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The Military Health System (MHS) needs to be properly reformed for the Defense Health Agency (DHA) to posture the MHS for future conflicts given the challenges potentially presented in the National Defense Strategy (NDS) 2018. In conflicts against great powers, the MHS will be challenged to provide its life saving services in contested operational environments. The best way forward for the DoD is to make addressing key vulnerabilities a top priority for the major reform it has begun of the MHS. This should include aligning with the DHA in identifying centralized billets that provide standardization across the MHS, providing more qualified medical personnel for operational environments potentially requiring longer levels of sustained care, and resolving the shortage in mission critical specialized providers.

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MASTER OF MILITARY STUDIES

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Addressing Key Vulnerabilities in the U.S. Military Health System

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Executive Summary

Title: Addressing Key Vulnerabilities in the U.S. Military Health System

Author: Lieutenant Commander, Kelly Ann Fulks, United States Navy

Thesis: In conflicts against great powers, the U.S military health system (MHS) will be challenged to provide its life saving services in contested operational environments. The best way forward for the DoD is to make addressing key vulnerabilities a top priority for the major reform it has begun of the MHS. This should include aligning with the DHA in identifying centralized billets that provide standardization across the MHS, providing more qualified medical personnel for operational environments potentially requiring longer levels of sustained care, and resolving the shortage in mission critical specialized providers.

Discussion: The Military Health System and services needs to be properly reformed for the Defense Health Agency (DHA) to posture the MHS for future conflicts given the challenges potentially presented in the National Defense Strategy (NDS) 2018. With an ever-increasing shortage of physicians, surgeons, nurses, and other medical specialties nationwide both civilian and military, it is becoming increasingly more challenging for the MHS to sustain essential prepared medical professionals for the next conflict. This comes at a time when the DoD FY Budget 2020 is presenting to decrease medical staff across the MHS of nearly 15,000 billets. The DHA provides a baseline standardization that the services have greatly neglected on the home front. A standard vision, standard electronic health record, and administrative management that is consistent from facility to facility. Afghanistan is the longest U.S. conflict on record and has validated the MHS with the highest survivability rate of combat injuries of any war prior. For this to occur, the services collaborated research, data, best-practices, and a standardization of care known as the Joint Trauma System (JTS). It has been proven over the last 15 years of the medical joint force working together that a military medical service, that is prepared and ready, must also work together with a standardized approach to casualty care. Due to ever-increasing threats in contested domains, including possible loss of command and control, the services must become standardized when it comes to the home front and combat. In future varying areas of conflict, the MHS must act now to build civilian partnerships to broaden the standardization and to ensure beneficiaries are receiving the highest standard of care.

Conclusion: The DoD reforms of the DHA need to address existing vulnerabilities. To do so, these reforms should include: identifying shortcomings of billets, restructuring of medical facilities is in alignment with operational strategy, liaison with civilian trauma facilities, and ensuring when healthcare providers are called to duty they are proficient to respond within their specialty.

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Preface

As a Lieutenant Commander in the United States Navy Nurse Corps, I was humbled that my service selected me for such an unique opportunity to study alongside Interagency, Department of Defense, United States and International Military Officers at Marine Corps University (MCU) Command and Staff College (CSC). During my transition to Quantico in 2019, the Navy and Military Health Services (MHS) was also transitioning to the management of military health services under the Defense Health Agency (DHA). When I began thinking about a topic for my paper, I knew I wanted to contribute back to Navy Military Medicine. As they were transitioning, I may be able to research and make recommendations based on experience and knowledge taking an outside look within. I first became interested in the “whole of medicine” as a part of the “whole of government” approach when I was in Sigonella, Italy 2013-2016 as a Medical Liaison. During my time there, the West African Ebola Virus epidemic outbreak was occurring close to the region I was stationed in, meanwhile in the America’s there was the Zika Virus epidemic outbreak. All the while we as military medicine are health professionals deployed globally, ready, trained, and prepared to react. Also, during this timeframe, the Defense Health Agency (DHA) is being stood up and in Congress the National Defense Authorization Act 2017 is being reviewed and directing a restructuring of facilities to prepare the MHS for supporting our beneficiaries globally. Reviewing the National Defense Strategy (NDS) 2018 and the NDAA 2017, I reflect on complex, changing environments that we may face in the future globally, and how can the DHA and the MHS collaborate to provide a ready force.

