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The Effect of a Disaster Medical Assistance Team on the Medical Surge Objectives for Hospitals Affected by a Mass Casualty Incident

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This is to certify that the doctoral dissertation by

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Walden University
2023

Abstract

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MA, Keiser University, 2010

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Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

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Abstract

The effective management of a medical surge during a disaster requires effective resources that have a proven track record. A Disaster Medical Assistance Team (DMAT) is such a resource. Literature indicated that the medical surge is still an unresolved issue even after many years of continued research. The research question involved the effect a DMAT had on the medical surge objectives for hospitals affected by a mass casualty incident. The purpose of this study was to better understand the effect a DMAT had on medical surge. A panel of 21 volunteers with at least 10 years of experience with the National Disaster Medical System (NDMS) was invited to take part in a survey using the three round Delphi method to answer the research question in the above stated purpose. Kingdon's multiple streams framework (MSF) was used along with the Acute Medical Severity Index (AMSI) to form the conceptual and theoretical framework for the research. Thematic coding was used, and responses were placed into 3 criteria of predeployment, deployment and postdeployment as having achieved consensus, or as having not achieved consensus. The results of the survey revealed a consensus that predeployment and postdeployment medical surge training should include hospital personnel likely to be affected by a mass casualty incident using metrics that indicated the existence of a medical surge event requiring a DMAT. Recommendations include the development of a panel to guide the deployment of metrics, triggers and associated DMAT training. Hospitals and communities in high impact zones can positively benefit from this research as recommendations are elevated to local politicians who can affect positive social change during policy periods.

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Dedication

I would like to dedicate this study to Helga Scharf-Bell, the Director of NDMS. Helga has instilled passion and care into a system of intermittent and full-time employees who deliver the best of care at the worst of times. This research has been inspired by Helga and those that she has mentored in disaster response. My hope is that this research contributes to the success of NDMS in a way that benefits the system and the American people.

Acknowledgments

I would like to acknowledge my family as they have stood with me through the struggles and challenges of completing my doctorate degree. I would like to thank Dr. Christina Spoons and Dr. Mi Young Lee for their support and patience in this process. I would especially like to thank Dr. LaToya Johnson, my student advisor. Dr. Johnson has been the long pole in the tent for me on many occasions. She really cares about her students, and I always knew that I was a priority when on the phone with her. I will always be indebted to her. When it came to crunch time, there were so many at Walden that helped in a meaningful way from financial aid to account management. In all, my experience at Walden was great and I am eager to give back to the academic community in some way in the future.

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Chapter 1: Introduction to the Study

The National Disaster Medical System (NDMS) is an integral part of Emergency Support Function #8 (ESF-8) which is responsible for the health and medical response when states are overwhelmed by natural or man-made disasters (NDMS, 2016). The responsibility for the nation's health and medical response falls within the purview of the Department of Health and Human Services (DHHS). The Assistant Secretary of Preparedness and Response (ASPR) is responsible for initiatives including but not limited to preparedness planning for federal medical response and countermeasure response research (ASPR, 2016).

The NDMS is specific to the federal medical response of which it is responsible for missions such as medical surge relief which has a direct impact on the local communities who fall within the disaster zone (NDMS, 2016). The NDMS has numerous response capabilities that serve communities through the mechanism of ESF-8. The mechanism through which the NDMS supplies public health and medical needs is a disaster medical assistance team (DMAT).

Hospitals located within natural disaster zones, like those in proximity to the coastline, are faced with the potential of a mass casualty incident. When a mass casualty incident occurs, hospitals look for the establishment of an alternate care facility (ACF) so they can shunt the lesser acuity patients there while appropriating the more critical resources to those of a higher acuity (Altevogt et al, 2010). A DMAT is the primary resource that is deployed for relief of medical surge because it has the unique ability to function as an ACF. This research contributes to the qualitative research gap by

examining the effect of the DMAT on the medical surge objectives of hospitals affected by a mass casualty incident.

The expectations for social change include but are not limited to the alignment of problems with the politics so the policies can be implemented to bring about a positive change. This chapter will detail the background and purpose of the study while also providing the scope and limitations as it all relates to the theoretical framework. Additionally, the necessary definitions will be discussed along with the problem statement and the research question.

Background of the Study

The United States is no stranger to mass casualty incidents, and it has been equipped with many elements of an effective response. The Centers for Disease Control and Prevention (CDC) has for many years offered the following guidance which states that 50%–80% of mass casualty victims usually arrive at the nearest hospital within the first hour (The Centers for Disease Control and Prevention, 2012). Other guidelines have instructed local communities to expect to be without federal help for at least 72 hours (Hunt et al., 2010). The Public Health Preparedness Capability 10 in the National Standards for State and Local Planning (2022) gives guidance for the management of medical surge yet states that the CDC has no performance measurements for medical surge capacity. Priority goal four of the 2020–2023 HHS/ASPR Strategic Plan calls for a unified, regional approach to improving medical surge capacity and it also calls for the improved alignment across NDMS, HHS, Critical Infrastructure Protection (CIP), Hospital Preparedness Program (HPP), Medical Reserve Corps, U.S. Public Health

Service Commissioned Corps, Regional Emergency Coordinators (RECs), and other HHS Regional Staff (Strategic Plan 2020-2023, 2020). A mission set of a DMAT currently includes medical surge relief for hospitals (NDMS Response Teams, 2022). Yet with an estimated 72-hour timeframe in which a response would be expected, there is a critical need for data to determine perceived performance results and perceived training and operational enhancements.

The gap in knowledge this research contributed to is the data specific to the response time of a DMAT and its effect on the medical surge capacity of hospitals impacted by a mass casualty incident. This research is important for disaster model practitioners and emergency managers at all levels of government to better understand the performance of current medical surge relief response policies in implementing an ACF through a DMAT.

Problem Statement

Hospitals affected by a mass casualty incident typically experience a surge of patients with the greatest need for medical surge relief being within the first 24 hours. Unfortunately, the response time of a DMAT is not expected to be inside of 72 hours, which reduces ACF capacity during the initial medical surge. The NDMS is responsible for providing public health and medical support under ESF-8 of the National Response Framework (NDMS Response Teams, 2016). When called upon, NDMS deploys DMATs to hospitals to provide medical surge relief during a disaster.

The CDC still advises that 50%–80% of mass casualty victims will report to the nearest emergency department within 1 hour of a disaster incident, with the remaining

presenting in the next 8–24 hours (The Centers for Disease Control and Prevention, 2012). Most fatalities occur in the first 24 hours with the remainder in the following few days (Manastireanu et al., 2010).

There is clearly a need for a DMAT to be co-located with hospitals in the first 24 hours following a disaster to provide an ACF for hospitals affected by a medical surge. (Manastireanu et al., 2010). With little to no studies examining the response time of a DMAT and its effect on medical surge, current response standards will at best be subjective in quality. Literature reviewed for this study not only indicated that there is a lack of data that would support a quality medical surge capability, but also that medical surge response effectiveness is a global issue and has been for decades (Kirsch, et al., 2022). This study contributed to this literature by examining the effect of the DMAT response time on the medical surge mission goals of affected hospitals in a mass casualty incident. The findings of this research should contribute positively to public policy especially as it relates to emergency management.

Purpose of the Study

The purpose of this Delphi study was to better understand the effect of a DMAT on the medical surge objectives of hospitals affected by a mass casualty incident. In part, this was accomplished by using Kingdon's multiple streams theory to identify opportunities that may exist between the problem stream, the politics stream and the policy stream.

There were no independent and dependent variables in this study due to its design and nature. The Delphi method used in this study invoked the feedback of subject matter

experts through a series of questions whereby they either arrived at consensus or they did not. As a result, confidence is high that the outcome of the study will be a higher level of awareness towards collaboration, analysis of available options, and subsequent policy improvements.

Research Question

RQ - What effect does a DMAT have on the medical surge objectives for hospitals affected by a mass casualty incident?

Theoretical Foundation

The framework for this study was grounded in Kingdon's (2011) multiple streams approach (MSA) to public policy. Kingdon's MSA framework has been instrumental in understanding and advancing public policy initiatives across other countries and policy domains wherein it clearly defines the streams of politics, policy, and problems (Sabatier & Weible, 2014). John Kingdon developed an approach to understanding public policy through the unique approach of identifying multiple streams. His theory essentially states that there are three streams of influence in public policy, each of which must intersect with at least one other to draw the third stream into play. Once all three streams come together, the opportunity for public policy to be changed is at its greatest.

For this study, I used Kingdon's approach to better understand the potential oversight as described by the research problem. The multiple streams lens is considered sufficient and flexible in guiding the approach to the research as well as the theories and conclusions within this study. In Chapter 2 I will go into further detail concerning the merit and applicability of Kingdon's multiple streams theory.

Conceptual Framework

The conceptual framework used in this study as an evaluative model for the DMAT response time utility was the Acute Medical Severity Index (AMSI) developed by Bayram and Zuabi (2012). It is however prudent to understand the foundation upon which Bayram and Zuabi built their index, which is the following. Departing somewhat from the existing model produced by DeBoer and Debacker (2006), wherein the medical severity index (MSI) would be calculated and used to determine if an event would be classified as a disaster or an incident, Bayram and Zuabi developed the AMSI, which would then take into account the prehospital component of medical surge prediction. With an existing need for a comprehensive quantitative medical surge prediction model, the AMSI was promoted as a model that could lead to successful quantification of acute medical disasters. Chapter 2 will cover more on this subject and will detail the significance of medical surge metrics and how they can serve to equip practitioners to align necessary data relating to the problem with the politics that can affect policy.

Nature of the Study

This study used the Delphi method. The Delphi method has been in use since its inception in the 1950s by RAND Corporation. The Delphi method has been used successfully to forecast future developments and to assist in affecting policy (von der Gracht, 2012). The study was conducted with subject matter experts from the field of disaster medicine involving practitioners, administrators, and policy makers to the end of seeking consensus around ideas and theories that would solve the research problem stated in this study. The study involved three rounds of questions with feedback provided to the

respondents following each round. The study looked for consensus building around the questions. This information has provided the data to analyze the research question.

Definitions

AMSI – Acute Medical Severity Index. A qualitative model developed by Bayram and Zuabi (2012) which is the proportion of the Acute Medical Burden resulting from the event compared to the Total Medical Capacity.

ASPR – Assistant Secretary for Preparedness and Response.

DMAT – A disaster medical assistance team is made up of medical professionals and paraprofessionals who are deployed to disasters to promote individual health and national health security.

HACSC – Hospital Acute Care Surge Capacity. The proportion of emergency department beds to emergency department time as related to the treatment of T1 and T2 victims caused by the incident (Bayram & Zuabi, 2012).

NDMS – National Disaster Medical System which at the request of state, local, tribal or territorial authorities or by other federal departments, provides patient care, patient movement, and definitive care; contribute veterinary services; furnish fatality management support.

NEC – National Special Security Event. An NSE is an event of national or international significance deemed by the United States Department of Homeland Security (DHS) to be a potential target for terrorism or other criminal activity.

REC – Regional Emergency Coordinators. RECs serve as ASPR's primary representatives throughout the country at the regional level.

THC – Total Hospital Capacity. The representation of all hospitals and their respective capacities for treating T1 and T2 patients. This value is gathered by multiplying the individual HACSC of each hospital by the number of hours encountered by each hospital and then taking the sum of all of these values (Bayram & Zuabi, 2012).

TMC – Total Medical Capacity. The function of the THC and the medical rescue factor (R) (Bayram & Zuabi, 2012).

Assumptions

There are certain assumptions associated with this study. It is assumed that the capability of each DMAT referenced is the same. It is entirely possible that the mixture of personnel could be different from one DMAT to another. There is a certain number of deployment positions that are flexible and left to the discretion of the team commander. With this possible discrepancy in roster makeup, it is possible that one team could have more paramedics or nurses than another. Depending on the type of patients that present to the DMAT, this could represent a difference in capability in medical scope of practice. The same could be true if one team had more doctors, or doctors with certain specialties than another. This assumption was necessary in this study because the questions and statements for which consensus was sought were objective in nature and therefore not oriented to individual team capabilities.

Another assumption is that the experience levels in relation to a DMAT within the study were equal. It is possible to have different experiences, especially if the DMATs were deployed for different lengths of time and/or had very different mission sets.

The following assumption requires some detail. A DMAT is typically tasked with setting up a Base of Operations, which resembles a MASH unit. Western Shelters are used and are represented by three 19X35 shelters and one 20X20 shelter. This footprint takes a certain amount of space which can vary from one hospital to another due to geographical challenges. These challenges are represented by differences in time for the DMAT to become operational. It is assumed in this study that each DMAT could become operational in the same amount of time. This assumption was necessary so as not to pull the focus away from the core of the questions and statements for which consensus was sought. The study could remain objective without distraction of peripheral issues.

