The weaknesses in each plan indicate the gaps that exist in each of these plans. It was a little surprising that the matrix element of direct observation of compliance was a weakness for all the plans. It may be that although it is not addressed specifically in the Policy and Procedure plans, the Just in Time Training also includes a supervised observation of the volunteer doing a task assigned. The other surprise was that the disaster kit was a weakness in two of the three plans along with the weakness of having a personal/family preparedness plans addressed in the Policy and Procedure plan. Each of these Policy and Procedure Manuals evaluate the unit as a whole, and do not address individuals within the MRC unit. Some of the elements of measure may be addressed in individual job descriptions, but was not addressed in the Policy and Procedure Manual.

1. South Carolina Model for Use of Volunteers During Emergencies

Lack of hospital surge capacity is still a problem

- Anthony Kimery⁴²

South Carolina is listed in the top fifteen states that could possibly run out of hospital beds during a pandemic.

- Trust for America's Health⁴³

Reports "93% of South Carolina's hospitals would be at or exceed bed capacity for five weeks into a pandemic."

- Trust for America's Health⁴⁴

After reviewing the models and the Policy and Procedure Plans, the model that South Carolina most closely aligns with is the Volunteer Policy and Procedure Manual from Mesa County, Colorado. This program uses volunteers in county rural hospitals and is quite similar to the planned movement of South Carolina in using volunteers in a public health setting to augment acute care hospitals with their surge capacity.

In 2010, competitive grants (a total of 18–30) in the nation were available through ESAR-VHP. The award range was from \$50,000 to \$200,000 per grant year. The state of South Carolina was awarded a competitive ESAR-VHP grant for three consecutive years. The grant's requirements focused on meeting compliance requirements, support training and exercises, as well as the establishment of working relationships with external partners, and so forth. The premise behind the grant was to expand the capacity of the state volunteers by having hospitals draw from the SCSERV database to provide them with a list of verified and credentials licensed professionals willing to volunteer during the time of an emergency with a hospital.

⁴² Anthony Kimery, "Preparedness for Catastrophe Lax; Complacency Rises," *HSToday.us*, January 12, 2010, <http://www.hstoday.us>.

⁴³ Trust for America's Health, "H1N1 Challenges Ahead," October 2009, <http://healthyamericans.org/reports/h1n1/TFAH2009challengesahead.pdf>.

⁴⁴ Ibid.

The grant was called ESAR-VHP Acute Care Hospital Surge Project. The grant had three main objectives to achieve in three years.

1. Strengthen local and state coordination for the management and utilization of volunteers in South Carolina's acute care hospitals during an emergency.
2. Strengthen ESAR-VHP/MRC volunteers' ability to provide surge capacity for SC acute care hospitals.
3. Align SCSERV system capabilities with identified surge capacity needs of the acute care hospitals in South Carolina.⁴⁵

The premise behind the grant was to expand the capacity of the state volunteers by having hospitals draw from the SCSERV database to provide them with a list of verified and credentials licensed professionals willing to volunteer during the time of an emergency with a hospital. Although the SCSERV system can verify and credential those licensed professionals in the State of South Carolina Labor, Licensing and Regulation Boards, an individual hospital would still need to provide privilege rights within the hospital doors. Hospitals still have the final responsibility to use their own system to check the volunteers so that they are comfortable with them entering and volunteering in their facilities.

Table 3 is a proposed model of competencies that need to be addressed and answered before the volunteer program is fully operational in South Carolina. The model competencies for South Carolina are based on the objectives set by the state for the grant and cover training, exercises, and a revamping of the current SCSERV license database used by the state when volunteers register into the system. These competencies need to be addressed and covered before hospitals would consider using volunteers in their facilities.

⁴⁵ ESAR-VHP ACHES Grant Narrative, SC DHEC and USC CHEP, June 30, 2010.

Table 3. Competencies

Competencies	Yes	No
Develop Training Needs Assessment		
Offer trainings in Psychological First Aid/Austere		
Conditions		
New Release of SCSERV system		
Test SCSERV		
Exercise SCSERV		

This specific grant project is currently in the third and final year of funding and will be completed mid-2013. The goal is to have met the objectives of the grant and have a cadre of licensed medical professionals who have volunteered, trained and exercised with a rural hospital so they can augment the hospital during times of need. Much work is still to be done before the hospitals can activate and deploy volunteers to hospitals, which includes incorporating these policies and procedures into hospital and public health emergency operation plans, as well as staffing plans. South Carolina may serve as a model of partner engagement for other states.