Since first developing my thesis in October 2019 to analyze DHA and the MHS, America and the World are battling through COVID-19, the worst pandemic of our century since the 1918

Spanish Flu Pandemic. As I have analyzed researched and reflected on the NDS, NDAA, DHA, and MHS I try to apply complex situations that we military medicine may find ourselves in and how to best prepare for multidomain environments whether that be forward deployed overseas, boots on ground, providing humanitarian assistance, or fighting a pandemic on the homeland.

I want to specifically thank Dr. Jorge Benitez and Dr. Craig Hayden, MCU CSC, for providing guidance in this process from development of research to how to apply these concepts into writing. I appreciate them for taking the time to understand the intricacies of the DHA and the MHS to best assist me with this paper and its development.

I especially want to thank my Navy Nurse Corps family for mentorship, professional development, and continual support. Most importantly to the dedicated, selfless, and always ready to be ready Hospital Corpsmen that make our mission to care for our warfighters and their families possible.

Semper Fidelis.

I. Introduction

As the Joint Military Force continues to adapt to an ever-changing operational and security environment, so does the demand for a healthcare system to support the effort of the Joint Force mission. As mandated by the 2017 National Defense Authorization Act (NDAA), the Military Health System (MHS) began one of the largest transitions in the military medical system to an integrated Combat Support Agency, the Defense Health Agency (DHA).¹ The NDAA directed the DHA to serve as the center of administration and management for cost reduction, improving readiness, and delivery of services of Military Treatment Facilities (MTF).² As described in the Department of Defense (DoD) Fiscal Year (FY) 2020 Budget, “The centralized administration of the Military Treatment Facilities under the authority of the Defense Health Agency provides a unique opportunity to more closely integrate the Department’s focus on Readiness and elimination of redundancies while creating a common high-quality experience for patients.”³ The intent is to enable all medical services (i.e., Army, Air Force, and Navy) together to deliver a fully ready military force.

Over the past 19 years of war, military medicine has continually surpassed rates of survivability compared to previous conflicts resulting in the highest survival rates of combat injuries.⁴ This operationally ready medical force has been trained and conditioned with the operational environment of today, that is an uncontested air domain and medical aid stations for resuscitative care for the injured within the golden hour.¹ The 2018 National Defense Strategy acknowledges that the U.S military will be challenged to operate in more contested domains and an “increasingly complex security environment... defined by rapid technological changes, challenges from adversaries in every operating domain, and the impact on current readiness from

¹ The sixty minute period between point of injury to higher level medical care for rapid resuscitation improving patient survivability and outcomes.

the longest continuous stretch of armed conflict in our Nation's history."⁵ If operating domains are contested and there is no air superiority, then how can the high survivability of the "golden hour" be attained in future conflicts? While a radical transformation is occurring within the MHS, the operational environment is also undergoing significant change.

In addition to the changes in the security environment, U.S. military medical services are also experiencing severe cuts in funding and personnel. The DoD FY 2020 Budget proposed a reduction in military medical positions by 14,707 personnel (13% reduction in active duty medical military members).⁶ The DoD FY 2020 budget request down 2.3% (\$50.7 billion to \$49.5 billion) as compared to the DoD FY 2019 Budget.⁷ The proposal of a reduction in medical force size was to be "appropriately sized and shaped to meet National Defense strategy requirements" optimizing an operationally trained MHS care delivery system.⁸ With so many imminent changes, for success of this MHS overhaul, the DoD must work with DHA to identify gaps and shortcomings as a result of this acquisition.

In future conflicts against great powers, the MHS will be challenged to provide its life saving services in contested operational environments. This will be manifested in distinct problems for the MHS. Despite the current reform, military billets are not prioritized to meet the needs of future operational medicine. The best way forward for the DoD is to make addressing key vulnerabilities a top priority for the major reform it has begun of the MHS. This should include aligning with the DHA in identifying centralized billets that provide standardization across the MHS, providing more qualified medical personnel for operational environments potentially requiring longer levels of sustained care, and resolving the shortage in mission critical specialized providers.

It is important to understand the context of the current reform of the MHS. The radical changes the U.S. military medical services are experiencing, are also exposing existing vulnerabilities in the military health system. This study will address these vulnerabilities and propose valuable steps to make sure the reforms improve the MHS for the new security environment. And finally, this study will also briefly consider the impact of the COVID-19 Pandemic on the reform of the U.S. military health system.