Scope and Delimitations

This study comprised the perspectives and opinions of NDMS personnel, including DMAT team members, who had at least 10 years of field experience. The specific focus of the effectiveness of the DMAT involved the critical nature of the availability of a resource and its intended utility in a condition when time is a critical factor. If casualty presentations and mortality rates are time bound factors, then time is a critical factor in which the resources needed to care for those casualties must be available and deployable during that defined time frame. Internally, this focus is a valid concentration and a worthy consideration for healthcare providers within the scope of this study.

This study did not encompass all of healthcare but rather it focused on those healthcare entities that would be affected by a disaster where the general public and emergency services would seek higher levels of care, such as an emergency department

and a hospital. The results of this study are therefore generalizable to only those hospitals and emergency departments that would experience or have experienced such an event as well as policy makers within NDMS. The population considered is the total population of the hospitals involved in this research. While the research would not be considered empirically generalizable, it will have real and clear implications for public policy in an emergency management situation such as a mass casualty disaster.

Limitations

Limitations within this study include the natural subjectivity that can be present in opinion polling. Because this study was an e-Delphi, the limitations of internet connectivity and participant authenticity were present (Meshkat et al., 2014). In terms of subjectivity, the Delphi method has become increasingly vetted as a valid research tool (Meshkat et al., 2014) Internet connectivity concerns were minimal with the increased capacity of smartphones and 5G technology. Authenticity concerns were minimal as respondents were involved by invitation only. Further subjectivity limitations included differing experiences in response to some of the questions. However, the Delphi method is best utilized by reaching consensus after several rounds of questions with the respondents receiving the feedback summaries. Empirical research suggests that consensus is reached at higher levels after the fourth round of questions (Meshkat et al., 2014).

The external validity issues with this study were as previously mentioned. Because this was a Delphi study that involved the subject of hospitals affected by a mass casualty incident, the generalization of its findings are only applicable to those facilities

that would or could encounter such an incident. These would presumably be those facilities with a high index of potential impact by hurricanes or flooding.

Significance of the Study

This study sought to fill the literature gap identified in the problem statement through a Delphi study with subject matter experts of a DMAT's response. The research expounded upon the subject through systems thinking and advocacy (Callahan et al., 2012) with the overall objective of elevating the problem to the policy level in hopes to see it further promoted to the political engagement level and subsequently to achieve a positive change for society (Yob et al., 2014).

The terminal objective of this study was that of reaching consensus of a more efficient standard for relieving a medical surge inside of 24 hours. The advantages to society not only include lower morbidity and mortality, but also an increase in response and recovery and subsequently a more stable outcome following a disaster. The importance of this study to public policy is not only that of government responding better to disasters, but it is one that could foster a more collaborative thinking and planning model that would allow the focus to remain on maintaining a performance evaluation standard that is conducive for ensuring response effectiveness in the face of disaster.

Significance to Practice

It is believed that this study can and will advance improvement opportunities through the various streams identified in Kingdon's (2011) multiple streams theory. For findings within this study to reach the policy stream would be a significant advancement.

Significance to Theory

Depending on the participant responses, the theories within the problem statement and the research question will either be validated or refuted or neither. The significance remains in that the further NDMS can participate in these questions and discussions, the better chance that problems can be solved before they have a negative effect on public health and medical response.

Significance to Social Change

This study is significant to social change in that with any adjustments made to medical surge response as a result, the public can also be educated as to the policies and procedures involved in a medical surge whereby a more effective response can be achieved.

Summary and Transition

The Institute of Medicine convened a workshop in 2010 which identified the lack of qualitative study in medical surge capacity. The contributors highlighted the need for the standardization of medical surge capacity while emphasizing the hardship placed on hospitals due to the lack of a sound medical surge plan (2010). Contemporary literature reveals the problem not only as being global in nature but one that is ongoing with a need for further research on a quantifiable level. Altevogt et al. (2010) as well as Hunt et al. (2010) substantially identified the systemic lack of medical surge capability not only from hospital preparedness attrition but also through the lack of ability to implement an ACF in a timely manner. This study focused on the DMAT component for ACF provision

and the effect that it has on the medical surge objectives of hospitals affected by a mass casualty incident.

Aitken and Leggat (2012) detailed multiple considerations for disaster management. Of these considerations, timelines were included. These were represented by phases of care for field hospitals. Care Phase 1, early emergency care, is onset to 48 hours following the incident and would involve both emergency medical and trauma care. Care Phase 2, follow-up medical and trauma care, begins from day 3 and runs to day 15 and would involve services such as general surgery, internal medicine, obstetrics, etc. Care Phase 3, temporary health facility, beginning from the second month and running for 2 or more years involves substitution for a damaged and/or inoperable health and medical facility until it is re-established (Aitken & Leggat, 2012).

Aitken and Leggat (2012) also detailed what is defined by the World Health Organization (WHO) as a tri-modal distribution of medical issues post sudden onset of disasters. This distribution, which is covered in more detail in the literature review of this study, involves phases that relate specifically to the casualties of disasters. These casualty phases are similar to the phases of care in that there are also three phases yet with shorter timelines. These phases indicate severity of medical need. Casualty Phase 1 is seconds to minutes following the event, which typically includes the highest mortality rate. Casualty Phase 2 occurs minutes to hours after the incident and draws the medical focus on trauma management. Casualty Phase 3 involves days to weeks after the incident and usually involves organ failure, sepsis, and associated long-term issues (Aitken & Leggat, 2012).

When considering the response time of a DMAT as an ACF, which according to the CDC would coincide with the aforementioned Care Phase 2 (Hunt et al., 2010), and when understanding that the timeline of Care Phase 2 coincides with Casualty Phase 3, which by further indications from the CDC is after the medical surge except for the case of biological terrorism, the need for quantifiable data is once again highlighted.

Stewart (2013) addressed similar concerns about the need for a comprehensive surge capacity approach especially considering a 72-hour response time plan from the federal government. Stewart highlighted the need for ACFs along with the problem of existing protocols that are inconsistent with hospital surge capacity goals and objectives. Stewart's conclusions that local communities must develop their own resilience reinforces the research question within this study which examined the effect that the DMAT has on a hospital in terms of providing the ACF capability through the lens of the AMSI.

Literature suggests that a mismatch exists between the medical surge needs of a hospital during a disaster and the capacity of the federal government to meet that need (Manastireanu et al., 2010). Research suggests that the medical surge presentation takes place during Casualty phase 2 (Aitken & Leggat, 2012), while the response of the federal government takes place during Casualty phase 3. A current mission set for a DMAT is to relieve the medical surge that results from a mass casualty incident. With such a mismatch occurring, and in the absence of literature to address effect of a DMAT on medical surge mission objectives, this research is proposed to contribute to the scholarly

conversation of the impact that a DMAT has in relieving the medical surge for hospitals affected by a mass casualty incident.

Chapter 2: Literature Review

The literature researched in this study was found to hold a common theme in that a need exists in medical surge plan effectiveness. Hospitals are regularly seeking alternatives to better adapt to the critical nature of a mass casualty incident. Metrics are being sought and models are being proposed. Contemporary efforts to contribute to the conversation exist yet are still only on the threshold of a better understanding of the effectiveness of a DMAT to relieve a medical surge. The efforts of this study were to contribute to a better capability in terms of meeting medical surge objectives. State and federal assistance is a part of the overall strategy but as literature highlights, the time lapse between the incident and the arrival of outside help is marginal in terms of its effectiveness in meeting these objectives.

The CDC has stated that local communities should expect to be without federal help for at least 72 hours (Hunt et al., 2010). Additionally, the CDC gives guidance to hospitals through mass casualty prediction which states that 50%–80% of mass casualty victims usually arrive at the nearest hospital within the first hour (Mass Casualty Predictor, 2007). Presently, one mission set of a DMAT would include medical surge relief for hospitals experiencing a mass casualty incident (NDMS, 2016), yet a DMAT could be several days before arriving. The literature that was highlighted in this chapter suggested that a mismatch exists between the medical surge objectives of a hospital affected by a mass casualty incident and the response time of a DMAT, which would have the mission to relieve the surge. With these revelations in mind, I proposed a theoretical framework and a research design to analyze findings and contribute to the scholarly

conversation. This chapter will reveal the search strategy conducted as well as the literature itself that contributes to the problem statement. Additionally, the theoretical and conceptual frameworks are expounded upon, followed by summaries and conclusions.

Literature Search Strategy

This chapter highlights the literature search strategy, the theoretical foundation, and the conceptual framework involved with the research. It then includes a review of the literature that supports the research. Finally, a summary and conclusion is provided. I used databases located in the Walden University Online Library such as EBSCOhost and ProQuest with specific searches into peer-reviewed medical and disaster journals. Official federal government sites and Google Scholar were also searched. All searches included the following keywords: disaster models, disaster medical assistance team, medical surge, disaster resilience models, alternate care facility.

I included literature considered relevant from a scholarly viewpoint which falls within the past five years. However, I studied the federal response trends over the past 23 years where I found that the timely response of federal assets has been a continual problem. This is an interesting fact that reinforces the need to evaluate the effectiveness of current federal response policies if these policies are not conducive to mission success in terms of medical surge relief. Using the wider scope of a timeline reinforces the germane scholarship between researchers and the practitioners within NDMS that can contribute to the conversations.

Theoretical Foundation

John Kingdon developed an approach to understanding public policy which can aid in influencing public policy as well. Kingdon's (2014) approach was that of identifying multiple streams. His theory essentially states that there are three streams of influence in public policy, each of which must intersect with at least one other to draw the third stream into play. Once all three streams come together, the opportunity for public policy to be changed is at its greatest. These streams include a policy stream, a politics stream, and a problem stream. Typically, the problem stream gets raised to the level of politics due to some event and then the politics stream engages the policy stream which gives public policy the greatest chance at change.

This theory has been used on many fronts to understand and develop strategies for policy movement in government. Henstra (2013) edited the publication *Multilevel Governance and Emergency Management in Canadian Municipalities*, which highlighted several case studies. In Nova Scotia following the 2003 hurricane Juan, specific legislative prescriptions for local emergency management were inducted because of finding the local emergency management needs were not met because of the lack of MSA stream intersection. Furthermore, other provisions now considered to assist with policy movement are informal relationships between municipal, provincial, and federal administrators wherein these actors can have "the meeting before the meeting" to assess feasibility of policy proposals and discuss alternatives to a desired end. Moreover, the utility of nongovernmental organizations was also recognized to help meet local emergency management objectives (Henstra, 2013).

Lancaster et al. (2014) studied the “Ice” epidemic in Australia through Kingdon’s MSA lens and found great utility in its application to understanding policy movement with great emphasis being placed on Kingdon’s description of the “primeval soup”. Lancaster et al. however discovered some adaptations that could be made in Australian policy making that differ somewhat from Kingdon’s assertions, which were largely based upon United States public policy formation. The differences were found in the policy window and the absolute independence of each stream (Lancaster et al., 2014). Some of these same differences have been found in other MSA studies that have been done within the European Union.

Ackrill and Kay (2011) in their analysis of the 2005 European Union sugar reform discussed much of the same as their Australian successors in that there is great utility in the MSA as a starting point, yet they too found that Kingdon’s policy window claim was not necessarily the case for Europe nor was the alleged ambiguity of policy proposals as a rule. This study praised Kingdon’s contribution yet highlighted the needed adaptations for European Union policy understanding (Ackrill & Kay, 2011).

Cairney and Jones (2015) conducted an analysis and a qualitative study on the theoretical and empirical contributions of Kingdon’s MSA to public policy as a whole. The duo explains the concepts of Kingdon’s theory as being universal in its flexibility that allows for unique adaptations across the globe. Lovell (2016) discussed the application of MSA in the policy of “smart metering” in Australia while additionally highlighting needed adaptations to MSA outside of the USA. Lovell, however went further than many of her predecessors by discussing the international policy transfer

element by which Kingdon's model can be seen on a global scale. Within this view of Kingdon's theory, the streams of one nation's policy can intersect with streams of another nation's policy and make its way to an agenda in the subsequent nation or nations (Lovell, 2016).

Kingdon's theory has been a staple within public policy to influence positive change and from any level of government and any subject thought to be relevant to that government, Kingdon's MSA can prove to be a useful tool in understanding the policy process and subsequent planning as to how needed policies can make it to the agenda. In this study, I used Kingdon's approach to better understand the potential oversight as described by the research problem. The MSA lens is considered sufficient and flexible in guiding the approach to the research as well as the theories and conclusions within this study.

Conceptual Framework

Medical Severity Index

De Boer and Debacker (2006) developed an MSI by which medical facilities could determine the resources needed based upon the extent of the event and the injuries and/or illnesses involved. The authors declared the purpose of the study and proposed methodology to be that of encouraging the utilization of the metrics to produce data that can be both analyzed and updated (DeBoer & DeBacker 2006). A key component of the MSI is the average severity of injuries, which the authors advise should be updated continually as disasters unfold since every disaster is different in scope and nature.