2. Conclusions

Although much work still remains that needs to be completed on a national level with the MRC program, the local and state chapters also have challenges that could affect future enrollment and deployment of volunteers in the MRC program. A few conclusions follow that are based on discussions at the national level, as well as coordination and processes that need development at the local and state level.

1. Partnerships between local Red Cross chapters and other recognized associations with the local MRC should be developed to be implemented prior to disasters or emergencies.
2. Agreements with local agencies should be developed and formalized so volunteers can be used either by the local/state public health officials or be used to augment rural hospitals with volunteers who are verified and credentialed licensed professionals.

3. Processes for local jurisdictions to request and utilize MRC volunteers from outside their local areas should be delineated in advance of an emergency.
4. Legal protections for the volunteers still need to be identified, which include workman's compensation issues, personal liability, professional liability and lost wages.

The MRC program has traditionally been part of the umbrella services under the Hospital Preparedness Program, but beginning July 1, 2012, the capability is included in both the HPP and the CDC programs. This realignment in focus and definition will assist in the coordination of identification, recruitment, registration, credential verification, training and engagement of volunteers to support the public health agency's response to incidents. This crosswalk of resources and focus should help address the needs that still exist in the MRC program.

VIII. RECOMMENDATIONS

Mass casualty events present healthcare facilities with the challenge of surge as patients suddenly arrive in need of medical attention, which is beyond their normal system capacity.

This thesis has examined state and public health medical surge plans to identify practices and evaluate their best ideas regarding surge. Healthcare facilities have the unique challenge of preparing for large numbers of patients from arriving at their doors, and the need to know their response partners before the disaster strikes.

Medical surge planning not only examines parameters of seeing numbers of triage, patient flow and numbers of patients, but also included such factors as hospital budgeting, emergency plans, patient monitoring, and use of volunteers during an emergency, equipment, training and exercises.

A few recommendations follow that hospitals, especially EDs, can incorporate into their facility planning.

- Emergency Planning

Hospital plans should be compatible with national standards, and follow elements of the National Preparedness Guidelines of planning, response and recovery. This process needs to start with a hospital HVA done on the facility. This HVA is the basis for emergency planning based on the hospital's situational elements. For instance, if a facility is near the east coast and is prone to hurricanes, then its highly ranked vulnerability is hurricanes, and planning should be directed to either prepare to shelter in place, or evacuate. It also means that hospitals must allocate role and responsibilities to all sections of the healthcare facility for a system approach to disaster mitigation. Coordination of Operations (COOP) planning is increasingly important to a facility so it can recognize which services would be restored quickly after a disaster. Hospitals must also plan for affected factors, such as electricity, water, telephones, and the water supply. The Hospital Incident Command System (HICS) is one element of planning that cannot be overlooked. It should be compatible with the national Emergency Management

System (EMS) and the local structure. Some emergencies can be handled within the hospital and do not require state or federal interaction, but protocols for each staff should be developed and communicated with staff to provide a coordinated response regardless of the size of the incident. Hospitals can also not plan in a vacuum. Other sectors of emergency preparedness need to be involved in the planning for a mass casualty event. Partners to consider would be the Division of Emergency Management, County Emergency Planners, public health, EMS, first responders and private companies that provide utilities, ice, and other vendors.

Procedures for surge planning should also include elements, such as the discharge of less acutely ill patients, the cancellation of elective procedures, the addition of extra beds to wards and rooms, the setting up of cots in open spaces, procedures to call back staff for extra shifts, as well as maintaining or increasing stocks of equipment, supplies, and pharmaceuticals. This tiered approach to planning also includes the need for agreements with healthcare facilities to share staff and equipment based on MOUs, logistical systems to coordinate and distribute equipment, supplies, and pharmaceuticals, and the ability to call up volunteers identified as willing and able to provide assistance to the facility. Alternate care sites need to be identified for additional space for treatment, while still having standards of care outside the normal settings in place. Transportation plans should also be in place and must be updated and be able to track patients.