Figure 1. DHA Strategy Map Trifold (Oct 17, 2019).⁹

II. Radical Changes in US Military Medical Services

On October 1, 2018 the MHS began a phased four-year process for transferring responsibility of management and administration to the DHA.¹⁰ The MHS has 475 hospitals/clinics and 248 dental clinics that it operates world-wide.¹¹ The preparation to transition began in 2017 with an official commencement date on October 1, 2018 that would continue in three subsequent phases projected through FY 2022.¹² The first phase began on October 1, 2018 and included 31 southeastern US facilities.¹³ The second phase being executed in FY 2020 will result in 53% or 241 eastern US MTFs transitioning to DHA management.¹⁴ The third phase will be executed FY 2021 and transition the remaining US MTFs, which encompasses 83% facilities.¹⁵ Finally the remaining 17% global based MHS facilities should finish transitioning in FY 2022.¹⁶ As the execution of these phases continues, the MHS has a global responsibility to a range-of-military-operations (ROMO). The MHS “system leverages a \$49.5 billion budget to support more than 125 thousand medical professional delivering services in 49 hospitals, 427 clinics, and 246 dental clinics as well as in contingency and combat-theater operations to 9.6 million beneficiaries globally.”¹⁷ To best address the MHS enterprise, the DHAs goal is to provide patients a more unified, efficient, standardized approach to care while improving safety, quality, and access across the MHS.¹⁸

It is expected that there will continue to be even further restructuring as DHA analyzes MTF markets, regions, facilities, capacity/services, hospitals, and clinics.¹⁹ During this reorganization, DHA may decrease or increase capabilities of the MTFs dependent on its ability to meet the mission per the NDAA.²⁰ Before the House Armed Services subcommittee December 5, 2019, Assistant Secretary of Defense for Health Affairs Thomas McCaffrey and Director of the DHA Army Lt. Gen. (Dr.) Ronal Place explained that, “Our primary mission is

readiness- the readiness of medical personnel to support our forces in battle, and the medical readiness of combat forces to complete their mission. Readiness also entails caring for the families of our troops and our retirees, and their families.”²¹ Readiness is also a top objective in the NDS. The NDS list a great cost of losing military advantage as the result of a “Joint Force that has legacy systems irrelevant to the defense of our people” if “without sustained and predictable investment to restore readiness” the goal of creating a modern, current, ready military will be unattainable.²²

This study addresses the important concern that the DHA is restructuring medical facilities regionally and globally in a way that may not align with operational strategy of the future. A likely operational strategy of the future is affected by “rapid technological advancement and the changing character of war” in a security environment with contested domains.²³ To align with the NDS, the DHA must set the global stage. The DHAs mission states “as a Combat Support Agency, the Defense Health Agency leads the MHS integration of readiness and health to deliver the Quadruple Aim: improved readiness, better health, better care, and lower cost.”²⁴ One of the DHA’s responsibilities to the Combatant Commands is to “Deliver globally integrated health solutions to combat forces,” and their commitment is “DHA provides health solutions essential to joint mission success.”²⁵ One way that DHA is meeting this goal is through the DHA Combatant Command Liaison Program using Liaison Officers (LNOs).²⁶ DHA is achieving standardization through integrated systems and a single-line of communication to geographic areas. DHA is also integrated into Joint Operations Center (JOC), Joint Capabilities Integration and Development System (JCIDS), and The Joint Trauma System (JTS).²⁷ Within the area of combat readiness, these individual systems are pivotal in providing a database to track patients and their care to implement evidence-based guidelines in combat care.

Prior to 2004, the services were sending medical personnel to staff the needs of the mission that was specific to that service, also called “Individual Service medical missions.”²⁸ This was hazardous to the mission as there was not a Joint plan until 2004 when U.S. Central Command (CENTCOM) created the Joint Theater Trauma System (JTTS).²⁹ The services (Army, Air Force, and Navy) implemented the JTS between 2003 and 2005 as a collection point for clinical data so that injuries, equipment, and best practices could be collected for the improvement of care.³⁰ The JTS provides the MHS with research, development of evidence-based practice, and education.

Some of the best practices included how to facilitate medical evacuations within the “golden hour,” one-handed tourniquets, and identifying main causes of death.³¹ Because of the significant medical advances revealed through the JTS data, in 2009 the former Secretary of Defense Robert Gates mandated the DOD “Golden Hour” policy to ensure standardization of casualties.³² A report published by the Defense Health Board in 2015 examined lessons learned in combat military operations from 2001-2013 and revealed correlations on how the services collaborate to overall improve the efficiency of the medical systems.³³ Institutionalizing this collaboration should be included in the current reforms of the MHS.