Follow-On Research

Bayram and Zuabi (2012) have made many contributions to the subject of disaster metrics and quantifying casualty prediction and response. Their works have been cited in dissertations (Kearn, 2011; Montán, 2015) and peer-reviewed journals (Montán et al., 2016; Morton et al., 2015; Vonderschmidt, 2017) involving medical and disaster research. There have been several updates to this lens of medical surge management and this study will cover many years of medical surge models and conventions seeking to solve this elusive problem to highlight the ongoing need for reliable medical surge relief. This research will also benefit from Bayram and Zuabi's studies as well as those that have been influenced by them as mentioned above. This research will cover some aspects of the aforementioned studies which include the response time element and the philosophy that metrics are important to properly manage the need for an effective medical surge response.

Literature Review

Hospitals Seeking Alternatives

Many hospitals have adopted the Israeli model, which recommends hospitals reserve 20% of their overall bed capacity for a medical surge (Altevogt et al., 2010). This model calls for the Emergency Department to decide and move on patient dispositions within 10–15 minutes of notification to free up bed space for incoming casualties (Altevogt et al., 2010). The plan also predicts that 20% of all casualties from the incident will need high acuity care, while the remaining 80% from the incident can be treated in the ACF (Altevogt et al., 2010). This surge would be expected within the first 8 hours

unless the event was biological in nature, which would certainly be the exception (Centers for Disease Control and Prevention, 2011). The consideration of a need for extra bed space highlights the requirement for an ACF within the first 8 hours of an incident.

Healthcare Coalitions

Stewart (2013), in her thesis submitted to the Naval Postgraduate School, addressed the need for a comprehensive surge capacity approach. Stewart highlighted the need for ACFs along with the problem of existing federal protocols that are inconsistent with hospital surge capacity goals and objectives. Stewart's research questions revolved around alternatives for medical surge management because of the delay that would be expected from outside assistance. Stewart's research identified that many hospitals are seeking alternatives to medical surge management through healthcare coalitions and even state resources (2013).

In response to the expectation that state and federal assets would not arrive for several days to aid in medical surge relief, Walters et al. (2013) suggested a convertible use rapidly expandable (CURE) model for disaster management at the hospital level. This concept is one in which the hospital has a designated portion of infrastructure that can be rapidly converted and deployed. This could be a parking garage, a wing of the hospital that is unused, or even auditorium space. The cost of having the equipment on hand to deploy one critical care bed is approximately one sixth of the cost of adding an ICU bed to the hospital (Walters et al., 2013).

The goal of the CURE model for providing critical care is to be able to conduct triage within 1 hour and provide treatment within 6 hours, which aligns with the CDC

guidance on mass casualty prediction. The overall expectation of the CURE is that lower acuity patients would be funneled to the CURE allowing the emergency department the resources to treat the more urgent and emergent patients.

Metrics and Models

Medical Severity Index

De Boer and Debacker (2006) developed an MSI by which medical facilities could determine the resources needed based upon the extent of the event and the injuries and/or illnesses involved.

The model considers the following: The MSI is composed of the number of casualties (N), the average severity of injuries (S), and the management capacity (C) which is equated as MSI = N x S/C. The average severity of injuries (S) is also known as the medical severity factor. De Boer and Debacker (2006) assigned one of three factors, (0.5, 1.0, 1.5) to the equation to serve as the medical severity factor which is a result of the ratio of those casualties needing immediate care (T1) and those needing delayed care (T2) to those needing minimal care (T3) on the triage category system (T1 + T2 / T3). Another possible classification would simply be those requiring hospitalization to those not requiring hospitalization, which would further be simplified by equating the number of casualties to the severity of injuries (N = T1 + T2; DeBoer & DeBacker, 2006).

Strengths and Limitations of the MSI

This model, as explained by De Boer and Debacker (2006) appears instrumental in the prediction of resources needed given a mass casualty incident. What is not clear in their report is the relay of casualty information and the timeliness of that exchange that

would allow hospitals and emergency medical services to determine what severity factor exists for the delivery of the appropriate medical capacity, which is defined as number of medical teams in the field, the number of ambulances, and the number of beds available at the hospital. It is also noteworthy that these capacities are measured by a 4-hour clearance time from the disaster area. The limitations appear to be the assignment of only three severity factors, the time taken to determine the factor, which could call into question its utility, and the typical 4-hour clearance time given that this value would also be affected by medical capacity, severity of event and severity of injuries. It is assumed that these factors were assigned as a stabilizing factor to the many variables, yet it is still noteworthy that the limitations still exist. This index alone signifies the demand for a disaster model that is both predictive and evaluative. Such a model would seek to provide quality assurance and an expandable platform that could be event specific.

Acute Medical Severity Index

Bayram and Zuabi (2012) used the MSI proposed by DeBoer and Debacker (2006) to propose their own model, the AMSI, to quantify acute medical disasters that were trauma related, whereby the desired end of prediction and quality assurance could be accomplished. The chief difference between the AMSI and the MSI appears to be that the AMSI is more inclusive of the medical surge factors for affected hospitals in each part of the equation. This medical surge factor as defined by Bayram and Zuabi is called the Hospital Acute Care Surge Capacity (HACSC). The HACSC is the maximum number of critical and moderately injured patients that a hospital can care for per hour after

recruiting all possible medical assets while maintaining a level of care that does not decay or become inadequate even after the assets have been acquired (Bayram & Zuabi, 2012).

The AMSI proposed by Bayram and Zuabi (2012) is defined as the proportion of the acute medical burden (AMB) to the total medical capacity (TMC) or AMSI = AMB / TMC (2012). The result is a quantifiable value that establishes both a priori and a posteriori insight into acute medical management. Additionally, the categorization that results is that of an acute medical incident (an AMSI value of < 1 with no surge capacity involvement), an acute medical emergency (an AMSI value of < 1 with the need for surge capacity), or an acute medical disaster (an AMSI value > 1; Bayram & Zuabi, 2012).

The AMB is composed of the sum of critical (T1) patients and moderately injured (T2) patients, whereas the TMC is composed of the rescue factor (R) and the total hospital capacity (THC). The rescue factor (R) is composed of two parameters, the time factor (TF) and the capacity factor (CF) (Bayram & Zuabi, 2012). The TF is defined as the proportion of T1 and T2 casualties to hospital interval under the maximum allowable time for that level of acuity. This benchmark is set at 1 which is also the maximum possible value for this component. The CF is the proportion of T1 and T2 patients received by hospitals without exceeding the HACSC to the total sum of T1 and T2 casualties received by all hospitals. Again, this value has a maximum of 1 which is also the benchmark (Bayram & Zuabi, 2012).

The THC is defined as the sum of individual hospitals achieving HACSC status in receiving T1 and T2 patients multiplied by the number of hours during which those patients are received by each hospital (2012). The Total Medical Capacity (TMC) is the

product of the rescue factor and the THC, which can be equated as TMC = THC(R). This equation allows for the weakest link to be determined by considering both pre-hospital and hospital rescue efforts.

Strengths and Limitations of the AMSI

The AMSI model offers several advantages whereas the hospital and pre-hospital components are calculated with the ability to determine the weakest link in a mass casualty incident. Additionally, the consideration of the acute medical burden and its proportionality to the total medical capacity allows for a rapid size-up of an event which will help hospitals determine resource needs. Finally, this model affords an expected and an observed viewpoint which can serve to drive formation of decision markers for future events (Bayram & Zuabi, 2012). The limitations of the model would include estimation of parameters such as the rescue factor and the HACSC. An additional limitation would be any reliance on the predictability of a mass casualty incident and any reliance on the speed in which an accurate scene assessment can be communicated to the hospital given the nature of disasters and the potential for infrastructure collapse and/or the exhaustion of available resources.

Research Need Identified

The Institute of Medicine convened a workshop in 2010 which relied upon respected minds within the medical community to collaborate and formulate a way forward in which communities are more resilient to a mass casualty incident through enhanced medical surge plans at local hospitals. (Altevogt et al., 2010). The contributors of the workshop identified the need for triggers that would enable hospitals to move their

activities along a Conventional-Contingency-Crisis continuum. Crisis triggers would call for enlisting the resources necessary to return the hospital function to normal. Such a resource would include a DMAT to relieve the expected medical surge (Altevogt et al., 2010).

The workshop participants identified the prudence of adopting a common language that creates a framework for levels of disaster. The language consists of 3 levels of capacity. The first is conventional capacity which would be defined as a normal state of patient census. The second is contingency capacity where minor adaptations are made that would slightly alter standards of care. This capacity is understood to be one in which the hospital has engaged their surge plan and is capable of handling it. Finally, the crisis capacity is one in which standards of care are significantly altered to handle the surge. This requires immediate relief for the surge that is underway (Altevogt et al., 2010).

The workshop called for standards and metrics, especially in qualitative study, to properly evaluate the effectiveness of policy and procedure as well as to develop triggers that would automatically put the plan into motion (Altevogt et al., 2010). Additionally, the inclusion of pre-hospital resources was discussed in terms of factoring these medical capabilities into the surge plan. The Israeli model was discussed as being used by many hospitals as a starting point for handling a surge. These discussions highlighted the overall need for not only an effective surge plan, but for an evaluation mechanism through qualitative study to better develop such a plan.

The Search for a Model

Building on previous Institute of Medicine reports such as, "*Guidance for establishing crisis standards of care for use in disaster situations*" (2009), and "*Crisis standards of care: A systems framework for catastrophic disaster response*" (Altevogt et al., 2012), the committee on crisis standards of care (Hanfling et al., 2013) convened at the request of the ASPR, the Department of Transportation, and the Veteran's Health Administration to provide discussion on identifying indicators and triggers to engage necessary resources for meeting medical surge objectives. The operating definition that the committee used for triggers was, "decision points that are based on changes in the availability of resources that require adaptations to health care services delivery along the care continuum" (Hanfling et al., 2013).

The convention discussed and determined the utility of indicators and triggers in each phase of emergency response to include in-patient and out-patient care facilities. These criteria were separated into those which are scripted and non-scripted (Hanfling et al., 2013). Scripted indicators and triggers are typically constant and call for action when a certain criterion is met. An example would be that a medical surge event is indicated when patient census reaches 80% of total bed capacity. In contrast, the non-scripted criterion allows for a more analytical approach to the situation. An example could be reaching 80% of total bed capacity with the knowledge of a 20% discharge rate on the next day. Some events could produce a hybrid of the two such as a pandemic influenza outbreak where patient counts have not reached scripted thresholds yet.

The overall conclusions drawn from the convention reveal that within the limitations of establishing indicators and triggers is the issue of recognition of the indicator (an evaluation mechanism issue), and the disparate value of the indicator (e.g. a single hospital in surge capacity does not indicate a regional issue; Hanfling et al., 2013). This calls for individual plans and a comprehensive buy-in from the emergency community. Healthcare coalitions are encouraged to build strong alliances to produce decision trees that involve these indicators for individual facility use in coalition response for requesting additional resources through the State and the National Response Framework. In short, the need for triggers were concluded but how they should be applied was left up to the local level (Hanfling et al., 2013).

Medical Surge Criteria

The convention recognized many studies that have been done in terms of medical surge to include 13 data points for medical surge capacity study that were established yet without any progress made towards positive change from any of these studies (Hanfling et al., 2013). The convention specified there are basically 3 circumstances of medical surge that hospitals will encounter. First, many patients presenting over a short period. Second, sustained increases in volume over time, and lastly small numbers of patients with complex, heavy resource dependent needs (Hanfling et al., 2013).

Additionally, within this publication the Israeli model as well as the CDC guidance was also referenced as benchmarks used for the management of medical surge, both of which operate from the first surge criteria, thus reinforcing again the prevailing models being used by hospitals. The response time of a DMAT as a part of the National

Response Framework being that of 72 hours or greater would appear to lend itself to the second criterion of medical surge where a sustained increase over time would almost gently increase the surge to a point that would intersect with a DMAT arrival.

Further Disaster Models

Aitken and Leggat (2012) detailed multiple considerations for disaster management to include care phases and casualty phases. Within these considerations, disaster timelines are included. The following details their contribution to the concepts of disaster management with response time as a pertinent component.

Care Phases

These phases represent the care expectations of a field hospital such as would be provided by a DMAT. Care phase 1 represents the early emergency care needed and includes onset to 48 hours following the incident. Care phase 2 represents follow up medical and trauma care and begins from day three and runs to day number fifteen. Care phase 3 involves the establishment of a temporary medical facility wherein hospital infrastructure is inoperable and includes time frames from two months to two or more years until the infrastructure is re-established (Aitken, Leggat, 2012).

Casualty Phases

The Casualty phases are similar but with shorter timelines. These phases indicate severity of medical need. Casualty phase 1 is seconds to minutes following the event which typically includes the highest mortality rate. Casualty phase 2 occurs minutes to hours after the incident and draws the medical focus of trauma management. Casualty phase 3 involves days to weeks after the incident and usually involves organ failure,

sepsis, and associated long-term issues (Aitken, Leggat, 2012). These phases are based upon criteria provided by the WHO.

The WHO established the definition of a tri-modal distribution of medical issues post sudden onset of disasters. These definitions are not foreign to the medical community. There are numerous studies surrounding the concepts of early death, death within hours, and late death which are those produced by complications of injuries (e.g., Negoi et al., 2015; Sobrino & Shafi, 2013).