- Training and Exercises

As seen in the best practices from both state and public health, training and exercises are the most effective means of capacity building, and should be included in every plan a hospital produces. Lessons can be learned from countries, such as Israel, that has a very robust training and exercise schedule for all hospitals within its country. Israel conducts training with its preparedness community on a regular basis, and all hospitals follow a three-year cycle of exercises. During the first year, hospitals practice responding to a mass casualty event, while during the second year, they practice responding to a toxicological or chemical event, and then during the third year, the hospital addresses a weakness or area of interest for that particular facility. In addition to these exercises, each hospital each year is drilled for a biological event, such as SARS, the pandemic

influenza, or anthrax. The drills/exercises are coordinated with the Ministry of Health and work closely with the hospitals from the planning stage to the execution of the exercise, and then, analysis of the exercise.

The training and exercising does not stop with the facility. Each healthcare worker is required to take part in annual trainings that includes paramedics, physicians, and nurses. In fact, in Israel, emergency room shifts can pay more, and in reality, physicians can earn an average of 60% of their salary through emergency work. Although the United States is not advanced regarding physician and healthcare training, progress is occurring through trainings being made available for staff. Therefore, much more can be offered, and as such, interest in emergency preparedness and emergency training is increasing. Training should be evaluated at regular intervals. Staff should be updated annually, and the update listed in the employees' evaluation. Training helps ensure its quality, as well as the ability to adjust the course structure as needed.

- Communication

After an exercise, communication is listed as the one factor that needs to be improved during a mass casualty incident. Redundant communication systems need to be explored to extend communication beyond the hospital staff to include EMS, first responders and public health. Hospitals still need the ability to have advanced capabilities for EMS and ambulances to know the location to pick up patients and transport them to hospitals. Communication systems may not need to be the latest in technology, but they must be able to work no matter the situation. The saying goes that technology is great when it works. The more important factor is that it is reliable under all situations and weather conditions. The increased pressure and expectations of the public also make it more challenging for healthcare facilities to instruct the public on clear, concise messages during an emergency. Public anxiety, rumor control, and true information are desperately needed by the facility to communicate with the public. The hospital spokesperson should be well trained to deal with the media, as well as other sectors of emergency management.

These recommendations should be included in every individual hospital emergency plan in the state of South Carolina and other states across the nation. Although the nation has come a long way since 2001 regarding hospital preparedness, much work still needs to be done at all levels of the healthcare system. Locally, hospitals must ensure they possess up-to-date emergency plans with a well-developed HVA, and also address factors that influence their ability to see mass casualties in their hospital. Hospitals also need to ensure they engage the community with concise communication and direction to families. The use of continued training and exercising, and the constant ability to communicate with the first responders are the factors that greatly affect the medical surge plan and will help guide the hospital to the ability to see and treat large numbers of patients in the time of a disaster.

IX. CONCLUSION

For the want of a bed, a hospital was lost,
For the want of a hospital, the community was lost,
For the want of a community the region was lost,
For the want of the region the Nation was lost,
And all for the want of a hospital bed.⁴⁶

The results of the best practices show that hospitals in South Carolina should adopt and implement an emergency preparedness plan in their hospitals that reflects an all hazards approach to planning. Hospital surge capacity (planning, preparedness, response and recovery) begins with a single hospital bed. By incorporating the hospital preparedness program's capabilities, a hospital will be better prepared to handle large numbers of patients during a mass casualty event. The ED is the point of entry for both emergency and lower acuity patients. A hospital cannot afford to shut down due to the lack of preparedness or inability to decontaminate patients prior to entering the hospital.

Hospitals are the vital link in the multi-faced approach to emergency preparedness and medical surge. Their role in this challenge is to provide healthcare while maintaining a safe, clean environment for both employees to work in and patients to receive care. Although the United States does have challenges concerning emergency preparedness, the hospitals in this nation have certainly become more prepared since 2001 and the attacks on this nation. The common theme in the state and county plans reviewed indicate a continuous need for the constant coordination of resources, communication and planning at all levels of the healthcare system.

Emergency planning and emergency plans also need to be updated annually, and healthcare workers need to know their role during an emergency. The time it takes to update emergency plans, train, and exercise and update staff is the only way to ensure

⁴⁶ Rica Skinner, "Healthcare Preparedness Info Sphere," Bay State Medical Center, Springfield, MA, September 2003, 7.

hospitals have taken time to address after action reports, and make every effort to make their hospital safer, more efficient, and increase their ability to address the influx of patients during a mass casualty event.

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