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WHEN THE HOUSE IS FULL, BUT THE GUESTS KEEP COMING: DETERMINING THE IMPACT OF DAILY HOSPITAL OVERCROWDING ON DISASTER RESPONSE

by

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December 2018

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Hospitals throughout the United States are facing overcrowding every day, with more patients than available staff and space can accommodate, yet current disaster response policy related to managing a surge of patients does not include considerations for this daily challenge. This thesis investigates the questions that need to be answered regarding the foundational principles of current U.S. surge policy and how healthcare coalitions might assist in answering such questions. A gap analysis of current healthcare coalition policy related to surge was completed that identified the need for policy makers to continue to expand the role of evidence-based decision making for surge policy. As a result, this thesis recommends that additional data points be added for hospitals receiving patients during the required annual coalition surge test-related performance measures for healthcare coalitions. The additional data points are designed to help policy makers determine whether overcrowding impacts surge response, so policy can be adjusted if needed.

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WHEN THE HOUSE IS FULL, BUT THE GUESTS KEEP COMING: DETERMINING THE IMPACT OF DAILY HOSPITAL OVERCROWDING ON DISASTER RESPONSE

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ABSTRACT

Hospitals throughout the United States are facing overcrowding every day, with more patients than available staff and space can accommodate, yet current disaster response policy related to managing a surge of patients does not include considerations for this daily challenge. This thesis investigates the questions that need to be answered regarding the foundational principles of current U.S. surge policy and how healthcare coalitions might assist in answering such questions. A gap analysis of current healthcare coalition policy related to surge was completed that identified the need for policy makers to continue to expand the role of evidence-based decision making for surge policy. As a result, this thesis recommends that additional data points be added for hospitals receiving patients during the required annual coalition surge test-related performance measures for healthcare coalitions. The additional data points are designed to help policy makers determine whether overcrowding impacts surge response, so policy can be adjusted if needed.

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TABLE OF CONTENTS

I. INTRODUCTION....1
A. PROBLEM STATEMENT....1
B. RESEARCH QUESTIONS....4
C. RESEARCH DESIGN....4
D. LITERATURE REVIEW....5
1. Hospital Crowding at the Onset of a Disaster Event Affects Disaster Response Capabilities....6
2. Hospital Crowding at the Onset of a Disaster Event Does Not Affect Disaster Response Capabilities....7
E. DEFINITIONS....8

II. HOSPITAL OVERCROWDING PROBLEM....13
A. HOSPITAL OVERCROWDING CRISIS BACKGROUND AND CURRENT STATUS....13
B. HOSPITAL OVERCROWDING CRISIS ORIGINS....15
1. Emergency Medical Treatment and Labor Act....15
2. Changing Demographics....17
3. Lack of Hospital Emergency Department and Inpatient Capacity....18
4. Lack of Appropriately Trained Staff....19
C. CONSEQUENCES OF THE HOSPITAL OVERCROWDING CRISIS....22
1. Patient Safety and Clinical Outcomes....22
2. Pre-hospital Response Impact....23
3. Effect on Disaster Response....24
D. CONCLUSION....25

III. DEFINING SURGE AND UNDERSTANDING SURGE CAPACITY....27
A. UNDERSTANDING SURGE AND SURGE CAPACITY....27
B. BUILDING SURGE CAPACITY THROUGH IMMEDIATE BED AVAILABILITY....30
C. DESCRIBING A SUCCESSFUL SURGE RESPONSE: THE BOSTON MARATHON BOMBING....32
D. LINGERING QUESTIONS....35
E. CONCLUSION....37

IV. HEALTHCARE COALITIONS....39
A. WHAT IS A HEALTHCARE COALITION?....40

B. HOSPITAL PREPAREDNESS PROGRAM AND HEALTHCARE COALITION HISTORY 41
C. HEALTHCARE COALITIONS TODAY 44
1. Healthcare Coalition Organization 45
2. Healthcare Coalition Functions 47
D. BRINGING IT TOGETHER: HEALTHCARE COALITIONS AND THEIR SURGE POLICY REQUIREMENTS 49
E. CONCLUSION 51

V. HOSPITAL PREPAREDNESS PROGRAM SURGE POLICY GAP ANALYSIS 53
A. WHAT ARE HEALTHCARE COALITIONS TRYING TO ACCOMPLISH? 54
B. WHAT CHANGES CAN POLICY MAKERS AND STAKEHOLDERS MAKE THAT WILL RESULT IN IMPROVEMENT FOR HEALTHCARE COALITIONS? 54
C. HOW WILL POLICYMAKERS, STAKEHOLDERS, AND HEALTHCARE COALITIONS KNOW IF A CHANGE IS IMPROVEMENT? 56
D. CONCLUSION 56

VI. CONCLUSION 57
A. RECOMMENDATIONS 57
1. Modify CST Data Collection Tool to Include Additional Data Points to Answer Basic Surge Policy Questions 57
2. Pilot the Modified Data Collection Tools in a Single HPP Region 59
B. LIMITATIONS AND FUTURE RESEARCH OPTIONS 60
C. CONCLUSION 61

APPENDIX A. HPP CAPABILITIES AND PERFORMANCE MEASURE CROSSWALK 63

APPENDIX B. COALITION SURGE TOOL 71

LIST OF REFERENCES 99

INITIAL DISTRIBUTION LIST 107

LIST OF FIGURES

Figure 1. Surge Timeline for Sudden Impact Event....28

Figure 2. Surge Timeline for Obscure Events....28

Figure 3. Four Components of Surge as They Relate to the Three Functional Elements....29

Figure 4. IBA Strategies by Pillar and Intended Influence on the "4Ss" 32

Figure 5. CST Data Collection from Evacuating Facility at Start of the CST Exercise....51

Figure 6. CST Data Collection from Receiving Facilities during the CST Exercise....51

Figure 7. Sample Revised CST Tool Section for Evacuating Facilities 58

Figure 8. Sample Revised CST Tool Section for Receiving Facilities 58

Figure 9. Planning Regions for the HPP and FEMA 60

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LIST OF TABLES

Table 1. Crosswalk of Performance Measures to 2017–2022 Health Care Preparedness and Response Capabilities 63

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LIST OF ACRONYMS AND ABBREVIATIONS

9/11	September 11, 2001
ACA	Affordable Care Act
ACEP	American College of Emergency Physicians
ASPR	Assistant Secretary for Preparedness and Response
CDC	Centers for Disease Control and Prevention
CMS	Centers for Medicaid and Medicare Services
CST	coalition surge test
DHS	Department of Homeland Security
EBP	evidence-based policy
ED	emergency department
EMS	Emergency Medical Services
EMTALA	Emergency Medical Treatment and Labor Act
ESF	Emergency Support Function
FEMA	Federal Emergency Management Agency
FQHC	federally qualified health center
HCC	health care coalition
HHS	Department of Health and Human Services
HPP	Hospital Preparedness Program
HRSA	Health Resources Services Administration
IBA	immediate bed availability
ICS	incident command system
ICU	intensive care unit
MGH	Massachusetts General Hospital
MMRS	Metropolitan Medical Response System
NACCHO	National Organization of City and County Health Officials
NRF	National Response Framework
PAHPA	Pandemic and All-Hazards Preparedness Act
RHC	rural health center
UMCI	urban multiple casualty incidents

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EXECUTIVE SUMMARY

Generally, healthcare emergency preparedness strategies have revolved around major medical disasters or catastrophic-event surge planning. Leaders throughout the emergency preparedness and management continuum—including the Department of Homeland Security (DHS), Department of Health and Human Services (HHS) with the Centers for Disease Control and Prevention (CDC) and the Hospital Preparedness Program (HPP), Centers for Medicaid and Medicare Services (CMS), and hospital-accrediting bodies, such as the Joint Commission—all recommend the same nationally accepted strategies and tactics to address disaster surge events. However, they do not explicitly consider the role that daily challenges, such as overcrowding and the baseline capacity (defined within this thesis as the beds, staff, and resources available at the onset of an event prior to the implementation of any surge measures) of the hospital, may have on the organization's response capabilities for both major and minor events.

Experts disagree about the extent of the relationship between overcrowding and disaster response, which has resulted in two firm, yet divergent viewpoints. One school of thought asserts that very real consequences do result, as disaster response capabilities diminish with hospital overcrowding. This side makes broad factual claims as if the conclusion is common sense. The opposing school of thought claims that daily overcrowding has little to no impact on disaster response abilities. This side often points to tried-and-true surge planning recommendations and response actions from previous events, such as the Boston Marathon bombing or the Orlando Pulse Nightclub shooting. However, while those incidents are examples of successful medical responses, little supporting evidence is available that documents what the baseline capabilities were within the receiving hospitals at the onset of the events. Furthermore, those examples are of relatively small and short-term events during which traditional healthcare surge planning models may have sufficed regardless of baseline capacities. The bottom line is that current doctrine embraces both sides of the argument as fact even though very little supporting evidence exists to validate either claim, which has resulted in a very specific yet significant knowledge gap.

Despite this knowledge gap, U.S. surge policy continues to be based on assumptions in lieu of evidence. This thesis argues that a need exists to formulate national policy that is evidence-based. Only when the data is available and analyzed, can policymakers truly direct strategies and tactics to make the most impact on disaster response capabilities. This research provides an argument that an opportunity exists for HHS and its Hospital Preparedness Program to determine the impact of daily overcrowding on disaster response. This thesis poses two primary research questions, what are the questions surrounding surge capacity and crisis response in healthcare settings and how can healthcare coalitions be leveraged to provide data to answer the questions? Specifically, how can healthcare coalitions gather data to assist in assessing the efficacy of surge capacity targets and in determining if overcrowding impacts disaster response?

Five main components comprise the research design for this thesis. Chapter II lays the foundation by exploring the current state of the overcrowding crisis and delves into some of roots and side effects of the crisis. Chapter III explains hospital surge and surge capacity and describes the specific strategies and tactics of the current U.S. surge policy. One hospital's response to the Boston Marathon bombing is provided as an example of how surge strategies are implemented following disasters. It concludes with lingering questions that exist regarding the current surge policy. Chapter IV discusses the HPP's Healthcare Coalitions and provides insight into their federally prescribed roles and responsibilities with a focus on capabilities and performance measures related to surge capacity creation and disaster response. How coalitions may be leveraged to answer the lingering surge questions are also discussed in Chapter IV. Next, a quality improvement technique is employed in Chapter V to review current federal surge policy for healthcare coalitions by utilizing a gap analysis method as described in Jeffery Harrison's Essentials of Strategic Planning in Healthcare. Finally, Chapter VI focuses on providing conclusions on how to fill the policy gaps identified in Chapter V and offers recommendations on how healthcare coalitions can assist in answering the questions related to whether overcrowding affects hospital disaster response capabilities. The final chapter also identifies future research opportunities that have surfaced during the development of this thesis.

This thesis recommends that the HPP program leaders use the wealth of resources and expertise within the 476 healthcare coalitions across the country, including the 31,000-member organizations, to take the opportunity to assess U.S. surge policy critically. These stakeholders possess a vested interest in ensuring the best possible policy exists. Furthermore, their frontline status in addressing both the overcrowding crisis and surge events, affords them the unique viewpoint to identify gaps in the policy and experience to suggest potential solutions. Finally, the network of healthcare coalitions and national reporting requirements for performance measures provides an opportunity to gather data from across the country, in a method already being utilized through the Coalition Surge Test tool and related performance measures.

This information can be used to make informed and evidence-based policy decisions related to surge capacity planning moving forward. If the data suggests that overcrowding does affect surge response, future HPP program guidance can be modified to include recommended strategies health care coalitions (HCCs) can consider to address daily overcrowding issues. For example, HPP guidance may suggest that HCCs begin to explore utilizing their pre-existing networks of healthcare providers to implement programs, such as mobile integrated health designed to keep non-acute patients out of emergency departments and in appropriate levels of care. Conversely, if the data indicates that overcrowding does not affect surge response, then HPP leaders can keep the status quo; having additional evidence-supported assurance in their currently designed policy.

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In the wise words of Winnie the Pooh, “How lucky I am to have something that makes saying goodbye so hard.”

I. INTRODUCTION

> At the crossroads of healthcare delivery (and reform) and homeland security emergency preparedness lies the disaster.[1]
>
> —Heritage Foundation

A. PROBLEM STATEMENT

Generally, healthcare emergency preparedness strategies have revolved around major medical disasters or catastrophic-event surge planning. Leaders throughout the emergency preparedness and management continuum—including the Department of Homeland Security (DHS), Department of Health and Human Services (HHS) with the Centers for Disease Control and Prevention (CDC) and the Hospital Preparedness Program (HPP), Centers for Medicaid and Medicare Services (CMS), and hospital-accrediting bodies, such as the Joint Commission—all recommend the same nationally accepted strategies and tactics to address disaster surge events. When reviewing the healthcare surge planning guidance from these organizations, they often use descriptive terms, such as "sudden impact," "widespread," "prolonged," or "obscure" to describe the recommended planning scenarios, which insinuates that only large-scale or major acute events pose the greatest threat to hospitals and the healthcare system.[2] However, they do not explicitly consider the role that daily challenges, such as overcrowding and the baseline capacity (defined within this thesis as the beds, staff, and resources available at the onset of an event prior to implementation of any surge measures) of the hospital, may have on the organization's response capabilities for both major and minor events.

Nevertheless, conflict remains among experts as to the extent of the relationship between overcrowding and disaster response, which result in two firm, yet divergent

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[1] Heritage Foundation, *Health Care and Homeland Security: Crossroads of Emergency Response* (Washington, DC: Heritage Foundation, 2008), http://www.heritage.org/homeland-security/report/health-care-and-homeland-security-crossroads-emergency-response.

[2] Samantha K. Watson, James W. Rudge, and Richard Coker, "Health Systems' 'Surge Capacity': State of the Art and Priorities for Future Research," *Milbank Quarterly* 91, no. 1 (March 2013): 78–122, https://doi.org/10.1111/milq.12003.

viewpoints. One school of thought implies very real consequences do result, as disaster response capabilities diminish with hospital overcrowding. This side makes broad factual claims as if the conclusion is common sense. The opposing school of thought claims that daily overcrowding has little to no impact on disaster response abilities. This side often points to tried-and-true surge planning recommendations and response actions from previous events, such as the Boston Marathon bombing or the Orlando Pulse Nightclub shooting. However, while those incidents are examples of successful medical responses, little supporting evidence is available that documents the baseline capabilities within the receiving hospitals at the onset of the events. Furthermore, those examples are of relatively small- and short-term events during which traditional healthcare surge planning models may have sufficed regardless of baseline capacities.[3] The results may be much different when considering *complex mass casualty events* like the Las Vegas shooting or more long-term events *catastrophic health events* like pandemics or *largescale natural disasters* like Hurricanes Katrina, Harvey, or Irma. The bottom line is that current doctrine embraces both sides of the argument as fact even though very little supporting evidence exists to validate either claim, which has resulted in a very specific yet significant knowledge gap.

Despite this knowledge gap, U.S. surge policy continues to move forward largely based on assumptions in lieu of evidence. The DHS and HHS have historically recommended a surge capacity planning capability target of being able to attain 500 open hospital beds per million people rapidly.[4] Other disaster planners have suggested that a hospital should be prepared to surge up to 20% of its staffed bed capacity during a disaster.[5] The 20% benchmark has long been utilized for healthcare response planning by national programs, such as HHS's Assistant Secretary for Preparedness and Response's (ASPR) HPP Program, which currently uses it as a key performance measure for its healthcare

[3] The size of the event is relative to the size of the facility and its capabilities.

[4] Derek DeLia and Elizabeth Wood, "The Dwindling Supply of Empty Beds: Implications for Hospital Surge Capacity," *Health Affairs* 27, no. 6 (November 1, 2008): 1688–94, https://doi.org/10.1377/hlthaff.27.6.1688.

[5] Welzel et al., "Effect of Hospital Staff Surge Capacity on Preparedness for a Conventional Mass Casualty Event," *Western Journal of Emergency Medicine* 11, no. 2 (May 2010): 189–196, http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2908656/.

coalitions.[6] However, these planning targets also appear to be arbitrarily assigned goals that have become standard without a great deal of supporting data to back them up.

The national programs—from both federal leaders and accrediting bodies—all revolve around surge capacity tactics needed to address immediate needs from disaster or catastrophic surge events to make beds rapidly available in the hospital.[7] The HPP and Joint Commission recommend surge tactics, such as immediately opening unstaffed beds (thereby increasing staff to patient ratios).[8] They also routinely recommend treating patients in areas not traditionally utilized as patient areas (halls, meeting rooms, and cafeterias) as alternate care areas.[9] Furthermore, leaders in these programs often recommend cancelling elective surgeries and discharging patients early.[10] However, they do not suggest solutions that create additional baseline capacity prior to the onset of an event, which thereby improves the overcrowding problems that plague hospitals every day.

This thesis argues that a need exists to formulate an evidence-based national policy. Only when the data is available and analyzed, can policymakers truly direct strategies and tactics to make the most impact on disaster response capabilities. Leaders throughout the emergency preparedness and management continuum should make an effort to form policy based on evidence and data, and not conjecture. Ultimately, this research suggests methods of gathering data to determine the impact of daily overcrowding on hospital disaster responses, and thereby, close the knowledge gap to support a federal policy based on quantifiable evidence.

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[6] Office of the Assistant Secretary for Preparedness and Response, *2017–2022 Hospital Preparedness Program Performance Measures Implementation Guidance* (Washington, DC: Department of Health and Human Services, 2017), https://www.hsdl.org/?view&did=802147.

[7] DeLia and Wood, "The Dwindling Supply of Empty Beds," 1688-94.

[8] Joint Commission Resources, *Hospital Requirements (EM Chapter)* (Oakbrook Terrace, IL: Joint Commission, 2017).

[9] Office of the Assistant Secretary for Preparedness and Response, *2017–2022 Health Care Preparedness and Response Capabilities* (Washington, DC: Department of Health and Human Services, 2016), https://www.hsdl.org/?view&did=796991.

[10] DeLia and Wood, "The Dwindling Supply of Empty Beds," 1688-94.

B. RESEARCH QUESTIONS

This research aims to provide an argument that an opportunity exists for HHS and its HPP to determine the true impact of daily overcrowding on disaster response and resiliency. This thesis poses two primary research questions:

- What are the questions surrounding surge capacity and crisis response in healthcare settings?
- How can healthcare coalitions be leveraged to provide data to answer the questions? Specifically, how can healthcare coalitions gather data to assist in assessing the efficacy of surge capacity targets and in determining if overcrowding impacts disaster response?

C. RESEARCH DESIGN

Five main components comprise the research design for this thesis. Chapter II lays the foundation by exploring the current state of the overcrowding crisis and delves into some of the roots and side effects of the crisis. Chapter III explains hospital surge and surge capacity and describes the specific strategies and tactics of the current U.S. surge policy. One hospital's response to the Boston Marathon bombing is provided as an example of how surge strategies are implemented following disasters. It concludes with lingering questions that exist regarding the current surge policy. Chapter IV discusses the HPP's healthcare coalitions and provides insight into their federally prescribed roles and responsibilities with a focus on capabilities and performance measures related to surge capacity creation and disaster response. How coalitions may be leveraged to answer the lingering surge questions are also discussed in Chapter IV. Next, Chapter V employs a quality improvement approach to review current federal surge policy for healthcare coalitions by utilizing a three primary gap analysis as described in Jeffery Harrison's *Essentials of Strategic Planning in Healthcare*. Finally, Chapter VI focuses on providing conclusions on how to fill the policy gaps identified in Chapter V and offers recommendations on how healthcare coalitions can assist in answering the questions related to whether overcrowding affects hospital disaster response capabilities. The final

chapter also identifies future research opportunities that have surfaced during the development of this thesis.

D. LITERATURE REVIEW

This literature review explores the recent trends in the field by focusing on the key concepts related to hospital crowding, surge capacity, disaster response capability, and resilience. For this study, the literature indicates two schools of thought related to the effects of hospital crowding on disaster response capabilities. One camp posits no relationship exists between a hospital's baseline capacity at the onset of an event and its ability to respond to a disaster by asserting that traditional surge capacity planning strategies and tactics are sufficient for most disasters. Conversely, the opposing camp believes a direct relationship does exist between a hospital's crowding status and its ability to respond to a disaster adequately. Consequently, this literature review investigates and evaluates the available research related to both camps. Specifically, the literature review concentrates on discovering the availability of quantifiable data supporting either argument.

Additionally, hospital and healthcare system resilience research—as it relates to emergency preparedness and response capabilities—is a recently emerging field of study that should be considered within this narrative. In demonstrating the importance of this area of research, Shuang Zhong et al. states, "Given the critical role of hospitals, the model of 'safe and resilient hospitals' was promoted as a key component of disaster risk reduction planning in the healthcare sector during the 2005 World Conference on Disaster Reduction."[11] However, few academic sources on the topic currently exist. This literature review examines the current research and identifies gaps for further exploration.

[11] Shuang Zhong et al., "Development of Hospital Disaster Resilience: Conceptual Framework and Potential Measurement," *Emergency Medicine Journal* 31, no. 11 (November 1, 2014): 930, https://doi.org/10.1136/emermed-2012-202282.

1. Hospital Crowding at the Onset of a Disaster Event Affects Disaster Response Capabilities

The crisis of overcrowding in emergency departments (EDs) throughout the United States remains well documented and one of the few key concepts in the literature that is never disputed.[12] The effects of overcrowding, including patient safety and mortality, are frequently discussed throughout the literature.[13] Practitioners disagree primarily about the extent to which the EDs and hospital crowding affect disaster response capabilities.

Experts frequently assert that crowding has a definite influence on a hospital or healthcare system's ability to respond to a disaster event adequately. The foundational argument posited by researchers, such as those at the Heritage Foundation, remains that hospital crowding creates a vulnerability because critical resources, such as beds, staff, and emergency supplies, are maintained at just-in-time supply levels that offer little capacity to surge.[14] Essentially, as Jennifer Love et al. claim, the lack of extra staff, beds, and resources on a daily basis negatively affects surge response capabilities.[15] Nevertheless, authorities within the field, such as Robert Cherry and Marcia Trainer, as well as the aforementioned, frequently reference only their expert opinion and experience as supporting evidence.[16] They provide neither quantifiable nor reproducible supporting evidence for their claims.