Once again there is an apparent mismatch between the hospital need and the federal response. The primary focus for a medical surge for hospitals is casualty phase 2 which aligns with the prominent Israeli model and the CDC model. The DMAT response appears to be focused on care phase 2 which would align itself with casualty phase 3 rather than casualty phase 2 where the hospital would have the greatest need for medical surge relief according to the CDC and Israeli models.

A DMAT as an ACF

The NDMS's (2018) Federal Coordinating Center Guide as updated and revised by the DoD and the Department of Veteran's Affairs is signed off on by the Director of the NDMS. This guide is not updated annually but only when seen as necessary. In the 2018 update, it was recommended for NDMS teams to engage in medical surge exercises and a complete exercise evaluation guide was produced in this guide.

Volpi (2019) in her dissertation submission to Capella University, "*Disaster Medical Assistance Teams: A Case Study of Disaster Response*", cited NDMS as a definitive care capability during a medical surge. Her research also cited a reprimand

from a Hurricane Katrina aftermath report that stated the medical response component was unprepared for a large influx of patients (2019). This highlights the ongoing medical surge capability deficit.

Shen et al. (2020), in their National Institutes of Health publication, affirm the idea that a DMAT is an integral part of medical surge capacities of affected hospitals in a disaster. They additionally assert the need for each component of the disaster response elements to be in place at the time they are needed. The article also details the need for a fluid approach to disaster response so as not to exacerbate any scarcity of resources such as food and water due to an influx of rescue support (2020). The need for an adequate assessment of need is therefore advised on a case-by-case basis. This ability for precision response is suggested to be attainable through drills and exercises involving external support entities in collaboration with local hospitals and emergency agencies (2020). Shen et al. (2020) clearly urged the minimization of response time of exogenous medical surge support as well as advocating certain triggers that can be pre-identified for greater implementation of a medical surge response.

In Kirsch et al.'s (2022) article entitled "*Opportunities to Strengthen the National Disaster Medical System*," 6 critical themes emerged. Of the 6, the last 3 called for surge capacity, training and exercises, as well as metrics through which to measure performance. The study included 49 participants from NDMS, DHS Federal Emergency Management Agency, DOD, HHS Office of the ASPR, US Department of Transportation, VA, emergency medical services, and private healthcare facilities. The findings in regard to surge capacity revealed that there are inadequacies of specialty care in NDMS and that

enhancements to surge capacity should be a collaborative effort between federal and private sector stakeholders as well as outpatient clinics, rehabilitation and long-term care providers (2022). It was also recommended that a set of metrics be developed to improve NDMS definitive care, assess hospital capacity, and analyze NDMS efficacy (2022).

A 2021 article in the Foundation of the American College of Healthcare Executives described the findings of the Hospital Medical Surge Preparedness Index (HMSPI) tool which assesses a hospital's ability to respond to a medical surge event (Marcozzi et al., 2021). The unique approach of the HMSPI is that it utilizes healthcare data that is especially supplied by data sets such as the Affordable Care Act (ACA). This study validates the need for a dependable index for predicting and preparing for a medical surge event. The conclusion of the study is the call for the advancement medical surge capacity to avoid substantial morbidity and mortality (2021).

The ASPR Strategic Plan for 2020-2023 highlights the plan to advance the capabilities of NDMS to better facilitate the response to regional and national public health emergencies. The plan calls for greater integration with other public health entities within ESF-8 to increase cooperation and collaboration as well as increasing training and exercises geared towards mass casualty events that produce medical surge (2020).

Summary and Conclusions

It is clear that efforts to improve collaboration into the effectual management of a medical surge event have been ongoing for decades and could not be any more important than they are now. With the realization of how quickly hospitals can be over run, such as with the Covid-19 pandemic, it is even more important for the medical community, both

in the private sector and the public sector, to further the discussion of medical surge relief past the point of talking and moving into action. Specifically, NDMS as a critical link between the needs of hospitals and the provision of a response unit such as a DMAT, should be the center of discussion. Hospital staff across this country rose to a monumental occasion during the pandemic and many will never be the same. It is the burden of the entities charged with the relief of medical surge to get this right; and sooner rather than later. This study gleans the feedback from those who are well experienced in the field of medical surge and a DMAT response time. The results of this study provide recommendations for improvement as well as items requiring further discussion and therefore contribute positively to the gaps identified in this study.

Chapter 3: Research Method

The purpose of this Delphi study is to better understand the effect of a DMAT on medical surge involving hospitals affected by a mass casualty incident by utilizing the feedback from subject matter experts to the end of positively affecting current response policies of a DMAT. The information gleaned through the research could have a positive impact on future studies as well as public policy in terms of emergency and disaster management and response priorities. The model chosen of a Policy Delphi will empower the NDMS to develop policies that will enhance and support participating hospital abilities to adequately respond to a medical surge. This chapter will cover the research design, trustworthiness and the collection of data and how it will be treated.

Research Design and Rationale

This research design was a Delphi study as previously stated. Although a Delphi study does not automatically lend itself to external validity, it is useful internally and can be transferrable to like situations rather than being generalizable on a global scale. The discipline of emergency management is one in which a grasp on specificity of preparedness and response actions can never be accomplished fully because the dynamics of disasters and all the variables that enhance or mitigate them are a result of politics, policies, and even external problems. With such variability in the input factors of disaster analysis and response design, the Delphi study was chosen to search for consensus that could positively affect future policies for NDMS.

This choice of design is consistent with the information desired by hospitals affected by disasters to the end of answering the following research question: What effect

does a DMAT have on the medical surge objectives for hospitals affected by a mass casualty incident? As shown in the literature review, hospitals have been seeking ACFs, which increases their capacity above what is normal to maintain standards of care throughout the disaster life cycle. The possibilities of other design selections were vast and could have shown merit. However, the selection of the opinions of those individuals who deal with the need on a regular basis is clearly a sound choice. I anticipate this research to further the cause of medical surge relief not only for those who provide it, but also for those victims of a mass casualty incident.

Role of the Researcher

As the researcher in this study, I was an observer by collecting the anonymous data provided, analyzing it, and coding it correctly. I served with participants of this study from 2004 to 2017 as an intermittent federal employee. Service was dependent on incidents of national significance that would have the real possibility of mass casualties. The invitations were sent anonymously, and all responses have maintained anonymity. I had intermittent regular interaction with participants as a colleague and equal in terms of any hierarchy. The interactive conditions were mostly clinical in nature.

There were occasions of interaction within an instructional environment. These interactions were also as colleagues without hierarchy. There are no known conflicts of interest between the participants and me or ethical challenges with the study. I have no regular interaction with any participant that made the initial invitation list of 23 participants.

Methodology

The e-Delphi survey was emailed to each respondent as a link. Once received, the respondents chose their best answer for each question. The results were tallied inside SurveyMonkey (https://www.surveymonkey.com), where report copies were generated and distributed to each respondent. All data sent to respondents were sent via email utilizing blind copy.

Participant Selection Logic

The population within this study is not applicable in terms of a sample size. The population chosen for the Delphi study were subject matter experts with at least 10 years of experience within NDMS response, NDMS operations, NDMS administration or combinations thereof. The nature of the study was a consensus-building Delphi study. Delphi studies have shown an increased reliability for predictive policy making (Manley, 2013).

The study included tenured personnel who have operated within response and tactical, operations and administration, as well as policy making. The experience levels from the respondents was expected to produce an advanced level of information and insight that can potentially influence policy streams within the government.

Instrumentation

The Delphi study was comprised of 3 rounds of statements surrounding the effect of a DMAT on the relief of medical surge for hospitals affected by a mass casualty incident. The statements encompassed predeployment, deployment, and postdeployment perspectives to establish patterns and themes. Content validity was sought in the study by

having 3 rounds and by seeking consensus from the participants to whom the research pertains.

As mentioned in Chapter 1, the Delphi method was developed by RAND Corporation in the 1950s and has been used successfully to forecast future developments and to assist in affecting policy (von der Gracht, 2012). The study was conducted with tenured personnel from the field of disaster medicine involving practitioners, administrators, and policy makers to the end of achieving consensus around ideas and theories that will solve the research problem stated in this study.

The analysis from the e-Delphi format, where best practice statements were used with each round, eliminated the lowest scored responses until the remaining statements were identified. The e-Delphi method has been used in many disciplines, including Hong et al. (2019) and Pinnok et al. (2017), where each study was to seek increased content validity as well as developing implementation standards respectively.

Procedures for Recruitment, Participation, and Data Collection

The data collection instrument was the e-Delphi method which was anticipated to contribute to the colloquial conversation surrounding the research question. Participants were recruited by email with explanation of the voluntary and confidential nature of their participation.

- The data were collected from the survey sent to participants through SurveyMonkey.
- The data were collected within the SurveyMonkey survey instrument.
- The data were collected within three rounds of surveys.

- Each data collection round was conducted over a 2-week period allowing participants to work the survey into their schedules.
- Data were recorded by analyzing it first by using the SurveyMonkey platform and then I translated the data into a spreadsheet to identify trends while organizing the data into categories of response.
- The initial aim of this study was to achieve consensus surrounding the research question with 20 participants. The follow-up plan in the event of too few participants was to invite more participants than needed in case of attrition. I therefore invited 23 participants.
- Participants exited the study upon completion of the third survey and receiving the feedback from the final survey.
- There were no follow-up requirements for this study.

Data Analysis Plan

The e-Delphi instrument allowed the study to evolve in the following ways:

- The data analyzed 3 phases of response. The predeployment, the deployment, and the postdeployment behaviors which would certainly contribute to a result. It was hypothesized that the survey results could answer the research question posed through this study.
- Once the third round was complete, categories were identified as follows: current practices, information, response, surge, and recommendations. Answers were separated into each category as specified and then analyzed for any crossover characteristics that allowed for further reduction of overall

categories into the most relevant. Each of these categories were color-coded for ease of recognition. Once the process was complete, each set of questions within each category were further subdivided into predeployment, deployment, and postdeployment categories. This allowed for the differentiation in the expected data.

- There was no software used for this analysis.
- There were no discrepant cases noticed. Once complete, the data was separated into those answers where a consensus was met at the 70% or higher rate, and those answers where it was not met.

Issues of Trustworthiness

Credibility

The credibility of this research was grounded in the Delphi design. While the Delphi technique limits generalized acceptability of the data, it is very influential within the organization from which the participants are chosen. To ensure an added layer of credibility, some questions were asked redundantly between rounds. Additionally, a level of theory triangulation is expected to have been achieved by asking the same question from different perspectives or by wording the question differently.

Transferability

Transferability is expected to have been achieved albeit in a limited scope. The data within this research and its conclusions can be used by DMAT teams and hospitals alike. Thick description strategies were used in structuring the questions and statements to include, but not limited to, predeployment, deployment, and postdeployment activities.

These entities would naturally benefit the most from the research as they are directly impacted by the policy level regarding medical surge relief. Other entities such as state and local emergency management agencies could also derive value from the research.

Dependability

The dependability of this research is in the quality of the questions. I have intimate knowledge of NDMS operations having served on multiple deployments in the role of paramedic as well as in the role of management. Additionally, I aided in the development of the NDMS Fundamentals program that is referenced in this study. The e-Delphi method chosen for this study also is an appropriate fit for the emergency management community because the needs of various communities are unique and should therefore invoke the input of a panel.

Confirmability

The confirmability of the research data within this study was based on the design of the study by taking the bias of the researcher out of the answers. I derived the original questions from personal experiences that were limited to NDMS objectivity and therefore could ensure reflexivity. Further inclusion of questions and development of additional questions was left to the subjectivity of the participants. The participants decided what conclusions were confirmed and were worthy of consensus.

Ethical Procedures

Each participant received an invitation letter with the following sections. An introduction to the study, the background information leading to the study, procedures to

be followed in regard to the e-Delphi methodology, time commitment, and the voluntary nature of the study. The steps taken to preserve ethical continuity are as follows:

- Walden University's Institutional Review Board (IRB) approval number for this study is 02-16-22-0496213 and it expired on February 15, 2023.
- Ethical considerations that could have come into play in this study could be any biases that I may have towards any specific desired outcomes. The questions were therefore carefully crafted to ask for the participants' subjective feedback.
    - The ethical considerations of this study have been satisfied by the Walden University IRB, and I have conformed the study to these considerations.

I communicated the risks and benefits of participating in the study as follows: Being in this study could involve some risk of the minor discomforts that can be encountered in daily life, such as time involvement and after-hours computer time. With the protections in place, this study would pose minimal risk to your wellbeing. Protections include maintaining confidentiality of participant identification, storage of data on an external hard drive, and destruction of data after 5 years. The research method will be password protected for each participant. This study offers no direct benefits to individual volunteers. The aim of this study is to benefit society by the production of NDMS quality improvement to medical surge missions involving hospitals affected by a mass casualty incident. It will also benefit society by bringing a higher level of awareness to DMAT.

Additionally, the consent letter ensured the privacy of the participants and closed with contact information of the researcher as well as the Walden Research Participant Advocate. The study should be scrutinized by the academic community to identify any conflicts of interest.

Summary

The research of the past decade clearly indicates that effective medical surge management remains a need for hospitals affected by a mass casualty incident. Practitioners and providers alike have assembled in conventions, workshops, and cohorts to collaborate on potential solutions to the medical surge management problem. A wide array of possibilities have been presented over the years to mitigate the pressure that a medical surge event imposes upon medical care facilities.

Medical surge metrics have been produced from DeBoer and Debacker (2006) to Bayram and Zuabi (2012) to Mao et al. (2020) and all with credible solutions towards providing a systematic approach to predicting and managing a medical surge event. Options for an ACF have been explored by many practitioners in emergency management as well as those who are colloquial contributors in academia. All of which have validated the hurdle of the extended response time of DMAT teams.

The purpose of this study was to align the problem of the effect that the response time of a DMAT has on the medical surge objectives of hospitals affected by a mass casualty incident with the politics stream of influence. Once buy-in is obtained at the politics level, perhaps recommendations can emerge that will positively affect the outcomes of medical surge events. It is hoped that the findings of this study can bridge

the gap that has existed for the past decade and create a pathway to higher levels of collaboration between NDMS and the state and local entities among which hospitals affected by a medical surge can benefit.

Chapter 4: Results

The purpose of this Delphi study is to better understand the effect a DMAT has on the relief of medical surge for hospitals affected by a mass casualty incident. This chapter details the data collection, methodology, the setting, demographics and results. There are no independent and dependent variables in this study due to its design and nature. The Delphi method invokes the feedback of subject matter experts through a series of questions whereby they arrive at a consensus. The research question and hypotheses for the study were as follows:

- RQ: What effect does a DMAT have on the medical surge objectives for hospitals affected by a mass casualty incident?

Research Setting

The research setting allowed each respondent to take the survey at their own pace at a time convenient for them. Because it was an e-Delphi study, the respondents were able to prioritize each day with essential tasks. The e-Delphi survey is emailed to each respondent as a link. Once received, the respondents would simply choose their best answer for each question. The results were tallied inside SurveyMonkey where report copies could be generated and distributed to each respondent. All data sent to respondents was sent via email utilizing blind copy.

Due to the nature of the e-Delphi, respondents would not be expected to be exposed to normal distractions that could be associated with normal working conditions. That being said, these respondents are intermittent federal employees of the DHHS under the NDMS and they are typically rostered for events of national significance such as

hurricanes and the Covid pandemic. There is always the possibility that one or more of the respondents could have been engaged in briefings involving readiness of their respective teams, as well as the possibility that some of their team members could have been on various deployments for Covid-related issues within the healthcare system. Any of these possibilities could have brought the urgency of some of the issues discussed in the survey to the surface.

Demographics

The demographics chosen for this study were simple in nature. Respondents must have had at least 10 years of experience within NDMS. This could be in any capacity that was engaged in DMAT operations where a DMAT was deployed. Areas of service include, but are not limited to, headquarters staff, intermittent employees involved in responses as well as those responsible for logistics and coordination efforts. Over the span of 10 years, at any given decade since a DMAT has existed, there have been missions involving hospitals experiencing a medical surge for which a DMAT has been dispatched to assist.

By choosing respondents with at least 10 years of experience, this study was able to leverage the experiences of participants involving Super Storm Sandy in 2012, Hurricane Maria that decimated Puerto Rico in 2017, Hurricanes Florence and Michael in 2018, and of course the Covid pandemic that began in 2020. These are some of the most notable events and yet DMATs are deployed to National Special Security Events as well as floods which could cripple infrastructures. Flooding events that preclude access to

hospitals can easily become a mission assignment for a DMAT which would serve to be a resource in a patient reception area.

The patient reception area is a geographic locale containing one or more airfields, ports, terminals, or patient staging facilities with local patient transport assets to support patient reception and transport to the NDMS Partner Facility capable of providing definitive care for victims of a public health emergency or military contingency located within a 75-mile radius of the treatment facility (NDMS, 2018). The respondents are typically rostered and deployed for any of the events mentioned here and are expected to maintain training and development of their respective teams. These criteria make the respondents a special community of experienced personnel.

Data Collection

This study involved 23 participants who had a minimum of 10 years of experience within the NDMS. The evolution of involvement in NDMS operations includes a DMAT being on-call certain months out of the year to respond to events of national significance. Quite often each year, DMATs would expect to be deployed to a location impacted by a hurricane. Hurricanes could produce strong storm surges and destructive winds that could easily compromise local infrastructure to include hospitals and other healthcare facilities.

It would not be out of the question for a DMAT to be involved in an evacuation wherein they would function as a patient reception area, receiving and maintaining continuity of care until the evacuees could be placed in a receiving facility (NDMS Patient Movement Program, n.d.). DMAT leadership has the responsibility of team readiness, and therefore it is normal that teams will conduct some team training on

certain issues they could expect to encounter on a deployment. NDMS has provided training from time to time both consistently and sporadically depending on budgetary constraints, Covid-19, and contractual issues.

In 2013, NDMS established an "NDMS Fundamentals" course where teams were rotated through allowing 50 students at a time to participate (NDMS, n.d.). The fundamentals course also has suffered from the issues of sporadic training. DMAT teams are continually engaged in readiness either by active deployment or by training provided by NDMS or through self-training. The selection process therefore of 10 years of experience took all these factors into consideration.

Participants were invited via email to participate on a purely voluntary basis in an e-Delphi. The e-Delphi included 3 rounds of questions that would survey consensus on predeployment, deployment and postdeployment issues surrounding medical surge missions. Each round was delivered via email and approximately 2 weeks were allowed to complete, except for Round 3 wherein 3 weeks were allowed for completion. Upon completion of each round, the results were analyzed and distributed to each participant for a one-week review prior to the next round.

Of the 23 participants, 2 responded in Rounds 1 and 2 with 19 responding in round three. The invited participants' experience ranged from administration to logistics to operations and training to achieve the best possible sample representation. In each round, a 70% consensus was sought. Questions and statements were separated into predeployment, deployment, and postdeployment categories. Round 1 included 43 questions/statements that participants could choose one of a range of answers.

Of the 43 items, five were informational gathering as to the individual's experience with hours of training and the perceived effectiveness of a DMAT in relieving a medical surge. The remaining 38 questions were formatted as *strongly agree*, *agree*, *neither agree or disagree*, *disagree*, and *strongly disagree*. The value of the "strongly" answers could only assume a higher intensity of the answer chosen, whether agreeing or disagreeing. Essentially, for the purpose of this study, the "agree" and "strongly agree" answers were coupled together. The "disagree" and "strongly disagree" answers were also coupled together.

The "neither agree nor disagree" answers were concluded to be topics for further discussion. Consensus in each category was determined upon reaching 70% agreement in any of the 3 final categories. Additionally, if there was a shift of at least 10 percentage points towards consensus between rounds, even if consensus was not achieved, it was noted that there could be value in discussing further.

Data Analysis

Initially, results gleaned from the survey were displayed in percentages and bar graphs as a quick reference. The data were further divided by assigning a qualitative category for each set of questions/statements. Five categories were identified as follows: current practices, information, response, surge, and recommendations. Each of these was color-coded for ease of recognition. Once the process was complete, each set of questions within each category were further subdivided into predeployment, deployment and postdeployment categories.

The graduation of the quality of the questions and/or statements from the first survey to the last was that of a concentration towards response and those items related to the problem statement. The Round 1 survey was fairly even with 16 of 43 questions focused on predeployment activity. Fourteen questions were focused on deployment and response, whereas the postdeployment section received 13 questions. The goal of this research was to focus on the effect a DMAT has on the relief of medical surge for hospitals affected by a mass casualty incident, therefore the focus of the remaining rounds shifted towards the research problem and questions. This resulted in 23 of 30 questions from Round 2 concentrating on response while Round 3 resulted in 16 of 21 questions concentrating on response. This also equated to approximately 76% focus on response to a medical surge incident for Rounds 2 and 3.

As mentioned in the previous section, it was noted which questions achieved consensus and which ones did not. Of particular interest are the questions that were recommendations of the group, as well as those questions that will require more conversation.

Evidence of Trustworthiness

Credibility

Some questions were systematically asked redundantly between rounds. Additionally, a level of theory triangulation was achieved by asking the same question from different perspectives or by wording the question differently. The strategy of triangulation was implemented by asking a question and/or making a statement in more than one way over the course of several questions/statements.

Transferability

Transferability of the principles is limited to NDMS and DMATs involved in a medical surge mission. Additionally, NDMS participating hospitals could also benefit from the participant consensus since the subject matter is relatable to all medical communities involved. Additional entities such as the HPP, DHHS, ASPR, and FEMA could also derive great value from the study as they correspond with states through the RECs. Thick description strategies were used through the modulation of the questions/statements through the predeployment, deployment and postdeployment phases.

Dependability

The dependability of the research is grounded in the researcher's personal knowledge of DMAT operations and NDMS functionality. Additionally, the references of years of NDMS response coupled with contemporary examples, to include Covid responses, adds a critical layer of trustworthiness to the results of the Delphi. The participants within this study have extensive knowledge of DMAT operations as well as NDMS operations at the Secretary's Operations Center level. Participant insight provides rich qualitative material to further the medical surge discussion. The e-Delphi chosen is a well-used method for the consideration of policy implementation and therefore it served this study prudently.

Confirmability

The confirmability of this study is strong secondary to the subject matter being exclusive to NDMS and associated DMATs and the fact that NDMS and DMAT

personnel are the participants that are not only expressing consensus with the subject matter but also making recommendations for policy consideration. Reflexivity was implemented through the maintenance of objectivity throughout the question/statement structures.

Study Results

The research question below is addressed through the Delphi study due to the subjective nature of research design. The participants have had extensive experience in all components of NDMS operations to include DMATs.

- RQ - What effect does a DMAT have on the medical surge objectives for hospitals affected by a mass casualty incident?

The research involved three rounds of questions for the Delphi study. Round 1 served to lay the initial groundwork for what kind of consensus the participants would be able to arrive at. Statements and questions from predeployment, deployment and postdeployment aspects of response were used in the 43 questions of Round 1. Seven questions were simply for information gathering, whereas 13 of the 43 questions were centered around current practices. Only 2 questions were geared towards the response aspect alone with the remaining questions and statements being in the recommendations category.

If a question or statement achieved a consensus of 70%, then it was considered as having achieved consensus. If consensus was not reached, the question/statement was considered to require more conversation. Any item that in a subsequent survey shifted more than 10%, a note was made that potentially it could be revisited in future

conversations even though it did not obtain the required 70% consensus. The recommendation category in all 3 surveys was the only category to have an almost 100% consensus across-the-board. The specific statements and questions that the participants were not willing to come to consensus on were those of CDC Expectations that 50% of casualties would arrive in the first hour and the remaining 50% within the first 8 hours.

The question was designed to ask the participant if this parameter was a determinant alone as to whether or not a medical surge mission would exist outside of those first 8 hours. Additionally, the participants were not willing to come to consensus as to the value of a strike team/strike force in comparison to a full DMAT.

Survey 1

I will now discuss the findings of each statement or question and each survey beginning with Survey 1. I will begin with the predeployment section, and I will follow the questions chronologically. Note that questions or statements that could be significant are given an asterisk for special attention. Also, note that items that did not achieve consensus are listed in bold font.

1. Consensus was achieved for question number 1 which states that a DMAT is effective in relieving medical surge in a mass casualty incident.
2. Consensus was reached for question 2 which states medical surge predeployment training is an effective training topic.
3. **Consensus was not achieved with the statement that current predeployment training includes relieving medical surge**.

4. *This question was basically for information asking the participants how many hours per year are dedicated to medical surge training. It is noteworthy that nearly 43% state they received less than 1 hour of medical surge training per year 19% state 1 to 3 hours and 14.29% state 3 to 5 hours.
5. *This was an information gathering question which asked how many hours of predeployment training per year on medical surge is voluntarily initiated. 14% stated less than 1 hour, 28.5% stated 1 to 3 hours, and 23% stated 3 to 5 hours.
6. *This question was very similar which asked how many hours of medical surge training is provided by NDMS specifically. The results were as follows: 66.67% stated less than one hour and 28.57% stated 1 to 3 hours.
7. *Also, for information purposes, this question asked participants in the past 5 years how many times they have participated in predeployment training specific to medical surge relief. 23.81% stated less than 1 time.
8. **No consensus was reached as to whether or not DMAT teams should be individually responsible for medical surge mission training**.
9. Consensus was achieved in this question which was a recommendation that every command staff and general staff element be included in medical surge relief training.
10. Consensus was achieved in this question which stated that hospital personnel should be included in medical surge relief training for real time feedback.
11. Consensus was achieved in that NDMS sponsored predeployment training for medical surge relief is effective and should be employed.