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[12] Sharoda A. Paul, Madhu C. Reddy, and Christopher J. DeFlitch, "A Systematic Review of Simulation Studies Investigating Emergency Department Overcrowding," *Simulation* 86, no. 8–9 (August 1, 2010): 559–71.

[13] Eileen J. Carter, Stephanie M. Pouch, and Elaine L. Larson, "The Relationship between Emergency Department Crowding and Patient Outcomes: A Systematic Review," *Journal of Nursing Scholarship* 46, no. 2 (March 2014): 106–15; Institute of Medicine, *Hospital-Based Emergency Care: At the Breaking Point* (Washington, DC: National Academies Press, 2007), https://doi.org/10.17226/11621.

[14] Heritage Foundation, *Health Care and Homeland Security: Crossroads of Emergency Response,* 1-20.

[15] Jennifer S. Love et al., "National Differences in Regional Emergency Department Boarding Times: Are US Emergency Departments Prepared for a Public Health Emergency?" *Disaster Medicine and Public Health Preparedness* 10, no. 4 (August 2016): 576–82, https://www.cambridge.org/core/journals/disaster-medicine-and-public-health-preparedness/article/national-differences-in-regional-emergency-department-boarding-times-are-us-emergency-departments-prepared-for-a-public-health-emergency/C399ECBFB1ECD97988F9256F148DCFB9.

[16] Robert A. Cherry and Marcia Trainer, "The Current Crisis in Emergency Care and the Impact on Disaster Preparedness," *BMC Emergency Medicine* 8, no. 1 (May 1, 2008): 7, https://doi.org/10.1186/1471-227X-8-7.

Researchers often attribute a hospital or healthcare system's success following a disaster or mass-casualty event to the lack of overcrowding. For example, a report by Arthur Kellermann and Kobi Peleg that discusses lessons learned from the Boston Marathon bombing states the disaster's one percent mortality rate was, to a certain extent, due to the lack of hospital crowding at the time of the event.[17] They explain that the incident occurred on a state holiday, and "it is likely that the city's operating rooms and clinical services were running at less than full capacity."[18] Gabor Kellen and others who subscribe to this school of thought often describe surge capacity as a continuum ranging from daily surge (overcrowding) to catastrophic surge resulting from disaster events.[19] However, few supporting studies provide objective data, and only one study provides supporting quantitative data in a nationwide assessment of level 1 trauma centers.[20]

2. Hospital Crowding at the Onset of a Disaster Event Does Not Affect Disaster Response Capabilities

The opposing camp remains adamant that a hospital's baseline status at the onset of a disaster event has no bearing on its ability to surge. John Hick, Joseph Barbera, and Gabor Kelen state, "There is a significant difference in a health care facility's ability to accommodate patients on a daily basis compared with when their disaster plans are activated, regardless of how many beds are actually occupied at the time."[21] The purveyors of this school of thought, such as Samantha Watson, James Rudge, and Richard Coker, argue that employing traditional surge capacity planning strategies and tactics, such as cancelling elective surgeries, recalling additional staff, and discharging patients early,

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[17] Arthur L. Kellermann and Kobi Peleg, "Lessons from Boston," *The New England Journal of Medicine; Boston* 368, no. 21 (May 23, 2013): 1956–57.

[18] Kellermann and Peleg, 1956.

[19] Gabor D. Kelen and James J. Scheulen, "Commentary: Emergency Department Crowding as an Ethical Issue," *Academic Emergency Medicine* 14, no. 8 (August 1, 2007): 751–54.

[20] *Hospital Emergency Surge Capacity: Not Ready for the "Predictable Surprise: Hearing before the House Committee on Oversight and Government Reform*, House of Representatives, 110th Cong., 2nd sess., May 2008.

[21] John Hick, "Refining Surge Capacity: Conventional, Contingency, and Crisis Capacity," *Disaster Medicine and Public Health Preparedness* 3, no. 2 Suppl (2009): S59–67.

quickly create required capacity for disaster response.[22] Practitioners often cite a hospital's successful response to a real event, such as the Hennepin County, Minnesota bridge collapse, to support this argument.[23] Finally, few scholars comment on the influence of hospital crowding on disaster response capabilities whatsoever.[24] This lack of research may indicate that the emergency response capability has not been a priority or concern for researchers, that the researchers have not viewed the issue as related to the crowding crisis, or that they were simply unaware of the potential link.

E. DEFINITIONS

Little consensus exists on defining the terminology used to describe what constitutes and emergency and a disaster to include disaster types, surge capacity and its components, and even what consists of crowding and overcrowding. Challenges persist to pinpoint definitions because multiple variables exist between organizations, as far as resource and response capabilities and the size and scope of disasters. Consequently, one facility may consider an event a disaster that requires an implementation of surge protocols while another may consider the same event a routine occurrence. Variables may include the size of the organization, personnel experience, and environment among other factors. For example, a small rural hospital with limited staffing, supplies, and experience in trauma care might consider a multi-car accident with five victims a disaster requiring the implementation of surge capacity while a large level 1 trauma center in a metropolitan area might consider the same event a normal daily operation. Furthermore, because of the multiple factors associated with disaster size and scope and organizational response capabilities, some researchers have sought to stratify or classify some terms further within the healthcare emergency management field, which has resulted in various levels of definitions for words like *disaster* or types of *surge capacity*. Consequently, the following definitions are intended to provide consistency and clarification within this thesis.

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[22] Watson, Rudge, and Coker, "Health Systems' 'Surge Capacity,'" 78-122.

[23] Hick, "Refining Surge Capacity," 123-29.

[24] Nathan R. Hoot and Dominik Aronsky, "Systematic Review of Emergency Department Crowding: Causes, Effects, and Solutions," *Annals of Emergency Medicine* 52, no. 2 (August 2008): 126–36.

- *Baseline capacity* is the beds, staff, and resources available at the onset of an event prior to the implementation of any surge measures.

- *Boarding* is the process by which hospitals keep patients who have been admitted into the hospital in the ED due to overcrowding on inpatient floors.[25]

- *Disaster* definitions vary throughout the literature, but for the purpose of this thesis, Merriam Webster's definition is followed: "a sudden calamitous event bringing great damage, loss, or destruction."[26] Eric Toner et al. from the Johns Hopkins Bloomberg School of Public Health's Center for Health Security consider the need to break down the following disaster types that may require different response approaches:

    - *Small, mass illness/injury events*, such as a "bus crash, tornado, multiple shootings, local epidemics/small disease outbreaks"[27]

    - *Large-scale natural disasters* like "Hurricanes Maria, Sandy, and Katrina; moderate earthquake; large-scale flooding, such as Hurricane Harvey"[28]

    - *Complex mass casualty events* "for example, large-scale shootings (Las Vegas or Orlando) or bombings (Boston Marathon) with many victims, mass casualty burn events (Rhode Island nightclub),

[25] "Definition of Boarded Patient," ACEP, accessed August 18, 2017, https://www.acep.org/patient-care/policy-statements/definition-of-boarded-patient/#sm.00001wproexdc2dfgzbvnaiclgpkv.

[26] *Merriam-Webster*, s.v. "Definition of Disaster," accessed August 18, 2017, https://www.merriam-webster.com/dictionary/disaster.

[27] Eric Toner et al., *Framework for Healthcare Disaster Resilience: A View to the Future* (Baltimore: Johns Hopkins Bloomberg School of Public Health Center for Health Security, 2018), 3, http://www.centerforhealthsecurity.org/our-work/pubs_archive/pubs-pdfs/2018/180222-framework-healthcare-disaster-resilience.pdf.

[28] Toner et al., 3.

chemical or radiological incidents, limited outbreaks of lethal and contagious infectious diseases, such as Ebola or SARS"[29]

- *Catastrophic health events* like "nuclear detonation, large scale bioterrorism, severe pandemic, or major earthquake"[30]

- *Emergency care* "encompasses the full continuum of services involved in emergency medical care, including EMS, hospital-based emergency and trauma care, on-call specialty care, bystander care, and injury prevention and control."[31]

- *Emergency Medical Services (EMS)* describes pre-hospital medical services provided by 9-1-1 and emergency responders utilizing ambulance or helicopter transportation.[32]

- *Overcrowding* denotes the daily or routine occurrence of demand exceeding hospital ED or inpatient capacity not caused by an emergency or disaster.[33] In many cases, overcrowding is the result of daily surge.[34] *Crowding* may also be used to meet this definition.

- *Surge capacity* "encompasses potential patient beds; available space in which patients may be triaged, managed, vaccinated, decontaminated, or simply located; available personnel of all types; necessary medications, supplies, and equipment; and even the legal capacity to deliver health care

[29] Toner et al., 3.

[30] Toner et al., 3.

[31] Institute of Medicine, *Hospital-Based Emergency Care*, 19.

[32] Institute of Medicine, 81-82.

[33] Watson, Rudge, and Coker, "Health Systems' 'Surge Capacity'," 86-87.

[34] Melissa L. McCarthy, Dominik Aronsky, and Gabor D. Kelen, "The Measurement of Daily Surge and Its Relevance to Disaster Preparedness," *Academic Emergency Medicine* 13, no. 11 (November 1, 2006): 1138–41, https://doi.org/10.1197/j.aem.2006.06.046.

under situations which exceed authorized capacity."[35] John Hick, Michael Christian, and Charles Sprung further classify surge capacity into three functional elements.[36]

- *Conventional surge capacity* utilizes "usual patient care spaces, resources and practices."[37]
- *Contingency surge capacity* operates in "adapted areas of the facility…including adaptations to standard staffing and resource practices to provide functionally equivalent medical care, with minimal increase in risk to the patient."[38]
- *Crisis surge capacity* refers to situations where "significant changes to standard staffing and resource practices" is required. This level of care "may significantly impact patient morbidity and mortality."[39]

Samantha K. Watson, James W. Rudge, and Richard Coker also further present two additional surge capacity classifications:

- *Daily surge capacity* relates to the hospital and healthcare system's ability to respond to normal, daily fluctuations in patient census.[40]

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[35] Donna Barbisch and Kristi L. Koenig, "Understanding Surge Capacity: Essential Elements," *Academic Emergency Medicine: Official Journal of the Society for Academic Emergency Medicine* 13, no. 11 (November 2006): 1099.

[36] John L. Hick, Michael D. Christian, and Charles L. Sprung, "Chapter 2. Surge Capacity and Infrastructure Considerations for Mass Critical Care," *Intensive Care Medicine* 36, no. Supplement 1 (April 2010): 11–20, http://dx.doi.org.libproxy.nps.edu/10.1007/s00134-010-1761-4.

[37] Hick, Christian, and Sprung, S12.

[38] Hick, Christian, and Sprung, S12.

[39] Hick, Christian, and Sprung, S12.

[40] Watson, Rudge, and Coker, "Health Systems' 'Surge Capacity'," 86-7.

- *Disaster surge capacity* relates to the hospital and healthcare system's ability to respond to demand influx exceeding normal capacity as the result of emergency or disaster events.[41]

[41] Watson, Rudge, and Coker, 86-87.

II. HOSPITAL OVERCROWDING PROBLEM

A. HOSPITAL OVERCROWDING CRISIS BACKGROUND AND CURRENT STATUS

On September 10, 2001, *U.S. News and World Report's* cover story focused on "an emergency care system in critical condition as a result of demands far in excess of its capacity."[42] This report was published a single day prior to the event that would forever change the direction of this nation's homeland security policy and strategy. Unfortunately, little (if any) improvement has occurred in U.S. healthcare system capacity since that time. In 2014, the American College of Emergency Physicians (ACEP) released a national report that graded U.S. emergency care on a national and state-by-state level.[43] The overall rating for the nation in 2014 was a D+, a decrease from a C- in 2009.[44] This grade, based on a nationwide study of EDs, focused on 136 measures in five categories: access to emergency care, quality and patient safety environment, medical liability environment, public health and injury prevention, and disaster preparedness.[45] In addition to the 2014 ACEP report, numerous other scholars provide a consensus view that the U.S. emergency care system consistently remains in crisis.[46]

According to the Centers for Disease Control and Prevention (CDC), ED visits increased from 97 million to 115 million between 1995 and 2005.[47] Visits increased further

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[42] Institute of Medicine, *Hospital-Based Emergency Care*, 10.

[43] American College of Emergency Physicians, *America's Emergency Care Environment, A State-by-State Report Card—2014* (Irving, TX: American College of Emergency Physicians, 2014), http://www.emreportcard.org/uploadedFiles/EMReportCard2014.pdf.

[44] American College of Emergency Physicians, *2014 Report Card*.

[45] American College of Emergency Physicians, *2014 Report Card.*

[46] J. Lee Jenkins, Robert E. O'Connor, and David C. Cone, "Differentiating Large-scale Surge versus Daily Surge," *Academic Emergency Medicine* 13, no. 11 (November 1, 2006): 1169–72, https://doi.org/10.1197/j.aem.2006.07.022; Jessica L. Chow, Matthew J. Niedzwiecki, and Renee Y. Hsia, "Trends in the Supply of California's Emergency Departments and Inpatient Services, 2005–2014: A Retrospective Analysis," *BMJ Open* 7, no. 5 (May 1, 2017): e014721, https://doi.org/10.1136/bmjopen-2016-014721; DeLia and Wood, "The Dwindling Supply of Empty Beds"; McCarthy, Aronsky, and Kelen, "The Measurement of Daily Surge and Its Relevance to Disaster Preparedness."

[47] Suzanne Bohan, "UCSF Study Challenges ER Overcrowding Theory," *Journal of Emergency Medical Services (JEMS)*, accessed July 23, 2017, http://www.jems.com/articles/2008/04/ucsf-study-challenges-er-overc.html.

in 2010 to 130 million visits annually.[48] These numbers demonstrate a 34% increase in ED visits between 1995 and 2010.[49] The latest CDC data available from 2013 indicates that ED visits are holding steady at 130 million visits nationwide per year.[50] "The ED visit rate increase is double what would be expected from U.S. population growth alone."[51] Further complicating the problem of the high volume of ED visits is the 11% overall decrease in the number of hospitals providing emergency care across the nation between 1995 and 2010.[52] The discrepancy between the growing number of ED visits and the declining number of EDs provides intuitive understanding of the demand versus capacity struggle that hospital EDs face every day.

While the data continues to demonstrate a significant burden on hospitals, some recent positive trends have resulted. The most recent data from the CDC indicated that ED visits remained steady at approximately 130 million visits in 2013, which was the same in 2010.[53] Additionally, data indicate that the Affordable Care Act (ACA)'s requirement to allow young adults to remain on their parent's insurance has resulted in a decrease in ED use by young adults.[54] The 2014 ACA study demonstrated a lower increase in young adult (19–25 years) visits to an ED as compared to the sharper increase for adults 26 to 31.[55] Additionally, ED visits per 100 persons dropped to 41.9 according to the CDC's most

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[48] American College of Emergency Physicians, *America's Emergency Care Environment, A State-by-State Report Card—2014*.

[49] American College of Emergency Physicians, *2014 Report Card*.

[50] National Center for Health Statistics, *National Hospital Ambulatory Medical Care Survey: 2013 Emergency Department Summary Tables* (Washington, DC: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, 2013), https://www.cdc.gov/nchs/data/ahcd/nhamcs_emergency/2013_ed_web_tables.pdf.

[51] Tina Hernandez-Boussard et al., "The Affordable Care Act Reduces Emergency Department Use by Young Adults: Evidence from Three States," *Health Affairs (Project Hope)* 33, no. 9 (September 2014): 1648, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4453768.

[52] American College of Emergency Physicians, *America's Emergency Care Environment, A State-by-State Report Card—2014*.

[53] Hernandez-Boussard et al., "The Affordable Care Act Reduces Emergency Department Use by Young Adults."

[54] Hernandez-Boussard et al., 1648-54.

[55] Hernandez-Boussard et al., 1648-54.

recently available data from 2013, which is down from 43 visits per 100 persons in 2010.[56] Although this information does not demonstrate a complete downward trend, it may indicate that a plateau has been reached. Nevertheless, demand still outpaces the currently available supply.

B. HOSPITAL OVERCROWDING CRISIS ORIGINS

No single cause for the current crisis can be distinguished. To state that the issue is complicated is a radical understatement. Cherry and Trainer explain, "The causes are complex and multifactorial, but they have converged to present a severely overburdened system that regularly exceeds emergency capacity and capabilities."[57] The literature describes a wealth of origins for the current crisis. While a myriad of reasons for the current situation have been recognized, this paper focuses on the following causes: unintended consequences of laws, rules and regulations, changing demographics, imperfect business models resulting in decreased hospital emergency and inpatient capacity, and a lack of medical professionals to meet the current need.

1. Emergency Medical Treatment and Labor Act

One of the most frequently recognized causes of this national crisis is the 1986 Emergency Medical Treatment and Labor Act (EMTALA), which ensures "public access to emergency services regardless of ability to pay."[58] As a result of the law, EDs are the only providers of universal healthcare in the United States.[59] They are a vital safeguard for the healthcare system in the United States, which consequently results in increased visits from uninsured and underinsured individuals.[60] Additionally, EDs can be seen as a "safety

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[56] National Center for Health Statistics, *National Hospital Ambulatory Medical Care Survey*.

[57] Cherry and Trainer, "The Current Crisis in Emergency Care and the Impact on Disaster Preparedness," 1.

[58] "Emergency Medical Treatment and Labor Act (EMTALA)," Centers for Medicare, Medicaid Services, March 26, 2012, https://www.cms.gov/Regulations-and-Guidance/Legislation/EMTALA/index.html.

[59] Cherry and Trainer, "The Current Crisis in Emergency Care and the Impact on Disaster Preparedness."

[60] American College of Emergency Physicians, *America's Emergency Care Environment, A State-by-State Report Card—2014*.

net for the safety net" meant to ensure healthcare is provided to this nation's most vulnerable populations.[61] In other words, they provide more "safety net type care"—that is designed to support those uninsured or those without the ability to pay—than any other safety net providers, such as federally qualified health centers (FQHCs), rural health centers (RHCs), or other free and low-income clinics combined, according to a 2000 Institute of Medicine Report.[62]

Furthermore, EDs serve as the primary access point into the hospital for ill patients who require admission.[63] Primary care providers are relying more frequently on EDs to provide diagnostics, care, and treatment to their sickest and most complicated patients, because of the hospitals'[64] 24/7 availability and access to specialty services.[65] A 2013 *Rand Health Quarterly* report determined the following:

> Between 2003 and 2009, inpatient admissions to U.S. hospitals grew at a slower rate than the population overall. However, nearly all of the growth in admissions was due to a 17 percent increase in unscheduled inpatient admissions from EDs. This growth in ED admissions more than offset a 10 percent decrease in admissions from doctors' offices and other outpatient settings. This pattern suggests that office-based physicians are directing to EDs some of the patients they previously admitted to the hospital.
>
> EDs support primary care practices by performing complex diagnostic workups and handling overflow, after-hours, and weekend demand for care. Almost all of the physicians we interviewed—specialist and primary care alike—confirmed that office-based physicians increasingly rely on EDs to

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[61] Stephen Trzeciak and Emanuel Rivers, "Emergency Department Overcrowding in the United States: An Emerging Threat to Patient Safety and Public Health," *Emergency Medicine Journal* 20, no. 5 (September 2003): 402, https://doi.org/10.1136/emj.20.5.402; Robert A. Barish, Patrick L. Mcgauly, and Thomas C. Arnold, "Emergency Room Crowding: A Marker of Hospital Health," *Transactions of the American Clinical and Climatological Association* 123 (2012): 304.

[62] Trzeciak and Rivers, "Emergency Department Overcrowding in the United States," 402.

[63] Chow, Niedzwiecki, and Hsia, "Trends in the Supply of California's Emergency Departments and Inpatient Services, 2005–2014." 1.

[64] Cherry and Trainer, "The Current Crisis in Emergency Care and the Impact on Disaster Preparedness," 1-7.

[65] American College of Emergency Physicians, *America's Emergency Care Environment, A State-by-State Report Card—2014*; Bohan, "UCSF Study Challenges ER Overcrowding Theory."

evaluate complex patients with potentially serious problems, rather than managing these patients themselves.[66]

The increased ED utilization by medical providers indicates "defensive medicine" in an effort to avoid medical liability lawsuits; in other words, those providers will often refer non-emergency patients to the EDs that provide 24/7 diagnostics instead of having patients wait for traditional appointments with specialist providers. The 2014 ACEP report on the United States' emergency care environment cites "the failure to enact meaningful tort reform" as one of the contributing factors to this predicament.[67] By attempting to avoid lawsuits, providers across the country are contributing to the overcrowding crisis by hampering EDs with inappropriately referred patients.

These combined examples essentially demonstrate the expanding role of the ED to provide not only invaluable care during emergencies, but also provide "safety net care for uninsured patients, public health surveillance, disaster preparedness, and serving as an adjunct to community physician practices."[68] These collective features that contribute to ED overcrowding directly correlate to the ED's requirement to provide care for all "individuals regardless of their insurance status or ability pay" as stipulated by EMTALA, as providers rely on the fact that the hospitals cannot turn away their patients.[69]

2. Changing Demographics

Another contributing factor to the issue relates directly to the country's changing demographics. The world population, including the United States', is getting older.[70]

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[66] Kristy Gonzalez Morganti et al., "The Evolving Role of Emergency Departments in the United States," *Rand Health Quarterly* 3, no. 2 (June 1, 2013): 3, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4945168/.

[67] American College of Emergency Physicians, *America's Emergency Care Environment, A State-by-State Report Card—2014*, 2.

[68] Institute of Medicine, "Summary," in *Future of Emergency Care: Hospital-Based Emergency Care: At the Breaking Point* (Washington, DC: National Academies Press, 2007), 1, https://www.nap.edu/read/11621/chapter/9.

[69] Centers for Medicare, Medicaid Services, "Emergency Medical Treatment and Labor Act (EMTALA)."

[70] Institute of Medicine, "Summary," 2; Richard Dobbs, James Manyika, and Jonathan Woetzel, *No Ordinary Disruption: The Flour Global Forces Breaking All the Trends* (New York: McKinsey and Company, 2016).

Dobbs, Manyika, and Woetzel explain in their book, *No Ordinary Disruption*, that in 2013 "older persons outnumbered children by a margin of 21 percent to 16 percent of the populations."[71] This aging population presents its own challenges within healthcare. A growing elderly population generally results in more complex health issues and more visits to the ED.[72] The more complicated and higher acuity patients in the ED take more time and resources that thereby contribute to more overcrowding.[73] Also, these higher acuity patients generally have increased the need for inpatient admission; furthermore, when beds are not available on the floor, the ED becomes a "pseudo-ICU" (intensive care unit) as it cares for these complex patients.[74] Consequently, increased ED visits by more senior populations can have a dramatic effect on hospital capacity.

Socioeconomic status also plays a role. Generally, uninsured patients are as much as three times more likely to visit an ED than insured patients.[75] Low socioeconomic patients account for 60% of ED visits at rural hospitals, while 51% of acute visits for Medicaid patients are to the ED (instead of a primary care or outpatient provider).[76] Financial impediments to seeking healthcare outside of the ED play a critical role in pushing individuals to seek care in the ED. For example, reports indicate that 18% of children with insurance are underinsured, which results in their parents reporting unreasonable healthcare cost burdens.[77]

3. Lack of Hospital Emergency Department and Inpatient Capacity

The 2014 State-by-State Report Card by ACEP also identifies a lack of inpatient capacity as an underlying cause of the daily overcrowding dilemma.[78] When no inpatient

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[71] Dobbs, Manyika, and Woetzel, *No Ordinary Disruption*, 58.

[72] American College of Emergency Physicians, *America's Emergency Care Environment, A State-by-State Report Card—2014*.

[73] Trzeciak and Rivers, "Emergency Department Overcrowding in the United States," 402-05.

[74] Trzeciak and Rivers, 402-05.

[75] Barish, Mcgauly, and Arnold, "Emergency Room Crowding," 304-11.

[76] Barish, Mcgauly, and Arnold, 304-11.

[77] American College of Emergency Physicians, *America's Emergency Care Environment, A State-by-State Report Card—2014*.

[78] American College of Emergency Physicians, *2014 Report Card*.

beds are available, hospitals are often forced to board patients in the ED, which takes up valuable treatment space and staff resources. Not only is the ED flow affected but the EMS response can also be hindered as well when considering that the ability for an ED to have an efficient patient flow plays a key role in the overall success of patient throughput in the entire pre-hospital and hospital system. The report highlights that from 2009 to 2014, "the per capita rates of staffed inpatient beds have fallen from 358.3 to 329.5 per 100,000 people, and psychiatric care beds have also declined from 29.9 to 26.1 per 100,000." That rate follows a 39% decrease in inpatient beds between 1981 and 1999.[79] Generally, the decrease in inpatient beds has been due to business strategies intended to ensure higher patient census, and thereby, the creation of more income.[80] As Barish, Mcgauly, and Arnold describe, "Elective admissions reimburse better than poorly funded ER admissions and elective surgeries pay better than trauma in addition to being more predictable."[81] In other words, it ultimately, costs too much money for hospitals to keep empty beds available and staffed for disasters Thus, they do not do allow the practice to be implemented. Moreover, hospitals are often incentivized for maintaining a high census.[82] Consequently, maintaining a "full house" for inpatient treatment capacity can wreak havoc on the hospital's ED and its ability to respond to a disaster event.

4. Lack of Appropriately Trained Staff

Finally, the availability of ED and inpatient beds will have no impact on emergency overcrowding if professional medical personnel are not available to staff the beds. Chow, Niedzwiecki, and Hsia explain that staffed beds should be reviewed and considered in addition to licensed beds when considering a hospital's daily or disaster surge capacity.[83] Essentially, they identify a significant gap between the beds that a hospital is allowed to

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[79] Trzeciak and Rivers, "Emergency Department Overcrowding in the United States."

[80] Trzeciak and Rivers, 402-05.

[81] Barish, Mcgauly, and Arnold, "Emergency Room Crowding," 306.

[82] Beau Grant Barnes and Nancy L. Harp, "The U.S. Medicare Disproportionate Share Hospital Program and Its Effect on Capacity Planning Decisions," January 1, 2017, 10.1016/j.jaccpubpol.2018.07.005.

[83] Chow, Niedzwiecki, and Hsia, "Trends in the Supply of California's Emergency Departments and Inpatient Services, 2005–2014."

have (and that are usually considered when reporting their surge capability) according to their license and the beds they are actually able to staff.[84] In their 2014 study, they found that, in California, only 59% of medical surgical licensed beds were staffed, and only 73% of cardiac critical care beds were staffed.[85]

Staffing beds will continue to be a concern until nationwide shortages are addressed. A 2012 report projected a 300,000 to 1,000,000 nursing staff shortage by 2020.[86] Additionally, access to specialty physicians further contributes to the predicament. The ACEP report card states that there is only "a national average of about 2 neurosurgeons per 100,000 people; 2.2 plastic surgeons; 3.5 ENTs; and 9.7 orthopedists and hand surgeons."[87] Overall, a 2005 report predicted a shortage of 90,000 full-time doctors by the year 2020.[88] Further compounding the issue is the fact that these rates do not account for the specialists' "willingness to provide on-call services."[89] One national study from 2010 of 442 hospitals across the nation found that nearly 75% of participating hospitals stated that the lack of on-call specialty surgeons affected their ED.[90] Moreover, of the hospitals that reported some specialty surgeon on-call coverage, over 25% indicated that the coverage was undependable.[91] The lack of surgical specialty physicians available for the ED results in frustrated patients who often leave prior to being properly evaluated or long

[84] Chow, Niedzwiecki, and Hsia, 4.

[85] Chow, Niedzwiecki, and Hsia, 4.

[86] Stephen P. Juraschek et al., "United States Registered Nurse Workforce Report Card and Shortage Forecast," *American Journal of Medical Quality* 27, no. 3 (May 2012): 241–49, https://doi.org/10.1177/1062860611416634.

[87] American College of Emergency Physicians, *America's Emergency Care Environment, A State-by-State Report Card—2014*, 10.

[88] Heritage Foundation, "Health Care and Homeland Security," 6.

[89] American College of Emergency Physicians, *America's Emergency Care Environment, A State-by-State Report Card—2014*, 10.

[90] Mitesh B. Rao, Catherine Lerro, and Cary P. Gross, "The Shortage of On-Call Surgical Specialist Coverage: A National Survey of Emergency Department Directors," *Academic Emergency Medicine* 17, no. 12 (December 1, 2010): 1374–82, https://doi.org/10.1111/j.1553-2712.2010.00927.x.

[91] Rao, Lerro, and Gross, 1376-77.

delays, which further crowds the ED, as patients cannot be appropriately dispositioned to an inpatient bed or discharged in a timely manner.[92]

More recent studies show a slightly improved outlook for the current physician and nursing shortage. An article from 2016 by Mark Reiter, Leana Wen, and Brady Allen in the *Journal of Emergency Medicine* paints an improved picture of the future physician workforce, which asserts that enough ED physicians will be available over the next decade to meet the national demand.[93] However, they concede, "low-volume rural EDs will continue to have difficulty attracting emergency medicine specialists."[94] Additionally, an updated 2018 forecast shows improvement for the nursing workforce; nevertheless, they still project a shortfall of over 150,000 nurses across the United States by 2020 and half a million nurses by 2030.[95] Researchers identify several reasons for the shortage including medical programs not graduating enough students to meet the current patient demands across the nation at the same time that the current workforce is aging and retiring out of the system.[96] Researchers also identify poor pay and job dissatisfaction as additional issues causing nursing shortages.[97]

While the previously discussed forecasts and causes of the lack of appropriately trained medical staff are complex and multi-faceted, the results are the same. Hospitals find themselves critically disadvantaged when they cannot fill all the positions required to staff their emergency departments or their inpatient service areas for daily operations appropriately. Nationwide, the availability of staffed beds remains around 5% on any given

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[92] Rao, Lerro, and Gross, 1378-79.

[93] Mark Reiter, Leana S. Wen, and Brady W. Allen, "The Emergency Medicine Workforce: Profile and Projections," *The Journal of Emergency Medicine* 50, no. 4 (April 1, 2016): 690–93, https://doi.org/10.1016/j.jemermed.2015.09.022.

[94] Reiter, Wen, and Allen, 690.

[95] Xiaoming Zhang et al., "United States Registered Nurse Workforce Report Card and Shortage Forecast: A Revisit," *American Journal of Medical Quality* 33, no. 3 (May 1, 2018): 229–36, https://doi.org/10.1177/1062860617738328.

[96] Patrick Cox, William Willis, and Alberto Coustasse, "The American Epidemic: The U.S. Nursing Shortage and Turnover Problem," *Management Faculty Research*, March 1, 2014, http://mds.marshall.edu/mgmt_faculty/125.

[97] Cox, Willis, and Coustasse, 3.

day.[98] This percentage indicates that very little capacity exists for fluctuations in patient volume on any given day.

C. CONSEQUENCES OF THE HOSPITAL OVERCROWDING CRISIS

The consequences of the demand and capacity crisis in this nation's hospitals are widespread. This section briefly discusses some of the well-known patient safety and clinical outcome concerns associated with ED overcrowding and the "boarding" of patients. Additionally, the impact on pre-hospital response capacity and care due to hospital overcrowding are considered. Finally, the reliability of hospitals to be able to sufficiently respond to emergency and disaster events is questioned as a result of their failure to manage day-to-day surge events.

1. Patient Safety and Clinical Outcomes

Although a lot more research can be conducted, adverse effects have been recognized related to hospital overcrowding and ED boarding since the onset of the current crisis.[99] One study determined a 2% increase in mortality for patients boarded for more than 12 hours in the ED while waiting for an inpatient bed.[100] Another study concluded that 28% of boarded patients experienced a negative outcome while being housed in the ED awaiting an inpatient bed.[101]

Timeliness is imperative in medical care, especially when recognizing and responding to conditions like heart attacks, sepsis, or stroke, and timeliness can be a

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[98] American College of Emergency Physicians, *America's Emergency Care Environment, A State-by-State Report Card—2014*.

[99] Steven L. Bernstein et al., "The Effect of Emergency Department Crowding on Clinically Oriented Outcomes," *Academic Emergency Medicine: Official Journal of the Society for Academic Emergency Medicine* 16, no. 1 (January 2009): 5, https://doi.org/10.1111/j.1553-2712.2008.00295.x.

[100] Adam J. Singer et al., "277: The Association between Length of Emergency Department Boarding and Mortality: A Multicenter Study," *Annals of Emergency Medicine* 56, no. 3 (September 1, 2010): S91–92, https://doi.org/10.1016/j.annemergmed.2010.06.327.

[101] Shan W. Liu et al., "A Pilot Study Examining Undesirable Events among Emergency Department-Boarded Patients Awaiting Inpatient Beds," *Annals of Emergency Medicine* 54, no. 3 (2009): 381–5, https://www.ncbi.nlm.nih.gov/pubmed/19303168.

challenge in an overcrowded ED.[102] For example, several studies have demonstrated that increased ED overcrowding and patient lengths of stay are correlated to the delayed receipt of timely antibiotics, which can affect things like sepsis outcomes.[103] Overall, "EDs are often high-risk, high-stress environments fraught with opportunities for error."[104] ED overcrowding needlessly creates an added risk for error in an already complex environment.

2. Pre-hospital Response Impact

In addition to patient safety within the ED, overcrowding can also directly impact EMS response and capacity within the community. EMS response times within the community are traditionally closely monitored to validate the strategy of the community's EMS system.[105] However, the response times often do not consider the delays EMS crews experience waiting to turn over patient care at EDs.[106] Response times are critical to EMS because there is a "direct association with a patient's chance of survival following a cardiac arrest and other emergencies."[107] Consequently, EMS crews who are "parked" in an ED for an inordinate amount of time are not available to respond to other critical need patients within the community, which adversely affects the community's 911-response system.[108] Furthermore, the EMS units unable to respond to routine 911 calls because of transfer of care delays caused by ED overcrowding may also be unavailable to respond expeditiously to mass casualty events.

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[102] Bernstein et al., "The Effect of Emergency Department Crowding on Clinically Oriented Outcomes," 1-10.

[103] Bernstein et al., 1-10.

[104] Institute of Medicine, "Chapter 3: Building a 21st-Center Emergency Care System," in *Future of Emergency Care: Hospital-Based Emergency Care: At the Breaking Point* (Washington, DC: National Academies Press, 2007), 23, https://www.nap.edu/read/11621/chapter/3.

[105] Corey M. Slovis and Evan Dingle, "The Impact of Hospital Overcrowding on EMS Crews," *Journal of Emergency Medical Services*, accessed August 2, 2017, http://www.jems.com/ems-insider/articles/2017/may/the-impact-of-hospital-overcrowding-on-ems-crews.html.

[106] Slovis and Dingle, "The Impact on Overcrowding on EMS."

[107] Marc Eckstein et al., "Facilitating EMS Turnaround Intervals at Hospitals in the Face of Receiving Facility Overcrowding," *Prehospital Emergency Care*, July 2, 2009, https://doi.org/10.1080/10903120590962102.

[108] Eckstein et al., 267-275.

3. Effect on Disaster Response

Finally, the routine saturation of hospital beds and the predictable difficulty in managing daily surge within hospitals reflect widely expressed concerns regarding the hospitals' ability to respond to disasters.[109] In their paper on the threat ED overcrowding poses to public health, Trzeciak and Rivers assert, "overcrowded EDs would be ill equipped to handle mass casualty victims in a disaster scenario."[110] They hypothesize that hospital overcrowding results in greater challenges to expand capacity during mass casualty events and surmise that hospitals are at a disadvantage from the very onset of a response.[111] The implications of an ED overcrowding's effect on surge capacity are instinctive and often referenced throughout the reviewed literature; nevertheless, little measurable research is available to support the theory.[112] However, since this area of research is emerging, future opportunities to investigate these postulations are possible.

Representative Henry A. Waxman, Chairman of the U.S. House of Representatives' Committee on Oversight and Government Reform, requested one such study that attempted to demonstrate quantifiably the effect of daily hospital overcrowding on disaster surge capacity in 2008 following the 2004 Madrid, Spain train attack that killed 177 people and injured more than 2,000.[113] The request was made to survey seven level 1 trauma centers across the United States to determine if they had the capacity to respond to a Madrid-like event.[114] The survey was conducted on a single day in 2008 and the seven respondents were asked to provide their real-time ability to respond to the mass casualty event.[115] "The results of the survey show[ed] that none of the hospitals surveyed in the seven cities had sufficient emergency care capacity to respond to an attack generating the number of

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[109] DeLia and Wood, "The Dwindling Supply of Empty Beds," 1688-94.

[110] Trzeciak and Rivers, "Emergency Department Overcrowding in the United States," 403.

[111] Trzeciak and Rivers, 403.

[112] Jenkins, O'Connor, and Cone, "Differentiating Large-scale Surge versus Daily Surge," 1169-72.

[113] Committee on Oversight and Government Reform, *Hospital Emergency Surge Capacity: Not Ready for the 'Predictable Surprise* (Washington, DC: United States House of Representatives, 2008), https://www.hsdl.org/?view&did=485720.

[114] Committee on Oversight and Government Reform, *Hospital Emergency Surge Capacity*, 1-21.

[115] Committee on Oversight and Government Reform, 1-21.

causalities that occurred in Madrid."[116] Furthermore, the report indicated that all the hospitals reported that their EDs, critical care, and inpatient beds were basically full at the onset of the survey, which impacted the ability to respond.[117] Again, this emerging field of research presents more opportunities to collect objective evidence; nevertheless, this single study was able to demonstrate similarity in the impact of daily overcrowding on the emergency and disaster response capabilities on trauma centers across the United States.

D. CONCLUSION

The challenges associated with the U.S. healthcare system may be best described as wicked problems. A *wicked problem*, as defined by Horst Rittel and Melvin Ritter in 1973, is described as a problem not easily defined and even more difficult to solve due to its complexity and interdependency, contradictory, or evolving requirements, and a lack of a concrete and identifiable solution.[118] While the overcrowding crisis is just a symptom of the overall challenges associated with the U.S. healthcare system, it possesses its own unique complexity. Researchers identify numerous causes for the crisis, many of which intermingle and relate. Additionally, the consequences of the crisis are also widespread and exceedingly multifaceted. Consequently, this thesis focuses on questions surrounding its impact on hospital disaster response.

[116] Committee on Oversight and Government Reform, i.

[117] Committee on Oversight and Government Reform, 1-21.

[118] Horst W. J. Rittel and Melvin M. Webber, "Dilemmas in a General Theory of Planning," *Policy Sciences* 4, no. 2 (June 1, 1973): 155–69, https://doi.org/10.1007/BF01405730.

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III. DEFINING SURGE AND UNDERSTANDING SURGE CAPACITY

A. UNDERSTANDING SURGE AND SURGE CAPACITY

Before hospitals and healthcare coalitions can plan to meet surge capacity targets, they must first agree on what *surge* and *surge capacity* means. "Differences in the conceptions of health system surge capacity begin at the level of first principles, with contention over what constitutes a surge event, scenario, or process."[119] Barbisch and Koenig get to the heart of the problem when they state:

> It is difficult to determine: Prepared for what? How much is enough? How fast do we need it? Where are we going to get it? Even if we can afford it, how do we maintain capability? Given our need for support from other functional areas, how do we link with their resources?[120]

To assert that this problem is complex is an understatement. For example, surge capacity planning relates to what healthcare emergency response planners routinely refer to as the "4 Ss," which are space, staff, supplies, and standard of care. Each of the four topics possesses a myriad of topics, issues, and concerns for consideration. Barbisch and Koenig further separate surge event planning into two categories: *sudden impact* and *obscure*. Sudden impact surge events have abrupt onset and are generally shorter in duration, whereas obscure surge events may take longer to recognize, may be more widespread, or may take longer to resolve.[121] Sudden impact surge event examples include the 2013 Boston Marathon bombing or the Las Vegas shooting of 2017. Obscure events comprise Hurricane Katrina or large-scale disease outbreaks. Figures 1 and 2, developed by Barbish and Koenig in "Understanding Surge Capacity: Essential Elements," demonstrate their concepts as they relate to event timing and duration and surge needs.

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[119] Watson, Rudge, and Coker, "Health Systems' 'Surge Capacity'," 86.

[120] Barbisch and Koenig, "Understanding Surge Capacity: Essential Elements," 1098.

[121] Barbisch and Koenig, 1099-1100.

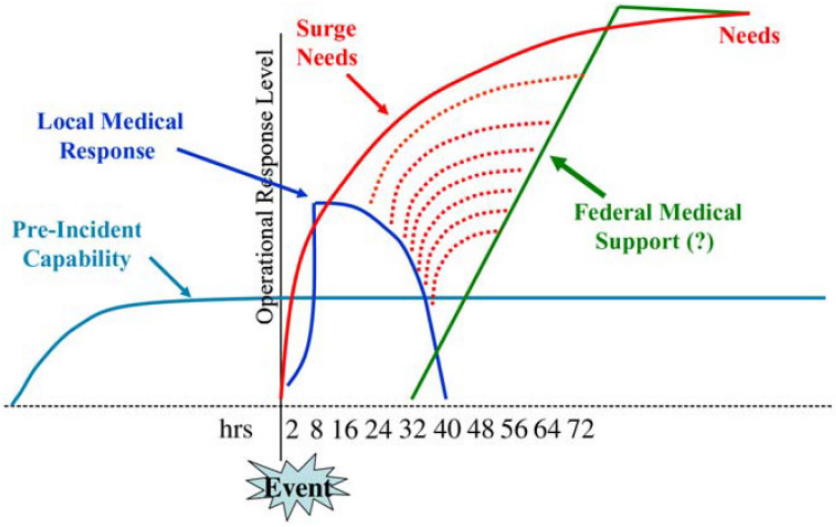

Figure 1. Surge Timeline for Sudden Impact Event[122]

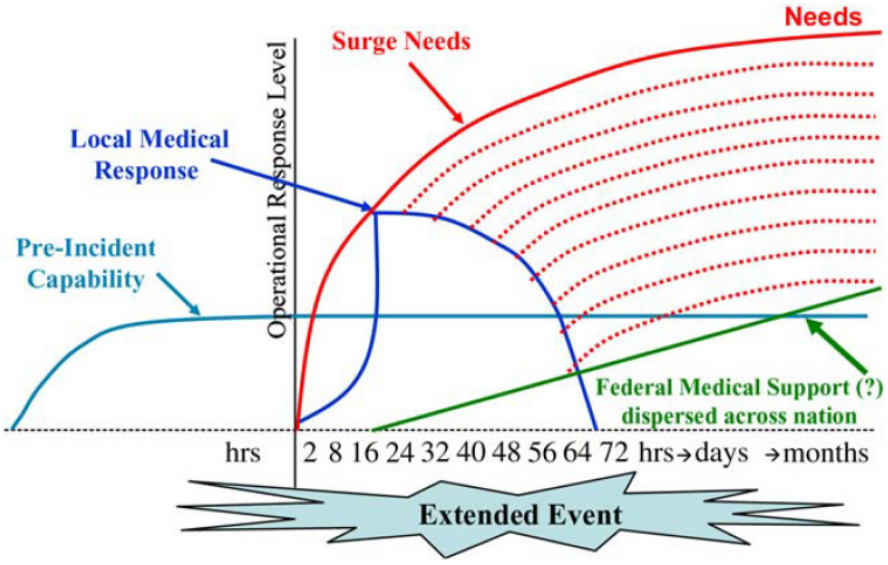

Figure 2. Surge Timeline for Obscure Events[123]

[122] Source: Barbisch and Koenig, 1100.

[123] Source: Barbisch and Koenig, 1100.