12. Consensus was achieved in that NDMS sponsored predeployment training for medical surge relief should include every command and general staff element.
13. **Consensus was not achieved stating that medical surge predeployment training currently involves hospital incident command staff personnel.**
14. Achievement of consensus was reached stating that pre assignment briefings do include medical surge mission information.
15. **Consensus was not achieved which stated criteria for medical surge mission recognition is adequately defined**.
16. Participants achieved consensus in stating that medical surge metric studies are not included in predeployment training.
17. As a recommendation that predeployment training should include medical surge, the participants did reach consensus.
18. Participants also reached consensus on this item which stated predeployment training should involve hospitals.
19. Consensus was achieved on the notion that medical surge metrics should be used in predeployment training.
20. **Consensus was not achieved on this item which stated the response time of a DMAT is adequately conducive for medical surge relief in hospitals affected by a mass casualty incident.**
21. ***Consensus was not achieved stating that medical surge missions involving NDMS have historically been requested by the affected hospital.**

22. **Consensus wasn't achieved that identification of a medical surge event is typically accomplished within the first 8 hours of an incident.**
23. Consensus was achieved that identification of a medical surge mission is typically accomplished within the first 24 hours of an incident.
24. **Consensus wasn't achieved that identification of a medical surge event is typically accomplished within the first 48 hours of an incident.**
25. **Consensus wasn't achieved that identification of a medical surge event is typically accomplished within the first 72 hours of an incident.**
26. Consensus was achieved stating that an NDMS base of operations is typically set up within 8 hours of arrival to a hospital experiencing a medical surge requiring a DMAT.
27. **Consensus was not achieved stating that an NDMS base of operations is typically set up within 24 hours of arrival to a hospital experiencing a medical surge requiring a DMAT**.
28. **Consensus was not achieved stating that an NDMS base of operations is typically set up within 48 hours of arrival to a hospital experiencing a medical surge requiring a DMAT.**
29. **Consensus was not achieved stating that an NDMS base of operations is typically set up within 72 hours of arrival to a hospital experiencing a medical surge requiring a DMAT.**
30. *This question asked what effect does a disaster medical assistance team have on the relief of medical surge for hospitals affected by a mass casualty

incident. The participants reached consensus that it has a positive effect. There is further discussion that should be initiated relevant to question number 20 where they did not reach consensus that the response time of a DMAT is conducive for medical surge relief in hospitals. This appears to be an incongruency, however it could be argued that they are speaking purely in terms of their personal experiences.

31. This item achieved consensus which stated that indicators and triggers should be utilized in determining if a medical surge exists at a hospital.
32. This item achieved consensus stating that a DMAT is an effective alternate care facility.
33. **This item did not achieve consensus that a DMAT as an alternate care facility should be set up to serve the hospital within. It could be argued that this question/statement was not worded in a fashion that provided clarity.**
34. This item achieved consensus which stated that lessons learned from medical surge missions should be included in postdeployment debriefings.
35. This item achieved consensus which stated that lessons learned from medical surge missions should be reflected in training and exercises.
36. This item achieved consensus which stated that NDMS operations best practices should be shared between teams.

37. This item achieved consensus which stated that training and exercises should be built from the lessons learned and the corrective actions of missions from the previous year.
38. This item achieved consensus which stated that NDMS should have a specific committee responsible for ensuring training initiatives are current and relevant.
39. This item achieved consensus which stated that NDMS teams should be tasked with the improvement plan and corrective actions of their own team specific lessons learned.
40. This item achieved consensus which stated that previous NDMS published research should be included in the development and quality control of current NDMS operations.
41. This item achieved consensus which stated that NDMS medical surge mission planning should include NDMS participating hospitals.
42. This item achieved consensus which stated that NDMS medical surge mission planning should include the Incident Management Team (IMT).
43. This item achieved consensus which stated that NDMS medical surge mission planning should include the Disaster Mortuary Operational Response Team (DMORT).

Survey 2

I will now discuss the findings of each statement or question continuing with Survey 2. I will begin with the predeployment section, and I will follow the questions

chronologically. Note that questions or statements that could be significant are given an asterisk for special attention. Also, note that items that did not achieve consensus are listed in bold font.

Survey 2 consisted of 30 questions, some of which were from Survey 1 to establish reliability and validity as well as transferability. The items within Survey 2 were also categorized by predeployment, deployment, and postdeployment activities.

1. This item achieved consensus which stated current predeployment training should include relieving medical surge.
2. ***To test the validity of question number 8 on survey 1, this item again suggested that each NDMS team should be individually responsible for medical surge mission training. Not only were the results the same in terms of requiring more discussion, but there was a movement towards greater consensus, however 70% was not achieved.**
3. This item aligned with question 5 of survey 1 which recommended that the criteria for medical surge mission recognition should be adequately defined. Consensus was achieved.
4. *This item asked participants how many hours of predeployment training per year on medical surge should be provided and just under 50% of the respondents answered 3 to 5 hours. In 2nd place, 23% of the respondents said 5 to 7 hours.
5. *This item asked participants the following: In the past 5 years, how many times have you participated in predeployment training specific to medical

surge relief? 47% stated less than 1 time and 42% stated 1 to 3 times in the past 5 years.

6. *This item received consensus by stating that NDMS sponsored postdeployment training for medical surge relief activities should involve hospital incident command staff personnel.
7. This item received consensus by stating that medical surge metric studies should be included in predeployment training.
8. This item received full consensus by stating medical surge metrics should be utilized when determining the need for a medical surge mission.
9. This item received full consensus by stating medical surge metrics should be used to determine completion of a medical surge mission.
10. **This item did not achieve consensus which states the following: the CDC states that 50% of casualties arrive at the hospital in the first hour following the incident with remaining arriving over the next 8 hours therefore the expectation of a medical surge mission should be identified within the first hour.**
11. This item achieved consensus by stating that a DMAT with a full cache acting as an alternate care facility best serves a hospital who is experiencing a medical surge by arriving within the first 24 hours of the incident.
12. *This item achieved consensus by stating that a DMAT may not be in place in time to adequately relieve a medical surge in a hospital given the CDC

expectations that a medical surge reaches capacity within the first 8 hours of an incident. *See question 30 on survey 1*.

13. **This item did not receive consensus which states that a DMAT with a full base of operation set up best serves a medical surge mission.**
14. **This item did not receive consensus which stated that in a medical surge mission, a DMAT should only deploy those personnel who fit the position shortages in that hospital.**
15. **This item did not receive consensus which stated the response time of a DMAT strike team/strike force is faster than a full DMAT with a cache.**
16. This item achieved consensus by disagreeing that the response time of a full DMAT with a cache is faster than a DMAT strike team/strike force.
17. **This item did not gain consensus which stated the response time of a full DMAT with a cache is adequate for a medical surge mission that is a non-pandemic response.**
18. **This item did not receive consensus which stated the response time of a DMAT strike team/strike force is adequate for a medical surge mission that is a non-pandemic response.**
19. This item achieved consensus which stated that in an event of significance such as a major hurricane, a needs assessment team should be dispatched to the affected area to determine specific DMAT requirements.
20. **This item did not receive consensus which said a DMAT is better utilized in a medical surge event as an alternate care facility.**

21. **This item did not receive consensus which stated a DMAT is better utilized in a medical surge event to provide staff support inside the hospital.**
22. This item achieved consensus which stated a DMAT is effective both inside the hospital and as an alternate care facility.
23. This item achieved consensus which stated a full DMAT should be proactively dispatched to a disaster affected area to ensure a quick response time in the event that a medical surge event unfolds.
24. **This item did not achieve consensus which stated the effectiveness of a DMAT for a non-pandemic medical surge response depends largely on its response time.**
25. **This item did not achieve consensus which says a non-pandemic medical surge event is better suited for a DMAT strike team/strike force.**
26. **This item did not receive consensus which stated a non-pandemic medical surge event is better suited for a full DMAT with an equipment cache.**
27. This item received consensus which stated length of mission should be determined by the utilization of medical surge metrics.
28. **This item did not receive consensus which said that medical surge metrics are better utilized in the predeployment phase.**
29. This item achieved consensus which stated medical surge metrics should be utilized to ascertain medical search deployment effectiveness.

30. **This item did not receive consensus which stated it is reasonable to expect a non-pandemic medical surge event to dissipate before the 72-hour expected federal response.**

Survey 3

I will now discuss the findings of Survey 3. I will begin with the predeployment section, and I will follow the questions chronologically. Note that questions or statements that could be significant are given an asterisk for special attention. Also, note that items that did not achieve consensus are listed in bold font.

Survey 3 consisted of 21 questions, some of which were from Surveys 1 and 2 to establish reliability and validity as well as transferability. The items within Survey 3 were also categorized by predeployment, deployment, and postdeployment activities.

1. This item achieved consensus which stated predeployment drills for medical surge relief should involve hospital incident command staff personnel.
2. **This item did not achieve consensus which says the CDC states that 50% of casualties arrive at the hospital in the first hour, therefore the expectation of a medical surge mission should be identified within the first hour.**
3. **This item did not achieve consensus which stated a medical surge mission should be a full DMAT mission with a full base of operations set up.**
4. ***This item did not achieve consensus which stated a medical search mission should be a needs-based mission, deploying only those personnel who fit the position shortages. It should be noted that the same question**

in Survey 2 received a 37% agreement rating and the same question in the third survey achieved 63% agreement rating. It still did not achieve the desired 70% consensus, however this item does show that it should receive further discussion.

5. **This item did not receive consensus which stated the response time of a strike team/strike force is faster than a full DMAT.**
6. This item achieved consensus which stated the response time of a full DMAT with a full cache is faster than a DMAT strike team/strike force. The consensus was that they disagreed with this statement.
7. **This item did not achieve consensus which stated the response time of a full DMAT is adequate for a medical surge mission.**
8. **This item did not achieve consensus which stated the response time of a strike team/strike force is adequate for a medical surge mission.**
9. **This item did not achieve consensus which stated a DMAT is best utilized in a medical surge event as an alternate care facility.**
10. *This item achieved consensus which stated the effectiveness of a DMAT in relieving medical surge response depends largely on its response time.
11. **This item did not achieve consensus which stated a strike team/strike force can adequately relieve a medical search.**
12. **This item did not achieve consensus which stated a medical surge event is better suited for a full DMAT.**

13. This item did achieve consensus which stated medical surge metrics should be utilized in all phases of deployment.
14. **This item did not achieve consensus which stated it is reasonable to expect a medical surge event to begin dissipating before the expected 72 hour federal response.**
15. This item achieved consensus which stated medical surge mission training should be a priority.
16. This item achieved consensus which stated criteria for a medical surge mission should be adequately defined.
17. This item achieved consensus which stated medical surge metric studies should be included in predeployment training.
18. This item did not achieve consensus which stated the response time of a DMAT is adequate for a medical surge mission.
19. This item achieved consensus which stated identification of a medical surge mission should be accomplished within the first 8 hours of an incident.
20. *This item achieved consensus which stated a DMAT as an alternate care facility should be set up to serve the hospital within.
21. This item achieved consensus which stated training and exercises should reflect lessons learned about medical surge missions.

Table 1

Predeployment With Consensus Round 1

	Round 1 (*n* = 21)	Round 2 (*n* = 21)		Round 3 (*n* = 19)	
Medical surge missions…	Agree % Disagree %	Agree %	Disagree	Agree %	Disagree %
1. Studies are included in training 1.16	5% 76%				
2. Info included in staging 1.14	91% 0%				
3. Is an effective training topic 1.2	95% 0%				
4. *Training should include all-ICS positions 1.9 & 1.12	86% 10%				
	81% 0%				
				95%	5%

5.	*Training should include hospital personnel for real-time feedback 1.10	100%	5%	76%	84%	0%
		0%				
				94%	89%	0%
		86%	0%			
		0%				
6.	*Should be included in training 1.17			86%		
		86%	0%			
		0%				
7.	*Training should include metrics 1.19					
8.	Training should include hospitals 1.18	76%				
		5%				
9.	*Training is effective and should be employed 1.11	86%		86%	89%	0%
		0%	0%			

Note. Neither agree nor disagree is not reflected in the table. This table reflects the flow of certain questions through all three rounds. * Denotes multiple entries of this question for increased reliability.

Table 2

Deployment With Consensus Round 1

Consensus Responses	Round 1 (n = 21)	Round 2 (n = 21)		Round 3 (n = 19)	
Medical surge missions…	Agree % Disagree %	Agree %	Disagree	Agree %	Disagree %
1. Can expect a DMAT to set up a Base of Operations in 8 hours 1.26	95% 0%				
2. *Should utilize indicators and triggers 1.31	100% 0%				
3. *Can effectively use a DMAT as an ACF 1.32	90% 5%				

Note. Neither agree nor disagree is not reflected in the table. * Denotes multiple entries of this question for increased reliability.