Taking an additional viewpoint, John Hick, Michael Christian, and Charles Sprung expand surge capacity planning classifications into three functional elements: conventional, contingency, and crisis.[124] *Conventional surge capacity* "utilizes usual patient care spaces, resources and practices."[125] *Contingency surge capacity* operates in "adapted areas of the facility…including adaptations to standard staffing and resource practices to provide functionally equivalent medical care, with minimal increase in risk to the patient."[126] In addition, c*risis surge capacity* refers to situations where "significant changes to standard staffing and resource practices" is required. This level of care "may significantly impact patient morbidity and mortality."[127] Figure 3 blends the concepts between the four components of surge and the three functional elements:

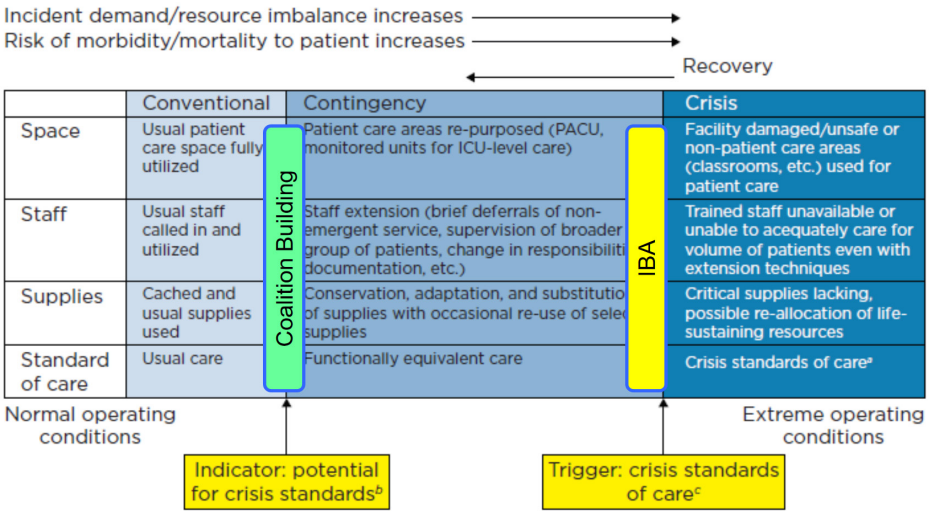

Figure 3. Four Components of Surge as They Relate to the Three Functional Elements[128]

[124] Hick, Christian, and Sprung, "Chapter 2. Surge Capacity and Infrastructure Considerations for Mass Critical Care."

[125] Hick, Christian, and Sprung, S12.

[126] Hick, Christian, and Sprung, S12.

[127] Hick, Christian, and Sprung, S12.

[128] Source: Institute of Medicine, "Volume 1: Introduction and CSC Framework," in *Crisis Standards of Care, A Systems Framework for Catastrophic Disaster Response*, ed. Dan Hanfling et al. (Washington, DC: National Academies Press, 2012), 41.

Consequently, considering the scope and depth of the debate on the range of formal definitions, this research applies the following definition provided by the Joint Commission in 2003:

> Surge capacity encompasses potential beds; available space in which patients may be triaged, managed, vaccinated, decontaminated, or simply located; available personnel of all types; necessary medications, supplies, and equipment; and even the legal capacity to deliver healthcare under situations which exceed capacity.[129]

Furthermore, surge capacity planners must consider the aforementioned definition that includes the "4 Ss" while also considering the consequence (conventional, contingency, and crisis capacity) and timing (sudden onset or obscure nature) of the disaster or surge event. However, none of these definitions addresses the baseline capacity of the hospital or healthcare organization and its effect on meeting surge demands.

B. BUILDING SURGE CAPACITY THROUGH IMMEDIATE BED AVAILABILITY

Creating immediate bed availability (IBA) is the initial and perhaps most critical approach for generating surge capacity in hospitals and healthcare systems. Generally, initial surge goals—such as those required by the HPP—require a target of 20% IBA within four hours of the onset of an incident.[130] ASPR and other organizations often describe the three following main pillars for creating IBA: ensuring systems are in place to document in real-time where bed availability exists, making certain procedures are in place for immediately off-loading of patients from the hospital or healthcare organization, and implementing protocols to increase or augment resources in an effort to on-load patients.[131]

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[129] Barbisch and Koenig, "Understanding Surge Capacity: Essential Elements," 1099.

[130] Office of the Assistant Secretary for Preparedness and Response, *2017–2022 Health Care Preparedness and Response Capabilities*. The 20% surge target can be obtained by creating any type of surge bed (i.e., conventional, contingency, or crisis). It is dependent on numerous factors, such as the size and capabilities of the hospital, size of event, or type of event.

[131] "Immediate Bed Availability," Public Health Emergency, accessed July 14, 2018, https://www.phe.gov/Preparedness/planning/sharper/Pages/iba.aspx; Michigan Department of Health and Human Services, *Michigan Immediate Bed Availability Decompression Strategy Guidelines and Toolkit* (Lansing, MI: Michigan Department of Health and Human Services, 2018).

Additionally, some ASPR guidance documents add a fourth pillar, maintaining capabilities to track patients throughout the healthcare system.[132]

Specific tactics concentrating on decompressing the hospital (or off-loading patients) consist of canceling elective surgeries and procedures and quickly discharging patients medically able to home. Hospitals may also off-load patients by transferring patients to other facilities or discharging patients who might require more medical support than they can receive at home alone to long-term care or utilize home health services. On-boarding tactics include those that create extra space, such as converting single rooms to double rooms or utilizing non-traditional patient care areas like hallways, lobbies, or waiting rooms. Opening closed areas or converting certain areas to new uses, such as converting a step-down unit to a critical care unit, also serve to increase bed capacity rapidly. Other on-boarding tactics focus on increasing personnel to take care of the influx of patients. These tactics include modifying or extending work hours, calling back off-duty staff, and using non-traditional care providers, such as family members, volunteers, or non-clinical staff. For these tactics to be truly successful, the hospital and healthcare system must maintain situational awareness—ensuring the ability to monitory patient acuity, volume, and bed availability—both internally to the organization and externally. Healthcare coalitions, discussed in more detail in the following chapter, serve to support the external situational awareness, information sharing, and resource coordination efforts.[133]

All these strategies exist to "quickly provide higher-level care to more serious patients during a disaster with no new space, personnel, or equipment."[134] The Michigan Department of Health and Human Services' "Michigan Immediate Bed Availability Decompression Strategy Guidelines and Toolkit" outlines many of the specific tactics recommended to create IBA. Figure 4 combines the strategies outlined in the Michigan

[132] Public Health Emergency, "Immediate Bed Availability."

[133] Michigan Department of Health and Human Services, *Michigan Immediate Bed Availability Decompression Strategy Guidelines and Toolkit*, 49.

[134] Public Health Emergency, "Immediate Bed Availability."

toolkit with the pillars and their intended influences on the "4Ss" in an effort to bring all the concepts together.

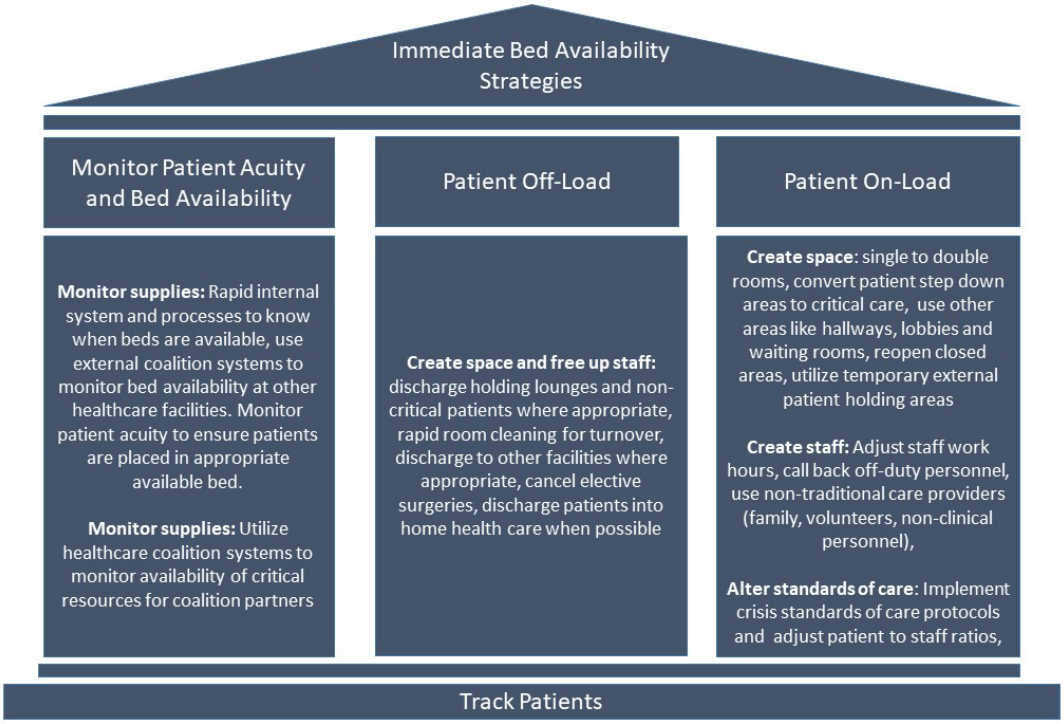

Figure 4. IBA Strategies by Pillar and Intended Influence on the "4Ss"

C. DESCRIBING A SUCCESSFUL SURGE RESPONSE: THE BOSTON MARATHON BOMBING

The Boston area hospital response to the April 15, 2013 Boston Marathon bombing is often described as a "best practice" event that demonstrates the effectiveness of national healthcare surge strategies and IBA response tactics.[135] Three people tragically died on the scene during the initial blasts. However, despite the severity of the injuries at the scene and the large number of victims, every single patient who left the incident alive ultimately

[135] Kellermann and Peleg, "Lessons from Boston," 1957.

survived.[136] This outcome is unheard of within the medical community when considering the quantity and the severity of the traumatic injuries from the blasts.[137]

Massachusetts General Hospital (MGH) activities are highlighted due to the detail of the publicly available information on its response. MGH is a 907-bed level I trauma hospital in the heart of Boston. The large, teaching hospital boasts that it has 61 operating rooms that average over 150 surgeries per day.[138] It also reports robust staffing levels with staff trained because of frequent schedule changes due to unforeseen events, such as multiple trauma patients or transplant donors.[139]

At 2:49 pm on April 15, 2013, explosions triggered by two bombs left near the Boston Marathon finish line caused three deaths and an estimated 264 injured; many of whom had traumatic amputations.[140] First responders, who were already working the marathon finish line, turned the area into a triage unit and started treating victims.[141] Twenty-seven Boston area hospitals received patients from the event, with the most serious patients being evenly distributed to the five level I trauma hospitals in downtown Boston.[142] Initial actions at Boston area hospitals included the following traditional surge principles to offload patients, assess resources, and prepare for patient on-loading:

> Hospital staff relocated patients to clear the emergency department, prepared operating rooms, and pre-positioned trauma teams. The incident commander for the emergency department coordinated the clearing of emergency rooms and the mobilization of staff and equipment. Hospitals also alerted their Radiology Departments to ensure the availability of technicians and equipment, such as CT scanners and X-ray units.

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[136] Atul Gawande, "Why Boston's Hospitals Were Ready," *New Yorker*, April 17, 2013, https://www.newyorker.com/news/news-desk/why-bostons-hospitals-were-ready.

[137] Gawande, "Hospitals Were Ready."

[138] Maureen Hemingway and Joanne Ferguson, "Boston Bombings: Response to Disaster," *AORN Journal* 99, no. 2 (January 25, 2014), https://aornjournal.onlinelibrary.wiley.com.libproxy.nps.edu/doi/full/10.1016/j.aorn.2013.07.019.

[139] Hemingway and Ferguson, "Boston Bombings: Response to Disaster."

[140] Federal Emergency Management Agency, *Boston Marathon Bombings: Hospital Readiness and Response, Lessons Learned Information Sharing* (Washington, DC: U.S. Department of Homeland Security, 2013), https://www.hsdl.org/?view&did=744165.

[141] Federal Emergency Management Agency, 4.

[142] Federal Emergency Management Agency, 4.

> Massachusetts General Hospital (MGH) suspended routine CT scans in order to have them available for bombing victims and asked technologists to standby with portable imaging units.[143]

MGH staff reported receiving the first notifications of the bombing via social media just prior to 3:00 pm.[144] The hospital leadership received official notification of the event through the Boston EMS system at 3:00 pm. They activated their disaster response at 3:03 pm based on the initial notifications from Boston EMS, which resulted in the operationalization of an incident command structure within the hospital. The first patient arrived at 3:04 pm.[145]

Staff within the hospital reported that they began operationalizing surge plans following the initial social media notifications and after the internal disaster declaration, prior to any official activation.[146] The initial steps included assessing staffing and operating room availability. Therefore, team leaders ordered day-shift members to remain on shift; thereby, increasing staffing resources as the night shift staff had already begun to arrive for their 3:00 pm shift. Furthermore, they rapidly determined that 32 active procedures were going on in the operating room that resulted in 26 available operating rooms and teams. The leadership team determined that the surgical resources available were sufficient to care for arriving patients. While operating room staff and space were sufficient, the team quickly realized that supplies for treating the blast wounds were not. The operating room received its first patient 20 minutes after its initial notification. In the end, MGH received 32 patients from the blast with seven patients requiring amputation procedures.[147] Identified issues shared by hospital responders following the events during lessons learned presentations included the need to secure amputation kits from neighboring healthcare

[143] Federal Emergency Management Agency, 2.

[144] Hemingway and Ferguson, "Boston Bombings: Response to Disaster."

[145] Hemingway and Ferguson, "Boston Bombings: Response to Disaster."

[146] Hemingway and Ferguson, "Boston Bombings: Response to Disaster."

[147] Hemingway and Ferguson, "Boston Bombings: Response to Disaster."

coalitions and jurisdictions, as well as blood and blood products from neighboring states.[148] Nevertheless, successfully caring for that number of traumatic patients in a short amount of time effectively illustrates the efficacious use of surge planning tactics, especially those designed to create IBA in EDs and operating rooms.

D. LINGERING QUESTIONS

MGH and other Boston area hospitals also reported several fortuitous events that facilitated their surge response that highlight some of the lingering questions surrounding the current U.S. surge policy. Arthur Kellerman and Kobi Peleg describe six additional events that may have contributed to the successful response in the *New England Journal of Medicine*:

> The bombing occurred at a major event where large numbers of police, security, and EMS personnel were already deployed.
>
> Because it was race day—indeed, a state holiday—it is likely that the city's operating rooms and other clinical services were running at less than full capacity.
>
> The attack happened shortly before the 3:00 pm change of shift at area hospitals. As a result, a full complement of administrative staff and two shifts of health care providers were on site at each facility.
>
> The bombs were detonated in a city that is home to seven trauma centers and multiple world-class hospitals…Boston EMS personnel wisely distributed casualties among the area's trauma centers, so each one received a manageable number.
>
> The bombers detonated their relatively low-yield devices out-of-doors. A bombing inside a closed space (e.g., a building, bus, or train) produces more primary blast injuries (e.g., blast lung) and fatalities, because surrounding walls concentrate blast waves. The absence of structural collapse facilitated the swift extrication of victims.
>
> Although most health care providers in the United States have never treated a bombing victim, lessons learned by military surgeons, emergency physicians, and nurses in Iraq and Afghanistan are progressively percolating

[148] Lisa J. Peterson et al., "Characteristics of State and Local Health Department Involvement with Healthcare Coalitions: Lessons Learned," *National Healthcare Coalition Preparedness Conference*, accessed November 17, 2018, http://nacchopreparedness.org/national-healthcare-coalition-preparedness-conference/.

> through the trauma care community. Moreover, hundreds of Boston's prehospital and hospital-based responders had already learned the basics of blast-injury care and the operational challenges their city could face.[149]

MGH data supports the assertions made by Kellerman and Peleg. At the start of the day, the hospital had only 51 of the 61 operating rooms scheduled, with 40 rooms expected to be operational at 3:00 pm.[150] Furthermore, they had full staffing from the morning shift available with additional staffing scheduled to arrive at 3:00 pm for the evening shift. This staffing resulted in 180 nurses available at 3:30 pm instead of the 88 scheduled for the night shift.[151]

This thesis does not emphasize these incidental factors to undermine the remarkable response of Boston area hospitals, such as MGH, in the face of a devastating tragedy or to diminish the effect of implementing surge strategies and tactics. Clearly, IBA tactics worked in this response and the patient volume did not exceed the 20% IBA threshold for the Boston area hospitals. Instead, it emphasizes them in an effort to draw attention to the foundational questions of this thesis related to healthcare surge and crisis response strategy:

- If the Boston area hospitals had been experiencing their normal overcrowding levels for a Monday, would their response and the outcomes have been the same? **What is the impact of overcrowding on surge response capabilities? How can hospitals or healthcare coalitions gather data to answer this question? Does the question need to be answered?**

- Boston boasts one of the most accomplished areas in the country for hospitals and healthcare assets and capabilities, with 20 hospitals in the city (seven of which are level 1 trauma centers).[152] If the bombing happened in another city, with fewer hospitals, capabilities, and resources,

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[149] Kellermann and Peleg, "Lessons from Boston," 1956.

[150] Hemingway and Ferguson, "Boston Bombings: Response to Disaster."

[151] Hemingway and Ferguson, "Boston Bombings: Response to Disaster."

[152] Scott P. Edwards, "Boston Hospitals," Harvard Magazine, October 15, 2012, https://harvard magazine.com/2012/11/boston-hospitals.

would the results have been the same? **What is the impact on baseline capabilities and resources on surge response?** What should baseline capabilities be?

- The number of victims at the Boston Marathon would be classified as a major incident for most areas but was managed within Boston without overwhelming any one hospital. **What is considered a "major" event versus a "minor" event? Is the scope of an event defined as major or minor determined by whether or not surge practices and IBA were implemented?**

- While the bombing resulted in numerous traumatic injuries, the surge itself to area hospitals was over within a few hours. What would be the consequences of a more long-term surge event? Would the surge strategies and IBA tactics be sufficient for a longer event?

E. CONCLUSION

The questions posed regarding surge and surge capacity are numerous and complicated. In an effort to create a manageable scope, this thesis concentrates on the questions related to whether daily hospital overcrowding influences disaster response capabilities or if baseline-operating status at the time of the event should be considered when formulating surge strategies. Kellerman and Peleg spell out the concerns when stating:

> As we reflect on Boston's response, it's not enough to enumerate what went well; we must understand why. Otherwise, some citizens and health care professionals may erroneously conclude that it doesn't matter if emergency departments are crowded and if disaster plans and rigorous drills are lacking, because their hospital's medical staff will simply 'rise to the occasion.' That's a risky bet.[153]

Even when considering successful surge capacity responses, such as the Boston Marathon bombing, it is shortsighted to assume surge capacity strategies and IBA tactics

[153] Kellermann and Peleg, "Lessons from Boston," 1957.

alone provide hospitals with the tools needed to respond effectively to any disaster event. This response potentially can be true in light of the daily challenges hospitals must overcome due to overcrowding. However, data must first be gathered to determine if baseline capacity is an issue for surge response at all. The following chapter focuses on how the questions surrounding those concerns can be answered by examining healthcare coalitions and how they can be leveraged to support answering the questions.

IV. HEALTHCARE COALITIONS

The protection and security of the U.S. healthcare community remains a high order task, especially when considering the complex amalgam of public and private entities involved in the system that must be able to coordinate response and information during disaster events. "Increasingly, the USA is building national capabilities to improve health security, which is defined as a state in which the nation and its people are prepared for, protected from, and resilient in the face of health threats."[154] To improve health security, a system must be in place to strengthen the U.S. health system at the local, state, and federal level with a focus on planning and preparing for and responding to any type of event that may affect the health.[155] Although Alex Mills et al. focus on urban environments in their paper, "Coordination of Autonomous Healthcare Entities: Emergency Response to Multiple Casualty Incidents," many of the concepts they describe also apply to suburban and even rural environments.[156] They use the term *slack capacity*, which they describe as possessing the extra capacity to respond to an incident (e.g., increasing daily surge capacity for overcrowding much like disaster capacity).[157] In an effort to combat the lack of surge capacity, Mills et al. explain the need for independent healthcare agencies to work together to respond to events.[158] Since they focus on urban environments, they use "urban multiple casualty incidents (UMCI)," which they define as "an incident with two or more persons needing medical attention, and multiple care resources involved in the response" as an example to demonstrate the need for partnership.[159] In reality, a UMCI is no different from a multiple casualty incident in any environment; they all require multiple response or

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[154] Ali S. Khan and Nicole Lurie, "Health Security in 2014: Building on Preparedness Knowledge for Emerging Health Threats," *Lancet* 384, no. 9937 (July 5, 2014): 93, http://dx.doi.org.libproxy.nps.edu/10.1016/S0140-6736(14)60260-9.

[155] Khan and Lurie, 93.

[156] Alex F. Mills et al., "Coordination of Autonomous Healthcare Entities: Emergency Response to Multiple Casualty Incidents," *Production and Operations Management* 27, no. 1 (January 2018): 184–205, https://doi.org/10.1111/poms.12790.

[157] Mills et al., 184.

[158] Mills et al., 184-205.

[159] Mills et al., 184.

treatment resources. Nevertheless, their central concept remains valid; they state, "the salient feature of a UMCI is not the absolute number of casualties, but the fact that multiple autonomous entities must work together to place them with an appropriate care resource."[160] In the past, independent hospitals and healthcare organizations did not always recognize the need to join forces during these incidents, but recent events and guidance have begun to shift those beliefs.

This chapter first explores the origins of healthcare coalitions. Next, the chapter delves into healthcare coalitions today to include their organization, function, and role in emergency response. Finally, the chapter concludes with a discussion on the federal capabilities guidance and performance measures for healthcare coalitions, which centers specifically on capabilities and measures related to surge capacity building and response, as well as data collection efforts that currently exist.

A. WHAT IS A HEALTHCARE COALITION?

As the recognition for national capabilities and capacity grew over the past two decades, many communities realized that they would be better served if they established "regional collaborations among health care organizations, providers, emergency managers, public sector and other private partners" to respond to these multiple casualty incidents.[161] This sort of grassroots effort within the healthcare community led to the initial establishment of some of the first healthcare coalitions.[162] As Melissa Harvey, the current director of the HPP, and others state:

> Large-scale emergencies, such as a terrorist bombing, would require a complex response across an entire region. Hospitals, in conjunction with EMS and public health and emergency management agencies, must work together under the rubric of a health care coalition to ensure collaboration,

[160] Mills et al., 184.