Table 3

Postdeployment With Consensus Round 1

Consensus Responses	Round 1 (*n* = 21)	Round 2 (*n* = 21)		Round 3 (*n* = 19)	
Medical surge missions…	Agree % Disagree %	Agree %	Disagree	Agree %	Disagree %
1. Lessons learned should be a part of postdeployment debriefing 1.34	100% 0%				
2. *Training and exercises should reflect lessons learned 1.35	100% 0%				
3. Best practices should be shared between teams 1.36	100% 0%				

4. *Improvement plans and corrective actions should be used to build training and exercises 1.37 — 95% / 0% / 100%
5. Training initiatives should be current and relevant and led by a specific committee 1.38 — 0% / 90% / 0%
6. Corrective actions should be the responsibility of each individual team 1.39 — 95% / 0%

7.	Previous research should be included in the development and QC of NDMS operations 1.40	95%	0%
8.	Planning should include NDMS participating hospitals 1.41	90%	5%
9.	Planning should include the IMT 1.42	90%	
10.	Planning should include DMORT 1.43		

Note. Neither agree nor disagree is not reflected in the table. * Denotes multiple entries of this question for increased reliability.

Table 4

Predeployment With Consensus Round 2

Consensus Responses	Round 1 (n = 21)	Round 2 (n = 21)		Round 3 (n = 19)	
Medical surge missions…	Agree % Disagree %	Agree %	Disagree %	Agree %	Disagree %
1. *Recognition criteria should be adequately defined 2.3		95 % 0%		94% 6%	
2. *Training should involve hospital incident command staff (HICS) personnel 2.6		76% 24%		95% 5%	

3.	*Should be included in postdeployment training 2.1	95 % 5%	84% 0%	
4.	*Metric studies should be included in postdeployment training 2.7	76% 0%	90% 0%	

Note. Neither agree nor disagree is not reflected in the table. This table reflects the flow of certain questions through all three rounds.* Denotes multiple entries of this question for increased reliability.

Table 5

Deployment With Consensus Round 2

Consensus Responses	Round 1 (n = 21)	Round 2 (n = 21)		Round 3 (n = 19)	
Medical surge missions…	Agree % Disagree %	Agree %	Disagree	Agree %	Disagree %
1. *Metrics should be utilized to determine mission completion 2.9		100 % 0%			
2. *Metrics should be utilized to ascertain medical surge deployment effectiveness 2.29		90% 5%			

3.	*Metrics should determine length of mission 2.27	90 % 5%	86%	95% 0% 79%
4.	*Effectiveness is best achieved when a DMAT arrives within the first 24 hours 2.11	5% 81%	0%	21% 79% 0%
5.	*Response times are better suited by a DMAT versus a strike team 2.16	10%	76%	
6.	Are best served by a DMAT that is pre-emptively dispatched 2.23	0%	95%	

7.	*Metrics should be used when identifying a medical surge mission 2.8	100%	0%
8.	Are effectively served by a DMAT both inside the hospital and outside 2.22	85%	10%
9.	May not be adequately relieved by a DMAT due to an extended response time 2.12		

Note. Neither agree nor disagree is not reflected in the table. This table reflects the flow of certain questions through multiple rounds. * Denotes multiple entries of this question for increased reliability.

Table 6

Round 3 Predeployment, Deployment, and Postdeployment Responses With Consensus

Consensus Responses		Round 1 (n = 21)		Round 2 (n = 21)		Round 3 (n = 19)	
Medical surge missions…		Agree %	Disagree %	Agree %	Disagree %	Agree %	Disagree %
1.	*Metrics should be utilized in all phases of deployment 3.13					95 %	0%
2.	*Identification should be achieved in the first 8 hours. 3.19					78%	11%
3.	*Response time of a DMAT is faster than a Strike Team. 3.6					0%	79%
4.	*Response effectiveness of a DMAT largely depends upon its response time. 3.10					79%	21%
5.	*Are best served by a DMAT functioning within the hospital 3.20					100%	0%
6.	*Training should reflect lessons learned 3.21					100%	0%

Note. Neither agree nor disagree is not reflected in the table. * Denotes multiple entries of this question for increased reliability.

Table 7

Round 1, 2, and 3 Information Questions

Consensus Responses		
Information gathering questions	Top 2 answers	
1. How many hours per year are dedicated to medical surge relief in predeployment training?1.4	43 % 19%	<1 hour 1-3 hours
2. How many hours of predeployment training per year in medical surge is voluntarily initiated 1.5	29% 24%	1-3 hours 3-5 hours
3. How many hours of postdeployment training per year in medical surge is provided? 1.6	67 % 29%	<1 hour 1-3 hours
4. *In the past 5 years, how many times have you participated in postdeployment training specific to medical surge relief? 1.7	33 % 24% 67%	1-3 times 3-5 times Very positive
5. What effect does a Disaster Medical Assistance Team (DMAT) have on the relief of medical surge for hospitals affected by a mass casualty incident?1.30	29%	Positive

Summary

The results of the research have revealed a pattern of consensus. The participants have shown that medical surge is an important issue in mass casualty incidents. Consensus was found that postdeployment training should include medical surge mission training. While there are still discussions to be had concerning the best format for a DMAT response to a medical surge event, there was good consensus that the expertise of DMAT responders could have a positive effect on mission outcomes.

The research literature showed that medical surge response is still a critical need that has not been adequately remedied for decades. The utilization of a DMAT as a medical surge resource is recognized as a beneficial element of medical surge response. All associated elements of healthcare delivery for a mass casualty incident were also found to be a critical element of medical surge relief by the participants. There was also consensus that metrics should be used in determining medical surge existence, efficacy of the response, and to determine when the surge is over.

Additionally, consensus exists that the response time of a DMAT is not adequate, that DMAT teams should be proactively deployed to reduce response times, and that there has been as little as 1 hour of medical surge training per year, to a few hours for some teams. Though the participants of this research produced useful feedback that could certainly affect NDMS response policy in a positive way, the research in and of itself is limited and should be scrutinized for validity, reliability, and transferability. The following chapter includes recommendations for further research.

Chapter 5: Discussion, Conclusions, and Recommendations

The purpose of this qualitative study is to better understand the effect of the DMAT response time on medical surge objectives of hospitals affected by a mass casualty incident. This study utilized a Delphi study. The Delphi method has been utilized successfully to forecast future developments and to assist in affecting policy (von der Gracht, 2012). The study involved 3 rounds of questions which looked for consensus building around the questions. The results of this research show a similar pattern to past and contemporary studies involving medical surge mission response. The participants corroborated the findings of past research as well as the suggestions of current peer-reviewed papers that suggest medical surge matrices can assist with response. As the literature in this research suggests, medical surge missions continue to be a challenge for emergency managers, response agencies, hospitals and policy makers.

Interpretation of Findings

The time constraints of moving personnel and equipment are still a challenge today as they were 20 years ago. There appears to be a continual mismatch between the care phases specified by Aitkin and Leggat (2012) with the response time of a DMAT. The burden of a mass casualty response still appears to be upon the shoulders of affected hospitals today as it was with Stewart's (2013) thesis, which highlighted the insufficiencies of existing federal medical surge protocols and the hospitals' collective search for an alternate care option.

Current research that calls for improvements to medical surge metrics and the intentional use of medical surge training and exercises such as Shen et al. (2020),

Marcozzi et al. (2021), and Kirsch et al. (2022) were validated by the recommendations of the participants of this study who also communicated the need.

A good consensus from this group was found around the idea that medical surge relief is a priority topic for policy makers at the NDMS level and that the results of studies in existence be used to modify and enhance existing medical surge mission response protocols. Although not every idea presented in this study achieved consensus, the responses to these ideas did indicate that a need for further discussion on those topics exists. Peripheral findings such as these can be used to improve NDMS policy simply by its recognition and inclusion into conversations surrounding medical surge capacity and a DMATs capacity to meet the need adequately given the current training, response, and after-action practices.

When considering the existing research involving the stand-alone issue of medical surge capacity, one can easily see that there are multiple facets to the issue and how it should be addressed. The collective literature surrounding medical surge seems to indicate that every mass casualty incident will bring this problem to affected hospitals. It is apparent that there will always be a need for an ACF to assist in the decompression of hospitals affected by the medical surge. In the absence of an ACF, the hospitals are left to contend for themselves by reallocating unused areas of the hospital, if that exists, or by seeking to partner with other hospitals through coalitions. The 72-hour window appears to remain a valid concern for hospitals and it still could be possible that the greatest need for medical surge relief could lie within that 72-hour window.

As long as these issues have persisted over the past few decades, it is incumbent upon the policy makers and response entities to collaborate on a plan of action that takes into account the recommendations of past and current research. The existing literature referenced in this research can still be useful in assisting local hospitals with ideas and resources to promote sustainability during a medical surge event because with the expected response time of a DMAT being in the range of 72 hours, hospitals will need a plan and will be able to rely on some of the posted literature.

The policy level of NDMS has been provided reliable and valid data for their internal consideration by the participants of this study. The collective recommendations for policy implementation are a solid reflection of beneficial actions and initiatives NDMS can utilize to consider its approach to medical surge needs for hospitals affected by a mass casualty incident. By involving the hospitals in the discussion, NDMS will be able to capitalize on the perspectives of those who are at ground zero of the event.

Limitations of the Study

Limitations would include my bias as the researcher who developed the questions. My experience level is limited in scope, so the questions and statements proposed would reflect that experience. Additional limitations included the bias of the participants as well as how they interpreted the questions. The questions within the model also are limited in their scope in that they only cover certain aspects of predeployment, deployment, and postdeployment content. There are also limitations to the validity of the research as the scenario would only include those NDMS-participating hospitals that are located in an

impact zone and would also include DMATs which are only one aspect of the total response entity.

The content validity was substantiated through participation and the level of engagement. The research is internally reliable because it utilized participants who have been involved in the response process. It is externally reliable because it has application to those NDMS participating hospitals and the communities of which they serve. Additional limitations include but are not limited to the many different assumptions that could be drawn from the answers. The model of this study and the questions utilized therein are not solid enough to provide grounds for policy improvement alone. There should be further discussion and exploration of the findings from the research.

Recommendations

The data within this research clearly indicate that those who are participating in the response, from administration to those operating in the field, have a consensus of recommendations on increasing the value of the response segment for medical surge missions. The recommendations offered by the participants in the research validate prior studies that would substantiate the claim that medical surge is a very real problem in disaster response. The medical surge missions are important to the public health and safety of communities, and the ability to get this right or at least to move the needle in a positive direction, is a burden that we must bear.

Contemporary research indicates there are tools available to us wherein we could increase the capability of medical surge response. The ASPR strategic plan calls specifically for an increase in medical surge capacity (2020). Taking recommendations

from those who do the work in the field, who have a feel for what works and what does not work and what they have seen in their own experiences, can enhance our ability to build models that gain traction and momentum in finding the winning rhythm for responding effectively to medical surge missions. The recommendations of this study are divided into the following categories: Researcher Recommendations and Study Recommendations.

Researcher Recommendations

I recommend that further study be done to validate the conclusions that can be drawn from this project. I recommend that a committee be formed to study the need for predeployment training in medical surge relief. The committee should take into account all research that has been done prior to its formation and the research that is ongoing to validate and to study medical surge matrices, response norms, evolving community needs, and current policy standings. The committee should receive recommendations from field personnel, from administrative personnel, and from NDMS participating hospitals. The recommendations of the participants of this study should be considered as well as previous studies that have been completed. The recommendations from within this study are as follows.

Study Recommendations

Training for medical surge relief should include all members of NDMS teams that would be involved in a medical surge mission. Hospital personnel such as hospital incident command system trained personnel should be involved in medical surge drills and exercises. It is recommended that medical surge metrics be used in predeployment

drills and exercises. These metrics should involve indicators and triggers as was mentioned in the Institute of Medicine workshop (2010).

Lessons learned from a medical surge mission should be collated and presented in postdeployment debriefings. Training and exercises should reflect lessons learned about medical surge missions. NDMS operations best practices about medical surge missions should be shared between teams. Training and exercises should be built from the improvement plan and corrective actions identified from the missions of the previous year. NDMS should have a specific committee responsible for ensuring training initiatives are current and relevant. The DMAT teams should be tasked with the improvement plan and corrective actions of their own team specific lessons learned and should present these to NDMS headquarters for further validation. Previous NDMS published research should be included in the development and quality control of current NDMS operations.

It is recommended that medical surge mission recognition criteria be adequately defined. Within this recognition, medical surge metrics should be utilized to determine the presence of a medical surge mission and the completion of a medical surge mission. It is recommended that in an event of national significance such as a major hurricane a needs-assessment team be dispatched to the affected area to determine specific demand requirements. It is recommended in order to provide an answer to the research problem identified in this study that the identification of a medical surge mission should be accomplished within the first 8 hours of an incident. Additionally, a full DMAT should be

proactively dispatched to the disaster-affected area to ensure a quick response time in the event a medical surge mission unfolds.

These recommendations provide actionable solutions to the research problem mentioned as well as the identifiable gaps that have been demonstrated in the Manastireanu et al. (2010) study on disaster victim mortality, the Aitken and Leggat study involving the care phases (2012), as well as Stewart's ACFs (2013). Some of the most recent research from Shen et al. (2020), also affirmed the idea that an integral part of medical surge capacity can be found in the DMAT response time. Many of the needs that have been identified in the research literature are also identified by the recommendations of the study, to include but not limited to, precision response through drills and exercises involving external entities. The advocation of certain triggers that can be preidentified for greater implementation of a medical surge response can be seen from Hanfling et al.'s (2013) "Crisis Standards of Care" to contemporary examples like Kirsch et al.'s "Opportunities to Strengthen the National Disaster Medical System" in the *Health Security Journal*, which called for surge capacity training and exercises as well as metrics through which to measure performance (2022).

In conclusion, there are limitations in the study that should be considered and the largest recommendation from the study is that a cohort of response professionals be assembled to not just analyze but provide actionable steps in the area of medical surge response.

Implications

The potential impact of this study on public policy would be, at a minimum, in the area of emergency management, whereas findings could align problems experienced by communities with those who function within the political realm. Once policy makers at the local level become influenced by the problem, it is possible to elevate the problem to the policy level. This is where lobbyists are generally focused so they can move desired policies into the field of view for legislators. The positive impact this could have on communities is the increased faith in local, regional, and federal government.

The response reaction of the community can either streamline or coagulate during a mass casualty incident. If the public becomes excessively anxious to the event, then compliance with emergency management can become minimized and as a result the population may not receive important instructions. Likewise, if adjustments can be made to current policies, and the public are kept up to date with positive policy implications, then the actions of emergency managers during a crisis will receive more credibility and therefore, emergency messages may receive more attention. Additional improvements to public policy include, but are not limited to, the development of medical surge plans between response entities and hospitals, as well as an increase in incident command awareness to include additional scheduled trainings for hospitals and response agencies.

Once a rhythm of increased emergency preparedness is established in these communities, qualifications for grants and fiscal allocations should only increase. These are just a few of the benefits that can both immediately be realized as well as be cumulative in benefit. Additionally, the outcomes of increased training capacity could

increase the cooperation with state, local and federal partners and therefore only improve the response capacity through regular collaboration. The expected benefits in a more chronic and conclusive fashion would summarily manifest accordingly. First, leadership within NDMS becomes aware of the findings within this research and a committee is formed to begin exploration of growth opportunities. Secondly, invitations to Regional Coordinators would be followed with briefings from the appointed committee and recommendations for further hazard vulnerability analysis in the area of medical surge planning.

It is possible, at this point, that indicators and triggers be considered from current predictive models and medical surge metrics. With these metrics, it could be possible to identify patterns that would match cities that would be considered most vulnerable with other predictive patterns such as flood mitigation and hurricane evacuation. Once the committee and the RECs have enough data to substantiate conclusions, invitations to state partners could be extended for one or more summits wherein collaboration can be employed to ensure potential policy changes will in fact benefit the states and the subsequent communities they are meant to serve.

As states reach into local municipalities and receive buy-in, the training of those relevant federal agencies can begin. Such agencies as NDMS are currently poised to shift training initiatives rapidly with the existence of the NDMS training program at the Center for Domestic Preparedness (CDP). The relationship of CDP with NDMS has been effective to such a degree that the ASPR has visited the training site personally. With a history of success, it would be fairly nonobstructive for NDMS to increase its medical

surge capacity and roll out the training to the DMAT teams as well as the associated logistical, veterinary, and mortuary teams.

Conclusions

The research clearly indicates in the data that those participating in the response to a medical surge mission, from administration to the field, have a consensus of recommendations on increasing the value of the response segment of medical surge missions. These recommendations appear to validate prior studies, which reinforces the claim that medical surge is a very real problem in disaster response. The medical surge missions are important to the public health and safety of communities and the ability to get this right or at least to move the needle in a positive direction is a burden that we must bear.

Contemporary research reveals there are tools available to us by which we could increase the capability of medical surge response. The ASPR Strategic Plan calls specifically for an increase in medical surge capacity (2020). By taking recommendations from those who do the work in the field, those who have a feel for what works and what does not work and by considering what they have seen in their own experiences, the ability to build models and to gain traction and momentum in finding the winning rhythm for responding effectively to medical surge missions can be greatly enhanced. There are limitations in this study that should be considered and as it is with any research, the conclusions should be scrutinized. It is my desire, and it is the purpose of this research that the conversations will become active in analyzing these data as well as other existing papers mentioned herein through which the problems surrounding medical surge response

can be elevated to the political level for policy consideration. Of all the recommendations I could make, the largest recommendation is that a cohort of response professionals be assembled to not just analyze but provide actionable steps in the area of medical surge response.

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Appendix A: Survey Round 1

Each question or statement was measured with a Likert scale listing, “strongly agree, agree, neither agree nor disagree, disagree and strongly disagree.” Because this was an e-Delphi study, the agree and disagree results were tallied together since consensus was the goal. The neither agree nor disagree measurement was used as an indicator that more discussion should follow to achieve clarity. The questions and statements that were intended to gather information about current practices used a Likert scale of a range of values whereby the participants could choose the answer that best matches their current experience. An example is question 4 of round one where the Likert scale reflected, “less than 1 hour, 1-3 hours, 3-5 hours, 5-7 hours, above 7 hours.” The following are the survey questions/statements for round one.

1. A DMAT is effective in relieving medical surge in an MCI.
2. Medical surge postdeployment training is an effective training topic.
3. Current postdeployment training includes relieving medical surge.
4. How many hours per year are dedicated to medical surge relief in predeployment training?
5. How many hours of postdeployment training per year in medical surge is voluntarily initiated (team driven)?
6. How many hours of postdeployment training per year in medical surge is provided (system driven)?
7. In the past 5 years, how many times have you participated in postdeployment training specific to medical surge relief?

8. Each NDMS team should be individually responsible for medical surge mission training.
9. Team led postdeployment training for medical surge relief should include every command and general staff element (Command, Safety, Liaison, Admin/Finance, Logistics, Operations).
10. Team led postdeployment training for medical surge relief should include hospital personnel for real-time medical surge feedback.
11. NDMS sponsored postdeployment training for medical surge relief is effective and should be employed.
12. NDMS sponsored postdeployment training for medical surge relief should include every command and general staff element (Command, Safety, Liaison, Admin/Finance, Logistics, Operations).
13. NDMS sponsored postdeployment training for medical surge relief actively involves hospital incident command staff (HICS) personnel.
14. Pre-assignment briefings (staging) include medical surge mission information.
15. Criteria for medical surge mission recognition is adequately defined.
16. Medical surge metric studies are included in postdeployment training.
17. Postdeployment training should include medical surge.
18. Postdeployment training should involve hospitals.
19. Medical surge metrics should be used in postdeployment training.
20. The response time of a DMAT is adequately conducive for medical surge relief in hospitals affected by a mass casualty incident.

21. Medical surge missions involving NDMS have historically been requested by the affected hospital.
22. Identification of a medical surge mission is typically accomplished within the first 8 hours of an incident.
23. Identification of a medical surge mission is typically accomplished within the first 24 hours of an incident.
24. Identification of a medical surge mission is typically accomplished within the first 48 hours of an incident.
25. Identification of a medical surge mission is typically accomplished within the first 72 hours of an incident.
26. An NDMS Base of Operations is typically set up of within 8 hours of arrival to a hospital experiencing a medical surge requiring a DMAT.
27. An NDMS Base of Operations is typically set up of within 24 hours of arrival to a hospital experiencing a medical surge requiring a DMAT.
28. An NDMS Base of Operations is typically set up of within 48 hours of arrival to a hospital experiencing a medical surge requiring a DMAT.
29. An NDMS Base of Operations is typically set up of within 72 hours of arrival to a hospital experiencing a medical surge requiring a DMAT.
30. What effect does a Disaster Medical Assistance Team (DMAT) have on the relief of medical surge for hospitals affected by a mass casualty incident?
31. Indicators and triggers should be utilized in determining if a medical surge mission exists at a hospital.

32. A DMAT is an effective alternate care facility.
33. A DMAT as an alternate care facility should be set up to serve the hospital within.
34. Lessons learned about medical surge missions should be an active part of postdeployment debriefing.
35. Training and exercises should reflect lessons learned about medical surge missions.
36. NDMS operations best practices about medical surge missions should be shared between teams.
37. Training and exercises should be built from the improvement plan and corrective actions identified from the missions of the previous year.
38. NDMS should have a specific committee responsible for ensuring training initiatives are current and relevant.
39. The NDMS teams should be tasked with the improvement plan and corrective actions of their own team specific lessons learned.
40. Previous NDMS published research should be included in the development and quality control of current NDMS operations.
41. NDMS medical surge mission planning should include NDMS participating hospitals.
42. NDMS medical surge mission planning should include the IMT.
43. NDMS medical surge mission planning should include DMORT.

Appendix B: Survey Round 2

1. Current postdeployment training should include relieving medical surge.
2. Each NDMS team should be individually responsible for medical surge mission training.
3. Criteria for medical surge mission recognition should be adequately defined.
4. How many hours of postdeployment training per year in medical surge should be provided?
5. In the past 5 years, how many times have you participated in postdeployment training specific to medical surge relief?
6. NDMS sponsored postdeployment training for medical surge relief actively should involve hospital incident command staff (HICS) personnel.
7. Medical surge metric studies should be included in postdeployment training.
8. Medical surge metrics should be utilized when determining the need for a medical surge mission.
9. Medical surge metrics should be utilized to determine completion of a medical surge mission.
10. The CDC states that 50% of casualties arrive at the hospital in the first hour following the incident with the remaining arriving over the next 4 hours, therefore the expectation of a medical surge mission should be identified within the first hour.

11. With the exception of a pandemic and events similar, a DMAT with a full cache acting as an Alternate Care Facility (ACF) best serves a hospital experiencing a medical surge by arriving within the first 24 hours of the incident.
12. In terms of CDC expectations of a medical surge reaching capacity within the first 4 hours of an incident, it is reasonable to conclude that a DMAT may not be in place in time to adequately relieve a medical surge in a hospital.
13. In terms of a DMAT as a resource, a medical surge mission should be a full DMAT mission with a full Base of Operations set up.
14. In terms of a DMAT as a resource, a medical surge mission should be a needs-based mission with only those personnel who fit the position shortages.
15. The response time of a DMAT strike team/strike force is faster than a full DMAT with a full cache.
16. The response time of a full DMAT with a full cache is faster than a DMAT strike team/strike force.
17. The response time of a full DMAT with a full cache is adequate for a medical surge mission that is a non-pandemic response.
18. The response time of a DMAT strike team/strike force is adequate for a medical surge mission that is a non-pandemic response.
19. In an event of significance such as a major hurricane, a needs assessment team should be dispatched to the affected area to determine specific DMAT requirements.
20. A DMAT is better utilized in a medical surge event as an ACF.

21. A DMAT is better utilized in a medical surge event to provide staff support inside the hospital.
22. A DMAT is effective both inside the hospital and as an ACF.
23. A full DMAT should be proactively dispatched to a disaster affected area to ensure a quick response time in the event that a medical surge event unfolds.
24. The effectiveness of a DMAT for a non-pandemic medical surge response depends largely on its response time.
25. A non-pandemic medical surge event is better suited for a DMAT strike team/strike force.
26. A non-pandemic medical surge event is better suited for a full DMAT with an equipment cache.
27. Length of mission should be determined by the utilization of medical surge metrics.
28. Medical surge metrics are better utilized in the postdeployment phase.
29. Medical surge metrics should be utilized to ascertain medical surge deployment effectiveness.
30. It is reasonable to expect a non-pandemic medical surge event to dissipate before the expected 72 hour Federal response.

Appendix C: Survey Round 3

1. Postdeployment drills for medical surge relief should involve hospital incident command staff (HICS) personnel.
2. The CDC states that 50% of casualties arrive at the hospital in the first hour, therefore the expectation of a medical surge mission should be identified within the first hour.
3. A medical surge mission should be a full DMAT mission with a full Base of Operations set up. A medical surge mission should be a needs-based mission, deploying only those personnel who fit the position shortages.
4. A medical surge mission should be a needs-based mission, deploying only those personnel who fit the position shortages.
5. The response time of a strike team/strike force is faster than a full DMAT.
6. The response time of a full DMAT with a full cache is faster than a DMAT strike team/strike force.
7. The response time of a full DMAT is adequate for a medical surge mission.
8. The response time of a strike team/strike force is adequate for a medical surge mission.
9. A DMAT is best utilized in a medical surge event as an Alternate Care Facility.
10. The effectiveness of a DMAT in relieving medical surge response depends largely on its response time.
11. A strike team/strike force can adequately relieve a medical surge.
12. A medical surge event is better suited for a full DMAT.

13. Medical surge metrics should be utilized in all phases of deployment.
14. It is reasonable to expect a medical surge event to begin dissipating before the expected 72 hour Federal response.
15. Medical surge mission training should be a priority.
16. Criteria for a medical surge mission should be adequately defined.
17. Medical surge metric studies should be included in postdeployment training.
18. The response time of a DMAT is adequate for a medical surge mission.
19. Identification of a medical surge mission should be accomplished within the first 8 hours of an incident.
20. A DMAT as an alternate care facility should be set up to serve the hospital within.
21. Training and exercises should reflect lessons learned about medical surge missions.