[161] Jeffrey Levi, Dara Alpert Lieberman, and Albert Lang, "Preparedness Must Permeate Health Care: Yet Still Has a Long Way to Go," *Health Progress* 94, no. 6 (December 2013): 53.

[162] Dan Hanfling, "Role of Regional Healthcare Coalitions in Managing and Coordinating Disaster Response," in *Nationwide Response Issues after an Improvised Nuclear Device Attack: Medical and Public Health Considerations for Neighboring Jurisdictions: Workshop Summary*, ed. Miriam Davis, Megan Reeve, and Bruce M. Altevogt (Washington, DC: The National Academies Press, 2014), 81–92, https://www.ncbi.nlm.nih.gov/books/NBK184316/.

coordination, and consistency in a systems approach to disaster planning and response.[163]

Healthcare coalitions are most simply defined as "groups of health care and response organizations that collaborate to prepare for and respond to medical surge events."[164] Through working together before and during emergencies, these independent (and often competing) organizations can recognize the benefit of cooperation.[165] Brooke Courtney et al. more specifically define healthcare coalitions as "a formal collaboration among hospitals, public health departments, emergency management and response agencies, and possibly other types of healthcare entities in a community that are organized to prepare for and respond to mass casualty and catastrophic health events."[166] One important key to the success of healthcare coalitions lies in the fact that they do not negate nor do they prevent individual healthcare organizations from preparing for or responding to events; instead, they are meant to augment the individual organization's response through cooperation.[167]

B. HOSPITAL PREPAREDNESS PROGRAM AND HEALTHCARE COALITION HISTORY

The establishment of formal healthcare coalitions across the country begins with the creation of the HPP. "The Hospital Preparedness Program (HPP) provides leadership and funding through grants and cooperative agreements to States, territories, and eligible municipalities to improve surge capacity and enhance community and hospital

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[163] Melissa Harvey et al., "The Role That Health Care Coalitions Play in Support of Mass Casualty Response," *Annals of Emergency Medicine* 70, no. 1 (July 1, 2017): 106, https://doi.org/10.1016/j.annemergmed.2017.02.024.

[164] Office of the Assistant Secretary for Preparedness and Response, *2017–2022 Health Care Preparedness and Response Capabilities*.

[165] Harvey et al., "The Role That Health Care Coalitions Play in Support of Mass Casualty Response," 106.

[166] Brooke Courtney et al., "Healthcare Coalitions: The New Foundation for National Healthcare Preparedness and Response for Catastrophic Health Emergencies," *Biosecurity and Bioterrorism: Biodefense Strategy, Practice, and Science* 7, no. 2 (June 1, 2009): 156, https://doi.org/10.1089/bsp.2009.0020.

[167] Courtney et al., 156.

preparedness for public health emergencies."[168] Furthermore, "it is the only source of federal funding for health care delivery system readiness."[169] Since the program's inception in 2002, the HPP has distributed nearly $6 billion to help in the development, sustainment, and growth of healthcare coalitions in an effort to improve this nation's healthcare emergency response capabilities.[170]

The HPP was created after September 11, 2001 (9/11), as the federal government leadership recognized the fractured healthcare and medical response to the attacks; consequently, the program initially focused on bioterrorism and individual hospital preparedness, and more specifically, sought to increase capacity for hospitals.[171] Before 9/11, grant programs focused on weapons of mass destruction preparedness and response, such as the Nunn-Luger-Domenici grants of the 1990s.[172] These grants provided limited guidance and encouragement for pursuing a regional healthcare response approach.[173] These grants were the impetus that began the move towards healthcare coalitions for some forward thinking leaders in some communities.[174] Additionally, HSS initiated the Metropolitan Medical Response System (MMRS) in 1996 after recognizing U.S. vulnerabilities following the nerve agent attacks in the Tokyo subway and the Oklahoma City bombing in 1995.[175] The MMRS system had similar directives as those of the HPP but was focused solely on the urban setting. This gap provided the opportunity for the

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[168] "Funding and Grant Opportunities," Public Health Emergency, last reviewed June 11, 2018, https://www.phe.gov/Preparedness/planning/hpp/Pages/funding.aspx.

[169] Melissa Harvey, *15 Years of Health Care Preparedness and Response* (Washington, DC: Assistant Secretary for Preparedness and Response, n.d.), 1, https://www.phe.gov/Preparedness/planning/hpp/Documents/HPP-15-anniversary.pdf.

[170] Office of the Assistant Secretary for Preparedness and Response, *2017–2022 Health Care Preparedness and Response Capabilities*.

[171] Levi, Lieberman, and Lang, "Preparedness Must Permeate Health Care: Yet Still Has a Long Way to Go."

[172] Hanfling, "Role of Regional Healthcare Coalitions in Managing and Coordinating Disaster Response," 2.

[173] Hanfling, 2.

[174] Hanfling, 2.

[175] Titan Corporation, *History of the Metropolitan Medical Response System (MMRS)—The First Decade: 1995–2005* (Reston, VA: Titan Corporation, 2005), https://www.hsdl.org/?abstract&did=465666.

development of a new, nationwide program to focus on the emergency response capabilities for the U.S. healthcare system in the creation of the HPP.

At its inception in 2002, the HPP was a part of the Health Resources Services Administration (HRSA).[176] In 2006, following the passage of the Pandemic and All-Hazards Preparedness Act (PAHPA), the HPP moved under the HHS' ASPR.[177] At that time, the focus of the program shifted away from basic capacity building and "shifted toward a capabilities approach to medical disaster response, focusing on such areas as personnel management, interoperable communications, and bed tracking."[178] Overall, in the subsequent years, the HPP has repeatedly demonstrated much advancement in cultivating the health system's capabilities to respond to emergencies and disasters.[179]

A 2007 study, commissioned by the ASPR at HHS, sought to evaluate the current state of hospital and healthcare system preparedness and make recommendations on future program directions for the ASPR and the HPP.[180] The assessment found that preparedness for individual hospitals across the country had dramatically improved since the inception of the HPP.[181] They supported this conclusion by identifying that hospital senior leaders were more involved in disaster response and had appointed personnel to focus on emergency planning, resource needs had been identified and stockpiled, community-wide information sharing and situational awareness had increased, and hospitals and health care partners had begun to plan, train, and exercise together.[182] However, probably the most important finding in this study identified the emergence and benefits of healthcare coalitions in pockets throughout the country.[183] After this study, the ASPR through the HPP grant program began to require the development of healthcare coalitions across the

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[176] Harvey, *15 Years of Health Care Preparedness and Response*.

[177] Levi, Lieberman, and Lang, "Preparedness Must Permeate Health Care: Yet Still Has a Long Way to Go," 53.; Harvey, *15 Years of Health Care Preparedness and Response*.

[178] Levi, Lieberman, and Lang, 53.

[179] Levi, Lieberman, and Lang, 53-56.

[180] Courtney et al., "Healthcare Coalitions," 153.

[181] Courtney et al., 153.

[182] Courtney et al.

[183] Courtney et al.

nation. Between 2012 and 2016, the HPP focused on supporting the development and initial growth of healthcare coalitions.[184] The program then demonstrated increasing maturation in June 2013 with the release of its initial set of "true performance measures, requiring health care coalitions to demonstrate not just the existence of plans but the ability to implement those plans during a disaster."[185] These measures sought to demonstrate that the focus of the progress shifted from being capacity-based to capability-based.[186] To distinguish between capacity-based and capability-based simply means that the program emphasis changed from ensuring that hospitals had enough staff and stuff to respond to disasters to ensuring protocols, plans, and policies existed to provide a community-wide, systems-based response capability.

C. HEALTHCARE COALITIONS TODAY

The *2017–2022 Health Care Preparedness and Response Capabilities* (HPP Capabilities document) drives most of the activities of healthcare coalitions today.[187] Melissa Harvey et al. describe the current program:

> The capabilities are defined around 4 broad themes: ensuring a strong foundation for health care and medical readiness (including strong administrative and financial backing for disaster planning efforts), ensuring health care and medical response coordination by understanding that each of the key participants in the health care coalition has a role to support one another in response, promoting continuity of health care service delivery (recognizing that disruptions in service delivery constitute failure), and planning for medical surge to ensure timely and efficient care to patients even when the demand for health care exceeds available supply.[188]

Currently, 476 health care coalitions (HCCs) exist across the nation made up of over 31,000 member organizations that work together to ensure continued attention on

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[184] Public Health Emergency, "Funding and Grant Opportunities."

[185] Levi, Lieberman, and Lang, "Preparedness Must Permeate Health Care: Yet Still Has a Long Way to Go," 54.

[186] Levi, Lieberman, and Lang, 54.

[187] Harvey et al., "The Role That Health Care Coalitions Play in Support of Mass Casualty Response," 106.

[188] Harvey et al., 106.

enabling local communities to respond to and recover effectively from disasters with limited reliance on state and federal partners.[189] The composition of HCCs varies widely throughout the nation. "History, politics, existing relationships (e.g. among healthcare care institutions and with public health and emergency management agencies), hazards, geography, and culture all contribute to developing and operating the optimal healthcare coalition in each community."[190] The bottom line persists that prosperous coalitions exist because of the level of involvement and dedication of their leaders and their member organizations, not what they look like on paper.

1. Healthcare Coalition Organization

> If you've seen one healthcare coalition, you've seen one healthcare coalition.
>
> —Common phrase expressed in the HPP community

Recognizing the diversity of the health care system across the country, the HPP wisely avoids prescribing how coalitions should be developed and managed; thereby, allowing the members to dictate the structure and governance of each coalition. Consequently, as community needs develop, coalitions evolve to meet them.[191] Brooke Courtney et al. describe the variety in coalition governance in great detail stating, "coalitions have been formed by building on preexisting structures or entities (eg, Metropolitan Medical Response System [MMRS] groups), having the public health department serve as the organizing body, having a dominant hospital system bring neighboring hospitals together, or collaboratively creating an entirely new body."[192] Additionally, coalition partners formalize relationships with the use of mutual aid agreements that outline how the members will share information and resources and coordinate responses between member organizations.[193] The administrative structure and

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[189] Harvey, *15 Years of Health Care Preparedness and Response*.

[190] Courtney et al., "Healthcare Coalitions," 156.

[191] Mills et al., "Coordination of Autonomous Healthcare Entities: 184–205.

[192] Courtney et al., "Healthcare Coalitions," 156.

[193] Courtney et al., 156.

legal authorities of HCCs also vary with some seeking non-profit status that requires a formal executive body and director. State and local public health lead some HCCs, while influential hospitals drive other coalitions.[194] Finally, some coalitions rely on a formal structure with representative voting while others exist in a more democratic state with all members receiving equal say in coalition affairs.[195] No matter the type of formal or informal relationships established, the key is to create a defined network of partner organizations that establish methods of working together to prepare for and respond to emergencies.

Just as the governance structure of coalitions differs across the nation, so do the geographic boundaries and their definition of what their "communities" include. Therefore, HCC geographic boundaries may encompass an entire state, a region, a county, a city, or (for large metropolitan areas) a part of a city. They can even cross state and typical planning region borders. The bottom line is that the geography must reflect the needs, actualities, and healthcare referral patterns within the area and work for the coalition.[196]

Healthcare coalition membership also fluctuates widely. The current HPP guidance requires core membership from hospitals, public health, EMS, and emergency management.[197] HCCs should also ensure "a connection to the local/state incident command system (ICS), in collaboration with public health authorities through Emergency Support Function (ESF)–8 of the National Response Framework (NRF)."[198] However, as coalitions evolve, so does their membership. Wide varieties of healthcare and support organizations "such as specialty hospitals, long-term care facilities, dialysis centers, free-standing clinics, and surgical centers" now participate in healthcare coalitions.[199] Other non-healthcare specific entities may participate as well, such as the American Red Cross

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[194] Courtney et al., 156-57.

[195] Courtney et al., 157.

[196] Hanfling, "Role of Regional Healthcare Coalitions in Managing and Coordinating Disaster Response," 1-21.

[197] Office of the Assistant Secretary for Preparedness and Response, *2017–2022 Health Care Preparedness and Response Capabilities*.

[198] Courtney et al., "Healthcare Coalitions," 157.

[199] Courtney et al., 158.

and other non-governmental organizations that may participate in supporting coalition efforts, medical examiners, blood suppliers, medical equipment and resource suppliers, universities, etc. Just as with the governance and geography, a coalition may invite any organization to participate that will help meet the needs and goals of the HCC.

2. Healthcare Coalition Functions

No matter how different each coalition looks from another across the nation, each shares several critical roles. Just as the composition of the coalitions cannot be prescribed, neither can the way they complete their roles be prearranged.[200] "Broadly speaking, HCCs engage in two main activities: (i) coordination in the management of emergency response, and (ii) training, education, and group purchasing to improve emergency preparedness."[201] They complete these tasks by engaging in several specific activities, briefly described later in this section. They are also provided in more detail in Appendix A, which is a crosswalk between the HPP Capabilities document and the *2017–2022 HPP Performance Measures Implementation Guidance* (Performance Measures Guidance document) and provides a concise summary of the relevant HCC functional expectations and directives.

According to the HPP Capabilities document, healthcare coalitions are tasked with meeting four main capabilities described in the following four paragraphs. HCCs are first tasked with formalizing their structure and activities. At a foundational level, they do so by defining their boundaries, membership, and governance. Additionally, they must identify risks, gaps, and needs through completing a hazard vulnerability assessment and gap analysis. They must also assess how they can support regulatory compliance efforts for their member organizations. HCCs must also create preparedness plans that detail the administrative and daily undertakings of the coalition. The guidance further requires HCCs to assist with preparing healthcare personnel and coalition members by supporting trainings and exercises. Finally, as a part of the formalization process, the HPP tasks HCCs with

[200] Courtney et al., 153-163.

[201] Mills et al., "Coordination of Autonomous Healthcare Entities: Emergency Response to Multiple Casualty Incidents," 185.

ensuring key stakeholders remain engaged, which provides an opportunity to share the value of the coalition and enhance coalition sustainability.[202]

Next, the HPP requires coalitions to prepare to respond. Consequently, HCCs must produce and adopt a response plan that details how the coalitions will share information and resources. Moreover, they must define how they coordinate healthcare response operations and communicate with members and other partner organizations within their jurisdiction.[203] "HCCs serve as multiagency coordination groups that support and integrate with ESF-8 activities in the context of incident command system (ICS) responsibilities."[204] For the most part, individual coalition members must respond to incidents under their own organization's authority and follow their own response plans. According to a 2017 survey conducted by the National Organization of City and County Health Officials (NACCHO) of eight diverse healthcare coalitions across the country, HCCs response functions may include "sharing information and resources between HCC members and with other jurisdictional partners, coordinating patient movement and evacuation, conducting disease surveillance functions, and providing staff to support emergency operations centers."[205]

In addition to formalizing their preparedness and response activities, HCCs must work to ensure the continuity of the healthcare system within their jurisdiction. Activities, such as creating a continuity of operations plan, evaluating the integrity of supply chains, and developing plans to manage resource shortages, embodies key requirements for the capabilities related to resilience. Furthermore, coalitions must identify and define activities that ensure the safety of the healthcare workforce. Additionally, they are tasked with identifying the required strategies and tactics associated with evacuating healthcare

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[202] Office of the Assistant Secretary for Preparedness and Response, *2017–2022 Health Care Preparedness and Response Capabilities*, 22-24.

[203] Office of the Assistant Secretary for Preparedness and Response, 25-31.

[204] Office of the Assistant Secretary for Preparedness and Response, 8.

[205] Raymond Puerini, "Healthcare Coalitions as Response Entities," *NACCHO Preparedness Brief* (blog), November 29, 2017, http://nacchopreparedness.org/healthcare-coalitions-as-response-entities/.

facilities. Finally, to ensure continuity, the HPP requires coalitions to facilitate recovery planning for their member organizations.[206]

Lastly, coalitions are required to ensure their member organizations plan for and are capable of responding to medical surge events. They must support the development of member organization surge plans, while facilitating the development of strategies to address special populations like children or functional needs individuals. Additionally, specific risks, such as burn, radiological, trauma, and infectious disease, must be addressed by coalitions or their member organizations.[207] More detail about surge response strategies and tactics for emergencies are explained in more detail in the following section.

D. BRINGING IT TOGETHER: HEALTHCARE COALITIONS AND THEIR SURGE POLICY REQUIREMENTS

Specific to healthcare surge capacity building, the HPP Capabilities document requires, "Health care organizations—including hospitals, EMS, and out-of-hospital providers—deliver timely and efficient care to their patients even when the demand for health care services exceeds available supply."[208] The guidance directs HCCs to support surge efforts by augmenting information sharing and resource coordination. It states:

> Health care organizations can most effectively implement and manage medical surge when appropriate information sharing systems and procedures have been established, appropriate plans for all levels of care and populations have been developed, and personnel have been trained in their use.[209]

The capabilities, as outlined in Appendix A, break down into objectives and activities. Capability 4 (medical surge) Objective 2 (respond to a medical surge) explicitly addresses healthcare surge planning targets. Specifically, the guidance requires that HCCs:

> Ensure IBA [immediate bed availability] (at least 20 percent additional acute hospital inpatient capacity within the first four hours following an

[206] Office of the Assistant Secretary for Preparedness and Response, *2017–2022 Health Care Preparedness and Response Capabilities*, 42-43.

[207] Office of the Assistant Secretary for Preparedness and Response, 48-55.

[208] Office of the Assistant Secretary for Preparedness and Response, 7.

[209] Office of the Assistant Secretary for Preparedness and Response, 45.

> emergency) by rapidly prioritizing patients for discharge, maximizing the use of staffed beds, and using non-traditional spaces (e.g., observation areas).[210]

Further reinforcing the surge policy target, the companion document to ASPR's HPP Capabilities document, the *2017–2022 Hospital Preparedness Program Performance Measures Implementation Guidance* also utilizes the 20% benchmark. Appendix A outlines all the measures as they relate to the capabilities. Several of the performance measures relate directly to a coalition surge test (CST) exercise. The CST requires each HCC across the country to demonstrate the ability to evacuate 20% of its acute care hospital beds by utilizing IBA strategies, and identify proper patient placement at receiving hospitals and healthcare organizations, and transportation resources within a 90-minute period.[211] The HPP requires the use of a standardized data collection tool for all coalitions across the country. The intent of data collection from the CST for the HPP is to create a baseline from which program benchmarks can be identified for HCCs throughout country.[212] While the scenario for the CST revolves around forced evacuation, the intention of the exercise is that HCCs should use the exercise to demonstrate capabilities to share information, coordinate emergency operations, and respond to a medical surge event.[213]

Figures 5 and 6 identify the key data points related to surges that HCCs capture each year utilizing the CST tool implemented in 2017. The entire CST tool is located in Appendix B. Figure 5 shows the data captured from the evacuating facilities, while Figure 6 documents the data captured from receiving facilities within the healthcare coalition.

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[210] Office of the Assistant Secretary for Preparedness and Response, *2017–2022 Health Care Preparedness and Response Capabilities*, 48.

[211] Office of the Assistant Secretary for Preparedness and Response, *2017-2022 Hospital Preparedness Program Performance Measures and Implementation Guidance,* 5.

[212] Office of the Assistant Secretary for Preparedness and Response, *2017–2022 Performance Measures*, 5.

[213] Office of the Assistant Secretary for Preparedness and Response, *2017-2022 Performance Measures, 5*.

Ask Evacuating Facility #2 the following questions and record their answers below:	
enter the name of the Evacuating Facility here:	
Read: *"Evacuating facility 2, what was your patient census at the start of the exercise?"*	
# patients at start of exercise:	
"Were any patients discharged rather than evacuated? If so, how many?"	
# patients discharged:	
"From the start of the exercise, how long did it take to complete your patient count and report to the HCC?"	
Time to complete and report patient census to HCC:	
"From the start of the exercise, how long did it take to receive confirmation that appropriate beds were found	
Time to receive confirmation :	

Figure 5. CST Data Collection from Evacuating Facility at Start of the CST Exercise[214]

Name of Receiving Facility	LTC	Med/ Surge	ICU	Peds	NICU	Psych	L&D	Total Beds
								0
								0
								0
								0
								0
								0

Figure 6. CST Data Collection from Receiving Facilities during the CST Exercise[215]

E. CONCLUSION

Healthcare coalitions have rapidly evolved over the past decade to become diverse organizations with a common purpose to improve medical disaster response capabilities. As the HPP dedicated itself to develop coalition functions, program leaders recognized the need to expand performance measures.[216] These expanded measures, which were implemented in 2017, focus more efforts to gather both quantitative and qualitative data, which is intended to promote the HPP value for stakeholders. Additionally, the HPP intends

[214] Adapted from "Health Care Coalition Surge Test," Public Health Emergency, 15, last reviewed April 23, 2018, https://www.phe.gov/Preparedness/planning/hpp/Pages/coaltion-tool.aspx.

[215] Adapted from "Health Care Coalition Surge Test."

[216] Office of the Assistant Secretary for Preparedness and Response, *2017–2022 Hospital Preparedness Program Performance Measures Implementation Guidance*, 3.

to utilize the first year's data to develop a baseline for future program targets.[217] With the HPP future guidance and performance measures in mind, the next chapter takes a gap analysis approach and reviews the current capabilities and performance measures in an effort to identify areas in which healthcare coalitions can be leveraged to pinpoint additional information related to surges needed to foster evidence-based policy (EBP) decisions and a greater understanding of surge capacity planning variables. Furthermore, the next chapter describes recommendations on how to identify the questions and methods of utilizing healthcare coalitions to gather the data needed to answer the questions.

[217] Office of the Assistant Secretary for Preparedness and Response, *2017-2022 Performance Measures,* 5.

V. HOSPITAL PREPAREDNESS PROGRAM SURGE POLICY GAP ANALYSIS

The previous chapters provided background on the problem area, the status of the healthcare system as it relates to daily overcrowding, basic principles involved with healthcare surge capacity, and the role of healthcare coalitions as they connect to surge planning. This chapter considers the current healthcare coalition guidance and performance measures utilizing a gap analysis dedicated to the central questions of this thesis, which is identifying the questions related to surge capacity and how coalitions can be leveraged to gather data to answer the questions. Specifically, the gap analysis concentrates on questions surrounding surge capacity targets and the impact of overcrowding on disaster response capabilities.

A gap analysis is intended to draw attention to the difference between the current status of the organization and its operational goals.[218] Jeffrey Harrison states, "Knowing where to focus efforts improves the efficiency of interventions."[219] Harrison offers three questions to ask when performing a gap analysis:

- What are we trying to accomplish?
- What changes can we make that will result in improvement?
- How will we know if a change is improvement?[220]

This method suits a policy review that concentrates on identifying policy flaws, as it emphasizes a critical review of the surge policy from the various viewpoints of what is working, what is not, how it can be improved, and identifying the risks associated with keeping the status quo. Furthermore, this method does not force a complete shift or

[218] Jeffrey Harrison, *Essentials of Strategic Planning in Healthcare*, 2nd ed. (Chicago: Health Administration Press, 2016).

[219] Harrison, 108.

[220] Harrison, 109.

alternative policy; instead, it provides opportunity to improve healthcare coalition policy, which is the goal of this thesis.

A. WHAT ARE HEALTHCARE COALITIONS TRYING TO ACCOMPLISH?

Fundamentally, HCCs exist (and are supported by federal grant dollars) to ensure that healthcare organizations work together "to effectively prepare for and respond to emergencies that impact the public's health."[221] Regarding surge capacity, the HPP charges HCCs with ensuring the healthcare community is positioned to manage events that exceed daily response capacity and overwhelm resources.[222] The HPP references the requirement for HCC partners to ensure plans are in place to implement contingency and crisis surge tactics and increase resilience within the healthcare community. As discussed in previous chapters, the guidance and associated performance measures reference a 20% IBA surge capacity target.

B. WHAT CHANGES CAN POLICY MAKERS AND STAKEHOLDERS MAKE THAT WILL RESULT IN IMPROVEMENT FOR HEALTHCARE COALITIONS?

HPP leaders and other policymakers should make a focused shift to an EBP. Policymakers benefit from utilizing evidence—in addition to considering experience, culture and other influencing factors—to support policy development. EBP has its roots in evidence-based medicine, which was intended to identify and terminate damaging or unsuccessful medical interventions while championing successful ones.[223] EBP "helps policymakers make better decisions, and achieve better outcomes, by using existing evidence more effectively, and undertaking new research evaluation and analysis where

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[221] Office of the Assistant Secretary for Preparedness and Response, *2017–2022 Health Care Preparedness and Response Capabilities*, 5.

[222] Office of the Assistant Secretary for Preparedness and Response, *2017-2022 Response Capabilities,* 7.

[223] Kathryn Oliver, Theo Lorenc, and Simon Innvær, "New Directions in Evidence-Based Policy Research: A Critical Analysis of the Literature," *Health Research Policy and Systems; London* 12, no. 34 (2014): 1, http://dx.doi.org/10.1186/1478-4505-12-34.

knowledge about effective policy initiatives and policy implementation is lacking."[224] With EBP, program leaders can more effectively guide program direction and effort, and thereby, create program efficiencies.

While the current U.S. surge policy has proven to be effective in many instances, as described in the Boston Marathon bombing example in Chapter III, the basis of the surge policy appears to rely primarily on gut instinct and experience instead of also being shaped by evidence from national data provided by real events or exercises. The previous chapters have highlighted the concerns with this approach. This researcher argues that the only way to determine if current surge policy and targets are adequate is to collect the data that will provide the evidence needed to support policy decisions.

HCCs' new performance measures provide possibilities to gather nationwide data, which affords additional opportunities for evidence-based policy-making. The coalition surge test as previously described is already designed to gather standardized data on the performance of HCCs as they implement surge policy through the evacuation of 20% of hospital beds within a 90-minute window. For the first time, this exercise allows researchers to compare apples to apples using the same standards and measures. Considering that every HCC in the country must complete this exercise and gather the required data and that over 5,300 hospitals (85% of the nation's hospitals) throughout the country participate in HCCs, the opportunity proves to be ripe to answer the core research question posed by this thesis, does overcrowding impact hospitals' disaster response capabilities.[225]

Regarding the impact of overcrowding on surge capacity, ultimately87 this data can be utilized to determine if hospitals experiencing crowding at the onset of the CST find more challenges in completing the surge test than those who are not. Furthermore, additional information can be gathered to test the 20% IBA threshold that has long been utilized by the HPP as a planning target. Consequently, the HPP has an opportunity to move

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[224] Philip Davies, "The State of Evidence-Based Policy Evaluation and Its Role in Policy Formation," *National Institute Economic Review* 219, no. 1 (January 1, 2012): R42, https://doi.org/10.1177/002795011221900105.

[225] Harvey, *15 Years of Health Care Preparedness and Response*.

towards EBP by making small modifications to the current CST and HCC performance measures in an effort to obtain more qualitative and quantitative responses to the surge related questions posed in this thesis. This shift to evidence-based surge policy will serve to strengthen the HPP and HCCs.

C. HOW WILL POLICYMAKERS, STAKEHOLDERS, AND HEALTHCARE COALITIONS KNOW IF A CHANGE IS IMPROVEMENT?

The additional evidence gathered should allow policy makers and stakeholders to compare data captured from year to year from healthcare coalitions to determine if the changes result in improvement to surge planning efforts. Knowing the answer to this question will immediately impact recommendations and guidelines for surge planning for all entities involved in created surge capacity within a community. Furthermore, the HPP can work to gather standardized data points following disaster events in an effort to capture consistent metrics related to overcrowding, baseline capacity, and efficacy of surge strategies and tactics; to include IBA tactics.

D. CONCLUSION

Fundamentally, HCCs ensure that jurisdictional healthcare systems are prepared to respond to and manage a surge of patients following disaster events. Utilizing a quality improvement approach, such as completing a gap analysis, can enhance today's surge policy by identifying what changes need to be made to current policy that will result in improvement. This gap analysis identifies the need for policy makers within the HPP to continue to gather appropriate data and expand the implementation of evidence-based decisions. The following chapter provides recommendations for an implementation strategy that allows an opportunity for stakeholder input, modifications, critical assessment, and testing. It also includes a conclusion to the thesis and offers recommendations for future research opportunities.

VI. CONCLUSION

A. RECOMMENDATIONS

Captured data points related to surge capacity in the current HCC performance measures and in the CST tool include the number of staffed acute care hospital beds within the HCC, the number of beds identified as available at receiving facilities during a 90-minute exercise window, the number of transportation assets identified, and other targets as listed in Appendix B. The HPP already requires HCCs and their healthcare organization partners to report these data points annually. However, this data set does not answer questions related to surge planning fundamentals, such as whether overcrowding impacts hospital emergency responses. Consequently, minimally expanding this reporting requirement by just a few data points can assist the HPP in answering these surge capacity questions with little additional effort on the part of HCC partners. The following two sections outline recommendations on how to leverage healthcare coalitions to identify and answer supplementary surge strategy questions.

1. Modify CST Data Collection Tool to Include Additional Data Points to Answer Basic Surge Policy Questions

Considering the focus and scope of this thesis, this author recommends additional data points for the Coalition Surge Test tool to consider whether overcrowding and baseline capacity impact disaster response capabilities. Specific adjustments are underlined and in italics in the sample revised CST tool sections in Figures 7 and 8. The figures are modified from the HPP CST Tool, which is included in Appendix B.

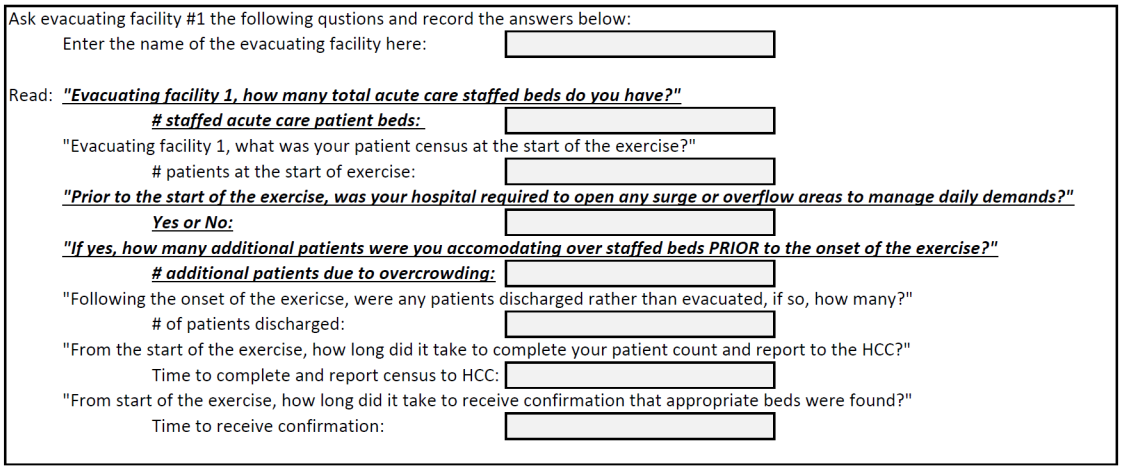

Figure 7. Sample Revised CST Tool Section for Evacuating Facilities[226]

Name of Receiving Facility	*Was surge space and/or staff in use prior to start of exercise to accommodate daily patients?*	*If yes, was your facility's bed availability impacted?*	LTC	Med/ Surge	ICU	Peds	NICU	Psych	L&D	Total Beds
										0
										0
										0
										0
										0
										0

Figure 8. Sample Revised CST Tool Section for Receiving Facilities[227]

Figure 7 added data points:

- Evacuating facility 1, how many total acute care staffed beds do you have?
- Prior to the start of the exercise, was your hospital required to open any surge areas to meet daily demands?

[226] Adapted from Public Health Emergency, "Health Care Coalition Surge Test."

[227] Adapted from Public Health Emergency.

- If yes, how many additional patients were you accommodating over staffed beds PRIOR to the onset of the exercise?

Figure 8 added data points:

- Was surge space and/or staff in use prior to the start of the exercise to accommodate daily patients?
- If yes, was your facility's bed availability impacted?

The added data points in bold on both figures offer an opportunity to gather information on the evacuating and receiving hospitals' crowding status at the onset of the CST without creating an additional burden on those coalition partners to provide the information. In general, hospitals and HCCs consider these added data points prior to responding to the coalition surge tool anyway, as they typically have bearing on how the hospitals are able to respond. The additional data added in Figure 7 documents the level of overcrowding experienced by the receiving hospitals at the onset of the exercise. Additionally, the added questions in Figure 8 provide an opportunity to capture qualitative data from hospital executives on the effects of crowding at the receiving hospitals.

Program leaders and policy makers can compare the baseline crowding status data for receiving hospitals between healthcare coalitions, while also comparing their ability to meet the 20% surge requirements required by the CST. This information, when combined, will then be able to document the level, if any, of impact that overcrowding has on surge response capabilities.

2. Pilot the Modified Data Collection Tools in a Single HPP Region

Given the potential scope of the newly formed measures and tools, this researcher recommends taking one year to pilot the changes within a single HPP planning region. The HPP regions mirror the DHS's Federal Emergency Management Agency (FEMA) planning regions. Figure 9 shows the planning regions for the HPP and FEMA.

Figure 9. Planning Regions for the HPP and FEMA[228]

Piloting the program adjustments in one region provides an opportunity to gather feedback from stakeholders and make modifications as necessary before a nationwide rollout. Furthermore, a pilot provides analysts a chance to see if the data they receive actually allows them to create an evidence-based recommendation on the impact of overcrowding and surge response. Questions can be modified if revisions prove necessary.

B. LIMITATIONS AND FUTURE RESEARCH OPTIONS

Throughout the evolution of this thesis, opportunities for future research have arisen. Chapter III poses several questions related to surge capacity planning not included in the scope of this thesis and can be explored further. Questions, such as "to what level should hospitals maintain a baseline surge capacity," warrant consideration, as well as what type of beds should be considered in forming baseline capacity (e.g., are operating room beds considered in the same way as floor beds or critical care beds?) Additional questions related to this subject relate to why hospitals do not maintain a daily portion of open beds

[228] Source: "FEMA Regional Contacts," Federal Emergency Management Agency, accessed September 2, 2018, https://www.fema.gov/fema-regional-contacts.

for potential surge and what fiscal considerations or incentives should be considered to support hospitals to maintain a daily surge capacity. Also, researchers may consider if it is even possible in today's healthcare environment? Related to foundational principles for surge planning, this thesis identifies questions, such as what is the difference between a "major" and "minor" disaster event. Furthermore, scholars may ask if it those terms can be defined in a manner applicable to all hospitals, and if so, how can they be defined in relation to hospital size and capability?

The major limitation to this research includes the narrow scope of the additional questions related to overcrowding that HCCs should address. In an effort to make the added data collection more palatable and less burdensome for coalition members, this researcher recommended intentionally limited-focused data points for the CST. Furthermore, because the CST focuses solely on an evacuation scenario, the other types of surge questions that can potentially be answered during the CST remain limited. For example, the impact of overcrowding on a hazardous materials event or an infectious disease outbreak's surge response capability has the potential to be assessed during a CST but neither of those scenarios may warrant a hospital evacuation that the currently designed CST requires. Consequently, HPP leaders may consider altering the scenario periodically to provide an opportunity to gather data on different types of events.

C. CONCLUSION

The persistent overcrowding crisis facing the nation has resulted in a healthcare system with minimal hospital capacity for disaster response. Consequently, because little available capacity exists, it becomes imperative to ensure that today's surge capacity planning principles remain efficacious to ensure that the nation's hospitals and healthcare coalitions can effectively respond to disaster events. This thesis asserts that room for improvement exists with the current surge policy, because many of the foundational assumptions behind the policy are not evidence-based. It identifies many of the questions related to surge and delves into identifying a method for healthcare coalitions to answer the questions to allow opportunities for the formation of evidence-based surge policies. Specifically, while several surge questions are identified, the scope of this thesis focuses

on whether the overcrowding crisis affects surge response and how healthcare coalitions can assist in gathering the data to answer the question. The unanswered questions may be sources of future research opportunities.

HPP program leaders should utilize the wealth of resources and expertise within the 476 healthcare coalitions across the country, including the 31,000 member organizations, to take the opportunity to assess U.S. surge policy critically. These stakeholders possess a vested interest in ensuring the best possible policy exists. Furthermore, their frontline status in addressing both the overcrowding crisis and surge events, affords them the unique viewpoint to identify gaps in the policy and experience to suggest potential solutions. Finally, the network of healthcare coalitions and national reporting requirements for performance measures provides an opportunity to gather data from across the country, in a method already being utilized through the Coalition Surge Test tool and related performance measures.

This information can be used to make informed and EBP decisions related to surge capacity planning moving forward. If the data suggests that overcrowding does affect surge response, future HPP program guidance can be modified to include recommended strategies HCCs can consider to address daily overcrowding issues. For example, HPP guidance may suggest that HCCs begin to explore utilizing their pre-existing networks of healthcare providers to implement programs, such as mobile integrated health designed to keep non-acute patients out of emergency departments and in appropriate levels of care.[229] Conversely, if the data indicates that overcrowding does not affect surge response, then HPP leaders can keep the status quo; having confidence in their currently designed policy.

[229] Eric Beck et al., *Mobile Integrated Healthcare Practice: A Healthcare Delivery Strategy to Improve Access, Outcomes, and Value* (Mobile Integrated Healthcare Practice, n.p., n.d.), accessed July 10, 2017, http://www.mobileintegratedhealthcare.com/Websites/mihc/images/MIHP_whitepaper_FINAL.pdf.

APPENDIX A. HPP CAPABILITIES AND PERFORMANCE MEASURE CROSSWALK

Appendix A is a crosswalk between the HPP Capabilities document and the *2017–2022 HPP Performance Measures Implementation Guidance* (Performance Measures Guidance document). It also provides a concise summary of the relevant HCC functional expectations and directives.

Table 1. Crosswalk of Performance Measures to 2017–2022 Health Care Preparedness and Response Capabilities[230]

PM Description	Capability
PM1: Percent of funding each HCC receives from the awardee, other federal sources, and non-federal sources.	• Capability 1 – Foundation for Health Care and Medical Readiness ▪ Objective 5 – Ensure Preparedness is Sustainable ➢ Activity 5 – Promote Sustainability of Health Care Coalitions
PM2: Number of calendar days from start of budget period for awardees to execute subawards with each HCC.	• Capability 1 – Foundation for Health Care and Medical Readiness
PM3: Membership representation rate of HCC core (acute care Hospitals, EMS, Emergency Management, Public Health) and additional member organizations by member type.	• Capability 1 – Foundation for Health Care and Medical Readiness ▪ Objective 1 – Establish and Operationalize a Health Care ➢ Activity 1 – Define Health Care Coalition Boundaries ➢ Activity 2 – Identify Health Care Coalition Members
PM4: Percent of HCCs that have a complete and approved Preparedness Plan.	• Capability 1 – Foundation for Health Care and Medical Readiness ▪ Objective 2 – Identify Risk and Needs ➢ Activity 2 – Assess Regional Health Care Resources ➢ Activity 3 – Prioritize Resource Gaps and Mitigation Strategies ▪ Objective 3 – Develop a Health Care Coalition Preparedness Plan
PM5: Percent of HCCs that have a complete and approved Response Plan.	• Capability 2 – Health Care and Medical Response Coordination ▪ Objective 1 – Develop and Coordinate Health Care Organization and Health Care Coalition Response Plans ➢ Activity 2 – Develop a Health Care Coalition Response Plan

[230] Source: Office of the Assistant Secretary for Preparedness and Response, *2017–2022 Hospital Preparedness Program Performance Measures Implementation Guidance*, Appendix 4.

PM Description	Capability
PM6, Part A: Percent of awardees that obtain de-identified data from emPOWER at least once every six months to identify numbers of individuals with electricity-dependent medical and assistive equipment for planning purposes. **PM6, Part B: Percent of HCCs that obtain de-identified data from emPOWER at least once every six months to identify numbers of individuals with electricity-dependent medical and assistive equipment for planning purposes.**	• Capability 1 – Foundation for Health Care and Medical Readiness ▪ Objective 2 – Identify Risk and Needs ➢ Activity 4 – Assess Community Planning for Children, Pregnant Women, Seniors, Individuals with Access and Functional Needs, Including People with Disabilities, and Others with Unique Needs
PM7, Part A: Percent of awardees that obtain data from the Social Vulnerability Index to estimate the populations with a higher likelihood of having access and functional needs for planning purposes at least once per year. **PM7, Part B: Percent of HCCs that obtain data from the Social Vulnerability Index to estimate the populations with a higher likelihood of having access and functional needs for planning purposes at least once per year.**	• Capability 1 – Foundation for Health Care and Medical Readiness ▪ Objective 2 – Identify Risk and Needs ➢ Activity 4 – Assess Community Planning for Children, Pregnant Women, Seniors, Individuals with Access and Functional Needs, Including People with Disabilities, and Others with Unique Needs
PM8: Percent of awardees that have provided an opportunity for each HCC to review and provide input to the awardee's ESF-8 preparedness and response plan.	• Capability 1 – Foundation for Health Care and Medical Readiness ▪ Objective 1 – Establish and Operationalize a Health Care ➢ Activity 3 – Establish Health Care Coalition Governance

PM Description	Capability
PM9: Percent of HCCs engaged in their awardee's jurisdictional risk assessment.	• Capability 1 – Foundation for Health Care and Medical Readiness ▪ Objective 2 – Identify Risk and Needs ➢ Activity 1 – Assess Hazard Vulnerabilities and Risks
PM10: Percent of HCCs where areas for improvement have been identified from HCC and member organizations' own exercises or real-world events and the HCCs' preparedness and response plans have been revised to reflect improvements.	• Capability 1 – Foundation for Health Care and Medical Readiness ▪ Objective 4 – Train and Prepare the Health Care and Medical Workforce ➢ Activity 5 – Evaluate Exercises and Responses to Emergencies ➢ Activity 6 – Share Leading Practices and Lessons Learned
PM11: Percent of awardees with a complete, jurisdiction-wide protocol that delineates a) the appropriate allocation of scarce resources during crises and b) local and regional crisis standards of care (CSC) planning and implementation efforts.	• Capability 1 – Foundation for Health Care and Medical Readiness ▪ Objective 2 – Identify Risk and Needs ➢ Activity 5 – Assess and Identify Regulatory Compliance Requirements • Capability 2 – Health Care and Medical Response Coordination ▪ Objective 1 – Develop and Coordinate Health Care Organization and Health Care Coalition Response Plans ➢ Activity 2 – Develop a Health Care Coalition Response Plan
PM12: Percent of HCCs that have drilled their redundant communications plans and systems and platforms at least once every six months.	• Capability 2 – Health Care and Medical Response Coordination ▪ Objective 2 – Utilize Information Sharing Procedures and Platforms ➢ Activity 1 – Develop Information Sharing Procedures
PM13: Percent of HCC member organizations that responded during a redundant communications drill by system and platform type used.	• Capability 2 – Health Care and Medical Response Coordination ▪ Objective 2 – Utilize Information Sharing Procedures and Platforms ➢ Activity 3 – Utilize Communications Systems and Platforms
PM14: Percent of HCC core member organizations participating in Phase 1: Table Top Exercise with Functional Elements and Facilitated Discussion of the Coalition Surge Test.	• Capability 1 – Foundation for Health Care and Medical Readiness ▪ Objective 1 – Establish and Operationalize a Health Care ➢ Activity 2 – Identify Health Care Coalition Members ➢ Activity 3 – Establish Health Care Coalition Governance ▪ Objective 4 – Train and Prepare the Health Care and Medical Workforce ➢ Activity 3 – Plan and Conduct Coordinated Exercises with Health Care Coalition Members

PM Description	Capability
PM15: Percent of HCC core member organizations' executives participating in Phase 2: After Action Review of the Coalition Surge Test.	• Capability 1 – Foundation for Health Care and Medical Readiness ▪ Objective 5 – Ensure Preparedness is Sustainable ➢ Activity 2 – Engage Health Care Executives
PM16: Percent of patients at the evacuating facilities that are identified as able to be: a) discharged safely to home or b) evacuated to receiving facilities during Phase 1: Table Top Exercise with Functional Elements and Facilitated Discussion of the Coalition Surge Test.	• Capability 3 – Continuity of Health Care Service Delivery ▪ Objective 6 – Plan for and Coordinate Health Care Evacuation and Relocation ➢ Activity 1 – Develop and Implement Evacuation and Relocation Plans • Capability 4 – Medical Surge ▪ Objective 2 – Respond to a Medical Surge ➢ Activity 1 – Implement Emergency Department and Inpatient Medical Surge Response
PM17: Time [in minutes] for evacuating facilities in the HCC to report the total number of evacuating patients.	• Capability 2 – Health Care and Medical Response Coordination ▪ Objective 1 – Develop and Coordinate Health Care Organization and Health Care Coalition Response Plans ➢ Activity 2 – Develop a Health Care Coalition Response Plan ▪ Objective 3 – Coordinate Response Strategy, Resources, and Communications ➢ Activity 1 – Identify and Coordinate Resource Needs during an Emergency • Capability 3 – Continuity of Health Care Service Delivery ▪ Objective 6 – Plan for and Coordinate Health Care Evacuation and Relocation ➢ Activity 1 – Develop and Implement Evacuation and Relocation Plans
PM18: Percent of evacuating patients with an appropriate bed identified at a receiving health care facility in 90 minutes.	• Capability 3 – Continuity of Health Care Service Delivery ▪ Objective 6 – Plan for and Coordinate Health Care Evacuation and Relocation ➢ Activity 1 – Develop and Implement Evacuation and Relocation Plans • Capability 4 – Medical Surge ▪ Objective 2 – Respond to a Medical Surge ➢ Activity 1 – Implement Emergency Department and Inpatient Medical Surge Response

PM Description	Capability
PM19: Time [in minutes] for receiving facilities in the HCC to report the total number of beds available to receive patients.	• Capability 2 – Health Care and Medical Response Coordination ▪ Objective 1 – Develop and Coordinate Health Care Organization and Health Care Coalition Response Plans ➢ Activity 2 – Develop a Health Care Coalition Response Plan ▪ Objective 3 – Coordinate Response Strategy, Resources, and Communications ➢ Activity 1 – Identify and Coordinate Resource Needs during an Emergency • Capability 3 – Continuity of Health Care Service Delivery ▪ Objective 6 – Plan for and Coordinate Health Care Evacuation and Relocation ➢ Activity 1 – Develop and Implement Evacuation and Relocation Plans • Capability 4 – Medical Surge ▪ Objective 2 – Respond to a Medical Surge ➢ Activity 1 – Implement Emergency Department and Inpatient Medical Surge Response
PM20: Percent of evacuating patients with acceptance for transfer to another facility that have an appropriate mode of transport identified in 90 minutes.	• Capability 3 – Continuity of Health Care Service Delivery ▪ Objective 6 – Plan for and Coordinate Health Care Evacuation and Relocation ➢ Activity 2 – Develop and Implement Evacuation Transportation Plans • Capability 4 – Medical Surge ▪ Objective 1 – Plan for a Medical Surge ➢ Activity 3 – Incorporate Medical Surge into a Health Care Coalition Response Plan

PM Description	Capability
PM21: Time [in minutes] for the HCCs to identify an appropriate mode of transport for the last evacuating patient.	• Capability 2 – Health Care and Medical Response Coordination ▪ Objective 1 – Develop and Coordinate Health Care Organization and Health Care Coalition Response Plans ➢ Activity 2 – Develop a Health Care Coalition Response Plan ▪ Objective 3 – Coordinate Response Strategy, Resources, and Communications ➢ Activity 1 – Identify and Coordinate Resource Needs during an Emergency • Capability 3 – Continuity of Health Care Service Delivery ▪ Objective 6 – Plan for and Coordinate Health Care Evacuation and Relocation ➢ Activity 2 – Develop and Implement Evacuation Transportation Plans • Capability 4 – Medical Surge ▪ Objective 1 – Plan for a Medical Surge ➢ Activity 3 – Incorporate Medical Surge into a Health Care Coalition Response Plan
PM22: Percent of hospitals with an Emergency Department (ED) recognized through a statewide, territorial, or regional standardized system that are able to stabilize and/or manage pediatric medical emergencies.	• Capability 4 – Medical Surge ▪ Objective 2 – Respond to a Medical Surge ➢ Activity 4 – Provide Pediatric Care during a Medical Surge Response
PM23: Percent of HCC core member organizations participating in the Command Center Table Top and Emergency Department Table Top during the Hospital Surge Test.	• Capability 1 – Foundation for Health Care and Medical Readiness ▪ Objective 1 – Establish and Operationalize a Health Care ➢ Activity 2 – Identify Health Care Coalition Members ➢ Activity 3 – Establish Health Care Coalition Governance ▪ Objective 4 – Train and Prepare the Health Care and Medical Workforce ➢ Activity 3 – Plan and Conduct Coordinated Exercises with Health Care Coalition Members
PM24: Percent of HCC core member organizations' executives participating in the After Action Review of the Hospital Surge Test.	• Capability 1 – Foundation for Health Care and Medical Readiness ▪ Objective 5 – Ensure Preparedness is Sustainable ➢ Activity 2 – Engage Health Care Executives

PM Description	Capability
PM25: Percentage of ICU beds made available during the Hospital Surge Test.	• Capability 4 – Medical Surge ▪ Objective 2 – Respond to a Medical Surge ➢ Activity 1 – Implement Emergency Department and Inpatient Medical Surge Response
PM26: Percentage of non-ICU beds made available during the Hospital Surge Test.	• Capability 4 – Medical Surge ▪ Objective 2 – Respond to a Medical Surge ➢ Activity 1 – Implement Emergency Department and Inpatient Medical Surge Response
PM27: Percentage of emergency department beds made available during the Hospital Surge Test.	• Capability 4 – Medical Surge ▪ Objective 2 – Respond to a Medical Surge ➢ Activity 1 – Implement Emergency Department and Inpatient Medical Surge Response
PM28: Percentage of patients with a bed identified in the emergency department during the Hospital Surge Test.	• Capability 4 – Medical Surge ▪ Objective 2 – Respond to a Medical Surge ➢ Activity 1 – Implement Emergency Department and Inpatient Medical Surge Response

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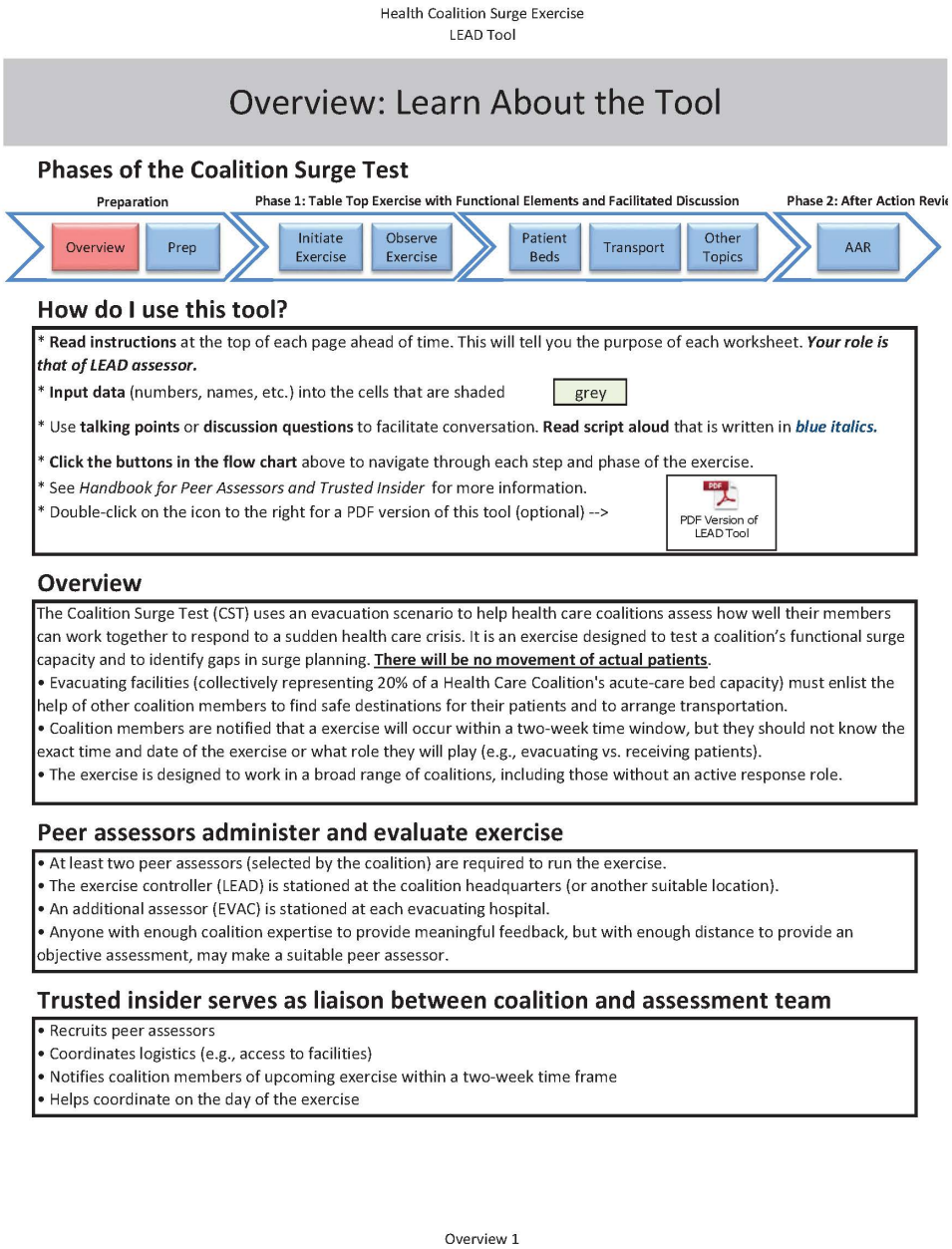
APPENDIX B. COALITION SURGE TOOL

The Coalition Surge Test is a tool designed to help HCCs identify gaps in surge and response readiness.[231]



Health Coalition Surge Exercise
LEAD Tool

Overview: Learn About the Tool

Phases of the Coalition Surge Test

Preparation | Phase 1: Table Top Exercise with Functional Elements and Facilitated Discussion | Phase 2: After Action Revi

Overview | Prep | Initiate Exercise | Observe Exercise | Patient Beds | Transport | Other Topics | AAR

How do I use this tool?

* **Read instructions** at the top of each page ahead of time. This will tell you the purpose of each worksheet. ***Your role is that of LEAD assessor.***
* **Input data** (numbers, names, etc.) into the cells that are shaded grey
* Use **talking points** or **discussion questions** to facilitate conversation. **Read script aloud** that is written in ***blue italics.***
* **Click the buttons in the flow chart** above to navigate through each step and phase of the exercise.
* See *Handbook for Peer Assessors and Trusted Insider* for more information.
* Double-click on the icon to the right for a PDF version of this tool (optional) -->

PDF Version of LEAD Tool

Overview

The Coalition Surge Test (CST) uses an evacuation scenario to help health care coalitions assess how well their members can work together to respond to a sudden health care crisis. It is an exercise designed to test a coalition's functional surge capacity and to identify gaps in surge planning. **There will be no movement of actual patients**.

- Evacuating facilities (collectively representing 20% of a Health Care Coalition's acute-care bed capacity) must enlist the help of other coalition members to find safe destinations for their patients and to arrange transportation.
- Coalition members are notified that a exercise will occur within a two-week time window, but they should not know the exact time and date of the exercise or what role they will play (e.g., evacuating vs. receiving patients).
- The exercise is designed to work in a broad range of coalitions, including those without an active response role.

Peer assessors administer and evaluate exercise

- At least two peer assessors (selected by the coalition) are required to run the exercise.
- The exercise controller (LEAD) is stationed at the coalition headquarters (or another suitable location).
- An additional assessor (EVAC) is stationed at each evacuating hospital.
- Anyone with enough coalition expertise to provide meaningful feedback, but with enough distance to provide an objective assessment, may make a suitable peer assessor.

Trusted insider serves as liaison between coalition and assessment team

- Recruits peer assessors
- Coordinates logistics (e.g., access to facilities)
- Notifies coalition members of upcoming exercise within a two-week time frame
- Helps coordinate on the day of the exercise

Overview 1

[231] Public Health Emergency, "Health Care Coalition Surge Test."

Coalition Surge Test has two phases

The Coalition Surge Test lasts approximately 4 hours and is divided into 2 phases:

- **Phase 1:** Table Top Exercise with Functional Elements and Facilitated Discussion (180-205 minutes). Evacuating facilities work to find appropriate destinations and transportation for as many of their patients as possible. A patient will be considered placed when another facility says it can accept the patient in transfer and when appropriate transportation assets have been identified. This is an exercise, and there will be no movement of actual patients. Following the exercise, representatives from as many coalition members as possible join a conference call to discuss what happened in Phase 1 and to discuss other topics relating to a coalition's role in an evacuation scenario.
- **Phase 2:** After Action Review (30 minutes). An After Action Review (AAR) concludes the exercise and consists of an assessment of strengths and weaknesses and corrective action planning. Ideally this should occurs immediately after Phase 1, but it can be scheduled for a later date to maximize health care executive participation. If the hotwash is scheduled in advance of the exercise taking place, it may or may not occur on the same day as the exercise.

Tool provides detailed instructions, scripts, and data collection tools

- Excel tools provide detailed instructions, scripts, and data collection tools for peer assessors (this tool is for the LEAD assessor; a companion tool, EVAC, is provided for assessors in evacuating facilities).
- A simple checklist is provided for the trusted insider in Appendix A of the *Handbook for Peer Assessors and Trusted*

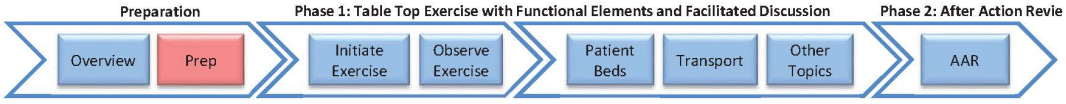
Summary of the tool's worksheets and your responsibilities.

This Excel tool has a worksheet for each portion of the exercise. You can navigate among the worksheets by clicking on the tabs below or on the process-flow graphic at the top of each worksheet. The table below summarizes key functions in each worksheet and your responsibilities during that portion of the exercise.

Worksheet name	What is in the worksheet?	What do I do?
Preparation	Provides checklist to prepare for the exercise.	* Work with the trusted insider to identify and select potential evacuating facilities.
Exercise – Initiation	Provides scripts for initiating and ending the functional exercise. Also includes FAQs to assist in answering questions from players.	* Proceed to the regional health care coordination center (RHCC) or other appropriate location. * Read the script to initiate the functional exercise. * Start the timer and note the exercise start and end times.
Exercise – Observation	Provides questions for evaluating play during the functional exercise.	* Click the appropriate box on the "agree-disagree" scale and add comments for use during the facilitated discussion and hotwash.
Discussion – Beds	Provides space to enter data and questions for facilitated discussion on finding patient beds.	* Prompt evacuating facilities to share information on patients and receiving facility destinations. * Use the questions to facilitate a discussion of issues related to the simulated evacuation.
Discussion – Transport	Provides space to enter data on transportation and discussion questions on patient transport.	* Prompt evacuating facilities to share information on transportation. * Use the questions to facilitate a discussion on patient transportation.
Discussion – Other	Provides additional questions for the facilitated discussion.	* Use the questions provided to lead a facilitated discussion on communication, at-risk patients, and continuity of operations.

After Action Review	Provides guidance for facilitating the after action review.	* Verbally summarize key outcomes of the exercise using auto-populated tables. * Facilitate the after action review discussion on strengths, weaknesses, and corrective actions.

Advance Preparation



Checklist	Timeline	Actions
Step 1	*Approximately 1 month before the exercise*	Schedule a meeting or teleconference with the entire assessment team. The trusted insider will provide you with names and contact information.
Step 2	*At least 2 weeks before the exercise*	Ensure that each peer assessor has the appropriate tool and training materials.
Step 3	*At least 1 week before the exercise*	Copy the information on the RHCC (if plans call for standing one up during a response) provided by the trusted insider into the table below.

Regional Health Care Coordination Center Information (RHCC)	
RHCC Location	
RHCC POC (Name and Phone Number)	

Step 4 — *At least 1 week before the exercise*

Select potential evacuating facilities.
* Determine the approximate total number of acute-care beds in the coalition and identify the facilities that collectively represent at least 20% of the total number of acute-care beds in order to adequately stress the coalition.
* List contact information for both a primary and secondary point of contact (POC).
* Also identify backup facilities, in case a facility declines to participate.
* In order to maintain surprise, do not notify the facilities or anyone else outside the assessment team.

Approximate total number of acute-care beds in the coalition			
Name of Coalition		Total number of acute-care beds in the coalition	
Info on Potential Evacuating Facilities			
Name of facility	Approximate # acute-care beds	POC name (primary and secondary)	POC phone #

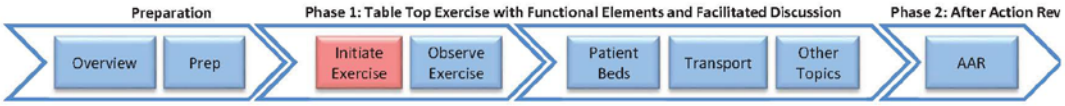
Step 5	*At least 1 week before the exercise*	Select a date and time for the exercise. Remind other members of the assessment team of the exercise date and logistics. Date _____ Start Time _____

Step 6	*At least 1 week before the exercise*	Develop a list of organizations and points of contact who should be invited to participate in the facilitated discussion and hotwash following the functional evacuation exercise.

Roster of organzations/people to be included in facilitated discussion			
Organization	Point of contact (name)	Phone #	Email address

Step 7	*A few days prior to the exercise*	* Convene a "check-in" meeting or teleconference with peer assessors and the trusted insider. * Ensure that all assessors understand their roles, responsibilities, and timelines. Consider doing a quick walkthrough of the sequence of events. * Determine with the team of peer assessors (and the trusted insider) whether to devise a specific scenario that would prompt a facility evacuation. If not, then simply assert the need to evacuate. * Assign specific assessors to each evacuating facility and confirm logistical plans for traveling to evacuating facilities (including backup facilities, if needed).

Table Top Exercise with Functional Elements: Initiation



Initiating the Exercise

Instructions

* On the morning of the exercise, assessment team members should assemble at a predetermined location.
* Ensure that peer assessors have cell phone/texting connectivity to communicate during the exercise if necessary.
* Inform evacuating facility that assessment team will arrive in one hour to begin the no-notice exercise. Instruct the evacuating facility not to begin exercise play until the assessment team arrives. If the first facility declines, call the next facility on the list. Record the name(s) of the evacuating facilities below:

Evacuating facility #1:		EVAC assessor name:	
Evacuating facility #2:		EVAC assessor name:	
Evacuating facility #3:		EVAC assessor name:	

* At the agreed upon time, instruct the evacuating facility peer assessors to enter the evacuating hospital(s) to begin the exercise. Use telephone, text, or other suitable means to maintain contact among assessment team members.
* Record the exercise start time and end time (90 minutes later).

Start time | End time

* Alert the RHCC players that the exercise has begun, and provide information on the structure of the exercise using the ***talking points*** below. Be sure to stress that **this is an exercise** and there should be **no movement of actual patients**. You may call a STOP if you believe patient safety is at risk.
* Answer any questions the RHCC players may have. You may refer to the FAQs provided at the bottom of this page.
* While the players are working on the evacuation exercise, observe players and use the "Exercise – Observation" worksheet to keep track of how the play unfolds and make notes for the facilitated discussion.

Talking points: Give instructions to RHCC staff

* Do not begin contacting receiving facilities and transportation companies about transferring patients until you have received a call from at least one evacuating facility alerting you to the current scenario and "activating" you.
* Once an evacuating facility has contacted you, we encourage you to use the communication and patient tracking systems that you would use in an actual scenario. However, please note that **this is an exercise** and there will be **no movement of actual patients** or of paper patients.
* We are not tracking individual patients but, rather, numbers of patients in each of the following categories: long-term care, general medical/surgery, ICU, pediatrics, NICU, labor and delivery, and psychiatry.
* Patients are not considered "transferred" until the receiving hospital confirms its ability to accept those patients and there is transportation.
* While waiting for the evacuating facility to notify/activate you, you must perform a "call-down" or email notification of all the coalition members who should participate in the facilitated discussion phase of the exercise, which will happen later. They should be told that:
  (1) a practice evacuation exercise is currently occurring,
  (2) they may or may not receive a call regarding patient placement, and
  (3) whether they were contacted or not, they should join the facilitated discussion at the appointed time.

Ending the Exercise

Instructions:

* Once the exercise time has reached 90 minutes or all patients have been placed, immediately alert the RHCC players that the exercise has ended and to stop what they are doing.
* Inform the players that the next phase is the facilitated discussion, which should include all members of the coalition who are available.
* Ask RHCC players to confirm with the coalition members again that:
  -- everyone is aware of the time of the facilitated discussion,
  -- they know how to call in or connect to the meeting, and
  -- the discussion should take about 2 hours.

Frequently Asked Questions *(for reference)*

Q: What is the role of the RHCC in this exercise?

A: If your coalition is set up to have the coalition headquarters participate in real-time mass casualty responses, then you should play whatever role you would during a real evacuation scenario. This might involve, for example, facilitating the matchup between patients who must be evacuated and coalition members willing to accept them in transfer. Many coalitions are not set up for such centralized coordination, particularly during the time frame of this exercise. Your other important role is to invite all potentially interested coalition members to participate in the facilitated discussion and to participate yourself.

Q: Which hospital(s) or facilities are evacuating?

A: Information on the situation comes from the evacuating facilities themselves.

Q: Which hospitals and facilities are participating in the exercise?

A: This exercise places no limits on which facilities can be contacted. To prevent confusion, please begin each phone call by emphasizing that you are participating in an exercise and there will be no physical transfer of patients. If a facility declines to participate, please inform the assessment team so that they can note this.

Q: Which transportation agencies are participating in the exercise?

A: Similar to hospitals and facilities, this exercise places no limits on which transportation agencies can be contacted. To prevent confusion, please begin each phone call by emphasizing that you are participating in an exercise, and there will be no physical transfer of patients.

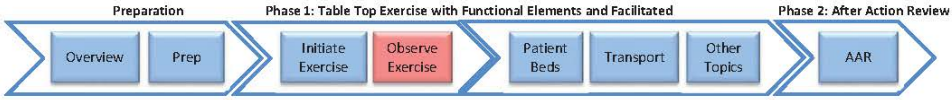
Q: What aspects of this exercise are meant to be simulated, and what parts of the exercise need to be carried out?

A: There will be no physical transfer of patients, staff, equipment, or medication. The focus of this exercise is on identifying bed space in different facilities to cover the needs of the evacuating facilities. This exercise is not intended to interfere with patient care, so be sure to act accordingly.

Q: Do we care about staff, equipment, and materials?

A: Staff, equipment, and materials are not the focus of the functional exercise. These issues should be considered as part of the exercise, but they will be addressed in greater depth during the facilitated discussion.

Table Top Exercise with Functional Elements: Observation



Overview

Instructions:

If the RHCC participates in the real-time response, evaluate the effectiveness of its participation.
* Review the qualitative measures below and decide how strongly you agree or disagree.
* Click your mouse on a box below to place a check mark in the box (and click a second time to remove it).
* Keep track of observations using the comments boxes.

Qualitative Questions

Situational Awareness	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	N/A	*Comments*
Understood the needs and actions of the evacuating facility/ies throughout the exercise							
Collected baseline capacity data from coalition facilities in a timely fashion							
Facilitated communication between evacuating and receiving facilities							
Considered the impact of the evacuation on other facilities in the region							
Effectively coordinated a unified response plan and updated the plan as the incident evolved							

Communication	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	N/A	*Comments*
Able to reach and communicate effectively with the appropriate persons at receiving facilities							
Able to reach and communicate effectively with the appropriate persons at this/other regional health care coordination centers (RHCCs)							
Able to reach and communicate effectively with the appropriate persons at EMS (emergency medical services)							
Coordinated with the evacuating facility on division of responsibilities regarding contact with receiving facilities							

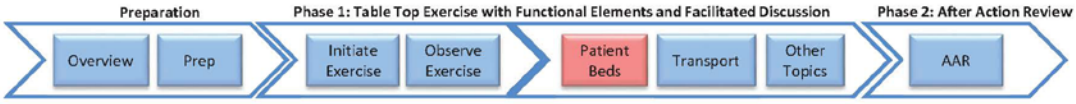
Transportation	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	N/A	*Comments*
Contacted EMS early in the exercise							
Considered acuity level of patients in choosing between ALS (advanced life support), BLS (basic life support), or other forms of transportation							
Coordinated decision-making on sequence of evacuation (i.e., who is evacuated first?)							

Patient Tracking and Information Exchange	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	N/A	*Comments*
Maintained a system for tracking patients while in transit							
Maintained a system for tracking the final destinations of evacuated patients							
Considered potential issues of transferring medical records and credentialing of medical personnel							

Appropriate Placement of Patients	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	N/A	*Comments*
Considered which types of beds would accommodate which types of patients							
Encouraged potential receiving facilities to expand capacity (surge) to accommodate evacuees							
Considered distributing patients across receiving facilities to minimize overload							

Regional Health Care Coordination Centers (if applicable)	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	N/A	*Comments*
The regional health care coordination center was helpful in facilitating the evacuation							
EMS was helpful in facilitating the evacuation							

Facilitated Discussion: Patient Beds



Overview

Instructions

* This worksheet (and the next 2 worksheets) will help you elicit information about patients and destinations, as well as conduct a discussion of the issues raised during the functional exercise.
* Enter information from the facilities into the tables below. The scripts will automatically incorporate information from the tables.
* If there are multiple evacuating facilities, please click the button at the bottom of the page to create additional space for data collection.
* Before beginning, ensure that all participants are on the conference call. If possible, use WebEOC or a system that allows participants to view the same screen.

Talking points for initiating the facilitated discussion

Introduce the discussion, addressing the following talking points:
* Remind players that this is the second step of the coalition surge test exercise.
* Briefly describe who is joining the discussion (e.g., evacuating facilities, receiving facilities, EMS/patient transport, RHCC, others).
* Inform players that we will (a) review where patients where sent, (b) review what transportation was used, and (c) discuss issues that arose during the simulated evacuation.

Collect Data: Evacuating Facility #1

Ask evacuating facility #1 the following questions and record answers below:

Enter the name of the evacuating facility here:

Read: ***"Evacuating facility 1, what was your patient census at the start of the exercise?"***

patients at start of exercise: 0

"Were any patients discharged rather than evacuated? If so, how many?"

patients discharged: 0

"From the start of the exercise, how long did it take to complete your patient count and report to the HCC?"

Time to complete and report patient census to HCC: m

"From the start of the exercise, how long did it take to receive confirmation that appropriate beds were found for all your evacuating patients?"

Time to receive confirmation : m

Ask the evacuating facility to go through the list of receiving facilities it contacted and indicate how many patients were accepted in each category of beds. As each evacuating facility gives its report, fill in the table below:

Read:	***"Evacuating facility #1, please briefly walk through each facility that agreed to accept patients. For each, list of the number of patients accepted in each of the following categories: long-term care, general medical/surgery, ICU, pediatrics, NICU, labor and delivery, and psychiatry. The RHCC and receiving facility staff should listen closely to the report and note any discrepancies you find."***
	[NOTE: In coalitions where a regional- or coalition-level command center plays an active role in bed-finding, you may need to prompt those players to participate in this dialogue. However, you should begin by asking the evacuating facilities.]

Table A1: Patients Transferred from Evacuating Facility #1

Name of Receiving Facility	Long-Term Care	General Medical/ Surgery	ICU	Pediatrics	NICU	Psych.	Labor & Delivery	Total Beds
								0
								0
								0
								0
								0
								0
								0
								0
								0
								0
								0
								0
								0
								0
Total # Patient Beds	0	0	0	0	0	0	0	0

* Ask the RHCC and receiving facilities on the call to comment on whether the information provided by the evacuating facility matches their records.
* If there were any discrepancies, decide on final number of patient beds as a team and update the information in the table. If more than one evacuating facility is playing, check with receiving facilities that beds were not double-counted.
* Summarize findings from evacuating facility #1 by reading the automatically generated text below.

Read: ***"Evacuating Facility #1, at the beginning of the exercise you had 0 patients at your facility. 0 patients were discharged, which gave you 0 patients who you needed to find beds for. You were able to find 0 beds at 0 other facilities. So 0 remained unplaced at the end of the exercise, correct? Thus, there was a successful evacuation rate of N/A percent."***

Was there a second evacuating facility? If so, please press this button --> YES

Collect Data: Evacuating Facility # 2

Ask Evacuating Facility #2 the following questions and record their answers below:

enter the name of the Evacuating Facility here:

Read: ***"Evacuating facility 2, what was your patient census at the start of the exercise?'***

patients at start of exercise: 0

"Were any patients discharged rather than evacuated? If so, how many?'

patients discharged: 0

"From the start of the exercise, how long did it take to complete your patient count and report to the HCC?"

Time to complete and report patient census to HCC: m

"From the start of the exercise, how long did it take to receive confirmation that appropriate beds were found for all your evacuating patients?"

Time to receive confirmation : m

Ask the evacuating facility to go through the list of receiving facilities they contacted and indicate how many patients were accepted in each category of beds. As each evacuating facility gives its report, fill in the table below:

Read: ***" Evacuating Facility #2, please walk through each facility that agree to accept patients, and list the number of each type of bed available."***

Table A2: Patients Transferred from Evacuating Facility #2

Name of Receiving Facility	LTC	Med/ Surge	ICU	Peds	NICU	Psych	L&D	Total Beds
								0
								0
								0
								0
								0
								0
								0
								0
								0
								0
								0
								0
								0
								0
Total # Patient Beds	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

* Ask the RHCC and receiving facilities on the call for any comments.
* Summarize findings from Evacuating Facility # 2, by reading the automatically generated text below.

Read:

"Evacuating Facility #2, at the beginning of the exercise you had 0 patients at your facility. 0 patients were discharged, which gave you 0 patients who you needed to find beds for. You were able to find 0 beds at 0 other facilities. So 0 remained unplaced at the end of the exercise, correct? Thus, there was a successful evacuation rate of N/A percent."

Was there a third evacuating facility? If so, please press this button --> YES

Collect Data: Evacuating Facility # 3

Ask Evacuating Facility #3 the following questions and record their answers below:

enter the name of the Evacuating Facility here:

Read: ***"Evacuating facility 3, what was your patient census at the start of the exercise?'***

patients at start of exercise: 0

"Were any patients discharged rather than evacuated? If so, how many?'

patients discharged: 0

"From the start of the exercise, how long did it take to complete your patient count and report to the HCC?"

Time to complete and report patient census to HCC: m

"From the start of the exercise, how long did it take to receive confirmation that appropriate beds were found for all your evacuating patients?"

Time to receive confirmation : m

Ask the evacuating facility to go through the list of receiving facilities they contacted and indicate how many patients were accepted in each category of beds. As each evacuating facility gives its report, fill in the table below:

Read: ***" Evacuating Facility #3, please walk through each facility that agree to accept patients, and list the number of each type of beds available."***

Table A3: Patients Transferred from Evacuating Facility #3

Name of Receiving Facility	LTC	Med/ Surge	ICU	Peds	NICU	Psych	L&D	Total Beds
								0
								0
								0
								0
								0
								0
								0
								0
								0
								0
								0
								0
								0
								0
Total # Patient Beds	0	0	0	0	0	0	0	0

* Ask the RHCC and receiving facilities on the call for any comments.

Read:	***"Evacuating Facility #3, at the beginning of the exercise you had 0 patients at your facility. 0 patients were discharged, which gave you 0 patients who you needed to find beds for. You were able to find 0 beds at 0 other facilities. So 0 remained unplaced at the end of the exercise, correct? Thus, there was a successful evacuation rate of N/A percent."***

Facilitated Discussion on Patient Beds

Discussion Topics for Evacuating Facilities

Ask players at evacuating facilities, and then the peer assessors, for BRIEF initial reactions about how the simulated evacuation went. At this point, stay focused on bed-finding. Discussion of transportation and other issues comes later. Encourage peer assessors to review the marks they made on the qualitative checklists:

"What went well with finding patient beds? What was difficult or challenging? Were any particular types of beds difficult to find?"

Ask players at evacuating facilities (and RHCC if they have input) about their interactions with the receiving facilities:

Discussion Topics:

1. How did the facility decide which receiving facilities to call? Consider asking how important the following factors were:
    a. Facility was specified in evacuation plan
    b. Availability of contact information
    c. Knowledge of the capacity and capabilities of the receiving facilities
    d. Real-time information about current census/bed availability (e.g., HAvBED)
    e. Geographic proximity
    f. Desire to balance the patient load so as not to overburden any facility
    g. Needs of at-risk populations
2. Were there any criteria missing that should have been factored into the decision of which facilities to call?
3. How did the evacuating facility establish communication with receiving facilities?
    a. Directly or through intermediaries (e.g., RHCC)?
    b. Did they have a list of points of contact? Of phone numbers? Did those numbers work?
    c. Could they have established contact in a power outage? Without Internet?
    d. Any problems establishing communication with an appropriate POC at receiving facilities?
4. Was the number of patients that the receiving facilities agreed to accept realistic?

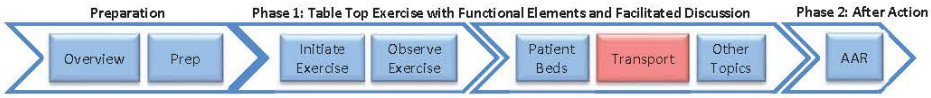
Discussion Topics for Receiving Facilities

Ask players at receiving facilities (and RHCC if they have input) about their experience with the exercise:

Discussion Topics

1. If this had been a real event, would their response have been any different? For example,
    a. would they have had to contact anybody else for approval?
    b. would they have been able to take the same number of patients, more, or less? Why?
2. Regarding the number of beds they could offer, did the response reflect your current "usual" free bed capacity? Did they consider "crisis standards of care"?
3. Is there anything else they could have done to increase capacity? Such as:
    a. Create additional space (where?)
    b. Bring in extra staff (from where?)
    c. Anything else?

Facilitated Discussion: Transportation



Overview

Instructions:

* This worksheet helps you elicit information about patient transportation and conduct a discussion of issues raised during the table top exercise with functional elements. Enter information from the facilities in the tables below.
* If there is a second and/or third evacuating facility, please click the button at the bottom of the page, which will provide further space to conduct the same data collection and discussion again.

Collect Data: Evacuating Facility #1

Ask each evacuating facility to go down the list of transportation organizations it contacted and say how many vehicles were offered by each. For example:

* "County EMS gave us 5 ambulances, 3 ALS and 2 BLS."
* "Ambulances-R-Us gave us 3 ALS units."
* "The local school district is providing 3 buses with a capacity of 30 patients each."
* "The state is sending 4 helicopters."

"From the start of the exercise, how long did it take to identify an available and appropriate mode of transport for the last evacuating patient?"

Time to identify transport for the last patient: _____ m

Read: ***"Evacuating facility #1, please briefly walk through each transportation agency that agreed to transport patients. For each, list of the number of BLS and ALS vehicles provided, along with any other non-ambulance vehicles (such as buses, helicopters, etc.). The RHCC and receiving facility staff should listen closely to the report and note any discrepancies you find."***

[NOTE: In coalitions where a regional- or coalition-level command center plays an active role in bed-finding, you may need to prompt those players to participate in this dialogue. However, you should begin by asking the evacuating facilities.]

Table B1: Vehicles Provided for Patient Transportation

Name of transportation organization	Ambulances provided			Other vehicles provided and description	Number of Patients Matched to Transport
	# ALS	# BLS	Total		
			0		
			0		
			0		
			0		
			0		
			0		
			0		
			0		
			0		
			0		
Total	0	0	0		0

* Ask any transportation providers who are on the call, as well as the RHCC (if relevant), to listen to these numbers and see if they agree with their numbers.
* If there is more than one evacuating facility, be sure to check with transportation providers to make sure that ambulances were not double-counted—i.e., the same ambulance wasn't promised to more than one hospital.

Was there a second evacuating facility? If so, please press this button --> YES

Collect Data: Evacuating Facility # 2

Read *"Evacuating Facility #2, from the start of the exercise, how long did it take to identify an available and appropriate mode of transport for the last evacuating patient?"*

Time to identify transport for the last patient: m

"Please list each transportation agency that agreed to transport patients, as well as their availability of type and number of vehicles."

Table B2: Vehicles Provided for Patient Transportation

Name of transportation organization	Ambulances provided			Other vehicles provided and description	Number of Patients Matched to Transport
	# ALS	# BLS	Total		
			0		
			0		
			0		
			0		
			0		
			0		
			0		
			0		
			0		
			0		
Total	0	0	0		0

* Ask any transportation providers who are on the call, as well as the RHCC (if relevant), to listen to these numbers and see if they agree with their numbers.
* If more than one evacuating facility, be sure to check with transportation providers to make sure that ambulances were not double-counted, i.e., the same ambulance wasn't promised to more than one hospital.

Was there a third evacuating facility? If so, please press this button --> YES

Collect Data: Evacuating Facility # 3

Read *"Evacuating Facility #3, from the start of the exercise, how long did it take to identify an available and appropriate mode of transport for the last evacuating patient?"*

Time to identify transport for the last patient: ____ m

"Please list each transportation agency that agreed to transport patients, as well as their availability of type and number of vehicles."

Name of transportation organization	Ambulances provided			Other vehicles provided and description	Number of Patients Matched to Transport
	# ALS	# BLS	Total		
			0		
			0		
			0		
			0		
			0		
			0		
			0		
			0		
			0		
			0		
Total	0	0	0		0

* Ask any transportation providers who are on the call, as well as the RHCC (if relevant), to listen to these numbers and see if they agree with their numbers.
* If more than one evacuating facility, be sure to check with transportation providers to make sure that ambulances were not double-counted, i.e., the same ambulance wasn't promised to more than one hospital.

Facilitated Discussion on Transportation

Discussion Topics for Evacuating Facilities

Ask the evacuating facilities about their experience reaching out to transportation organizations.

Discussion Topics:

1. What went well with procuring patient transportation? What was difficult or challenging? What could have been better?
    a. What transportation organization did they call first, and why?
    b. Were there any organizations they tried to contact but couldn't reach?
    c. Were the organizations reached as responsive as they could have been?
    d. Was there anybody who they should have tried to contact but didn't?
2. Does the RHCC have anything to add about reaching out to transportation organizations?

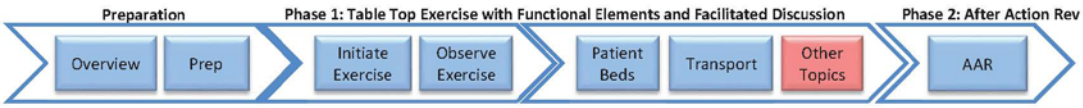
Discussion Topics for Everyone

Ask everyone on the call if they have anything to add to the previous conversation.

Discussion Topics:

1. Was the coalition able to find enough vehicles to evacuate its patients?
    a. Given the distances involved, about how long would each trip take?
    b. How many trips would each vehicle have to take to complete the evacuation? Is this feasible?
    c. How did they determine the number and type of vehicles needed?
    d. Which types of patients are hardest to transport? How would they handle them?
2. Would there be enough capacity left in the system to handle the usual 911 traffic and other emergencies?

Facilitated Discussion: Other Topics



Overview

Instructions:

* This worksheet will help you lead the remainder of the facilitated discussion. The discussion topics provided below cover patient tracking, communication, at-risk populations, continuity of operations, and a final wrap-up.

Facilitated Discussion: Additional Topics

Patient Tracking and Public Communication

Discussion Topics:

1. How would patients be tracked as they moved from one location to another? Who, if anyone, can access this information in real time?
2. How would medical records be transferred?
3. How would the facilities or coalition manage calls from families looking for evacuated patients?
4. What can the coalition, RHCC, or EOC do in the midst of an evacuation to help?
5. What should the coalition do now to prepare for a future evacuation?

At Risk Populations

Discussion Topics:

1. Who are considered at-risk populations?
2. In what way are at-risk populations relevant to an evacuation scenario?
3. Aside from the different types of patients in the exercise (e.g., psychiatry, pediatrics, NICU, L&D), are there any other at-risk populations that might be relevant in an evacuation scenario? How did evacuating facilities decide the order in which patients should be evacuated?

Continuity of Operations and Recovery

Discussion Topics:

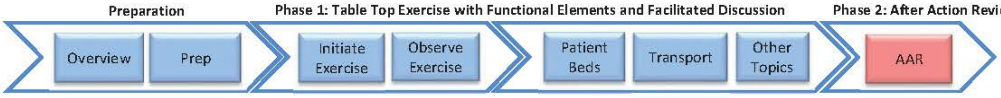
1. How would patients in the community be cared for during the evacuation and afterwards?
2. Can staff be transferred from one facility to another within the coalition to help? What are the barriers to doing this?
3. Where would facility command staff operate from if the facility were unsafe or unusable?
4. What can the coalition, RHCC, or EOC do in the midst of an evacuation to help?

Wrap-up

Discussion Topics:

1. What (if any) role did the health care coalition play in facilitating the evacuation? Consider both its real-time role and the role that it played in laying the groundwork for what happened today.
2. What else could the coalition do now to prepare for a future evacuation?
3. To all players on this call: If this were a real incident, are there individuals/organizations that would need to be involved in the response who were not on this call?

After Action Report



Leading the After Action Review

Instructions

Use the script and tables to lead the after action review discussion with everyone involved in the call. The structure of the after action review is as follows:

* Overview summary of the exercise, using the auto-populated table below.
* Discussion of strengths. Begin with the players and then have assessors add their observations.
* Discussion of gaps or weaknesses, prioritizing which are most important to focus on.
* Identifying corrective actions to address the gaps, including who will be responsible for championing changes.

Read ***"We are now moving to the after action review, the last portion of the Coalition Surge Test. We will begin with a brief summary of the coalition's performance and strengths in the evacuation scenario, and then identify and discuss and the most important opportunities for improvement."***

Use the table below to summarize the outcomes of the exercise.

Table C1: Summary of Evacuation Exercise

	Patients					Transportation	
	# patients at start	# patients discharge	# patients placed	% patients evacuated	# receiving facilities	Total # ALS & BLS vehicles	# transport orgs
Evacuating Facility #1	0	0	0	N/A	0	0	0
Evacuating Facility #2	0	0	0	N/A	0	0	0
Evacuating Facility #3	0	0	0	N/A	0	0	0
Total Coalition	0	0	0	N/A		0	

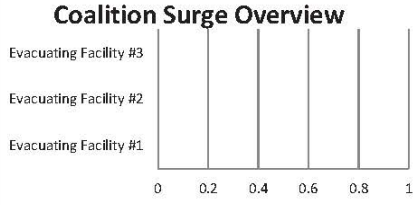
Alternatively, you can use the following text to summarize:

"During today's coalition surge exercise, 0 patients were evacuated. The evacuating facilities were able to discharge 0 patients, find beds for 0 others, and identify 0 vehicles for transporting them. The coalition had successful evacuation rate of N/A percent."

Discussion of strengths:

* Ask players to share the coalition's strengths that they observed during this exercise.
* Add any additional observations that you and the peer assessors noted as outside observers.
* Ask players what strategies they will employ to make sure these areas of strength are continued in the future.

Coalition Surge Overview



	Evacuating Facility #1	Evacuating Facility #2	Evacuating Facility #3
beds found	0	0	0
beds remaining	0	0	0

Discussion of gaps or weaknesses:
* Ask players to share what gaps they noticed during the coalition surge test exercise.
* Ask peer assessors to add any additional comments.
* Facilitate a discussion of the most important gaps (i.e., had significant impact on performance).
* Prompt players to discuss corrective actions and identify a champion for each.
* Ask players what they will focus on the next time they test the surge capacity of the coalition.

Congratulations! You have reached the end of the exercise.

Use the buttons below to save the exercise results or reset the tool for a new exercise.

Save as Excel | Save as PDF | Reset Data

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