The 2017 NDAA outlines under Section 708 “To communicate and coordinate lessons learned from such partnerships with the Joint Trauma System established under section 707.”³⁴ The JTS data led to the trauma care advances in Iraq and Afghanistan through its systematic data collection.³⁵ There are statutory and authority for the JTS which follow policies, regulations, and protocols that are in accordance with the DoD and Services.³⁶

“A broad constituency of trauma leaders from all Services includes medical treatment facility (MTF) trauma medical directors and trauma program managers, prehospital

personnel, injury prevention advocates, and others. This broad group of trauma leaders works with the Joint Trauma System to inform and educate others about the trauma system, implements trauma prevention programs, and assists in trauma system evaluation and research to ensure that the right patient, right place, right time and right care goals are met. There is a strong role for the trauma system leadership in conveying trauma system messages, building communication pathways, building coalitions, and collaborating with relevant individuals and groups.”³⁷

The existing regional combatant command (COCOM) trauma systems are contingent on the situation at the current time in that region, yet the DoD must ensure the trauma system is continuous regardless of the situation in war, peacetime, or dependent on the COCOM mission.³⁸ The joint pub figure demonstrates below the task and function of the regional medical command.

Chapter IV

Primary Tasks and Purposes of the Medical Command and Control Function	
Command and Control	<ul style="list-style-type: none"> To plan, prepare, execute, and assess medical support. To facilitate and enhance a seamless continuum of health care from the point of injury or wounding to definitive care in the continental United States-support base, if required. To maximize the use of scarce medical resources.
Communications and Computers	<ul style="list-style-type: none"> To maintain situational awareness and understanding through the use of command systems and the common operational picture. To facilitate the transfer of medical information, to enhance the documentation of medical encounters and exposures to health hazards, and to ensure the compatibility and interoperability of medical communications for combat casualty care systems.
Task Organization	<ul style="list-style-type: none"> To provide a scalable and tailorable medical infrastructure which ensures the right mix of medical capabilities is available to execute the medical mission. This capability is further enhanced through the modular design of medical units.
Technical Supervision	<ul style="list-style-type: none"> To ensure medical standards are established, implemented, and monitored throughout the operational area. To provide consultation and support to subordinate medical units/elements. To provide a reachback capability to the continental United States-support base in the areas of the various medical disciplines and specialties.
Regional Focus	<ul style="list-style-type: none"> To support and facilitate the execution of the combatant commander's plans.

Figure IV-1. Primary Tasks and Purposes of the Medical Command and Control Function

Figure 2. Primary Tasks and Purposes of the Medical Command and Control Function³⁹

The JTS vision is for the medical care that each individual military member receives gives them the same opportunity for survival and recovery, regardless if they are a soldier, sailor, marine, or airman.⁴⁰ In order for the CSA to fulfill its commitment to prompt medical care for military members, it must do so in a timely manner. To meet the mission to support a “high battlefield survivability,” the CSAs role is “to fulfill combat support functions for joint operating forces and combatant commanders across the full range of military operations.”⁴¹ “The DHA’s liaison officers within Combatant Commands enable direct contact with DHA, help the DHA better understand Combatant Command needs, and give the Combatant Commands better understanding of DHA capabilities.”⁴² This provides the correct level of medical expertise for the military operation.

Existing Vulnerabilities in Military Health System

The DHA should model the standard of care the JTS established for the joint services and should therefore create a similar standard of care for MHS stateside. It aims at doing this as directed by Congress and through its MHS Quadruple Aim focus. Unified military medical service standardization is a priority goal:

“Standardize to optimize—The US armed forces have learned the value of training and fighting as a joint force. Military health care providers have learned the same lesson in combat zones but when they return home, they tend to revert to the old ways. Some variations in approach are inevitable, but the military health system should strive to standardize key workflows, equipment, and even the layout of its operating rooms and delivery suites. That way, when a military health system provider rotates to a new hospital, he or she can swiftly integrate into a new health care team.”⁴³

But this goal needs further attention and resources to be successfully implemented by the DHA. Furthermore, implementing such standardization is critical for preparing the force for a longer period of sustained care to either front line units in war time, or conus hospitals in peacetime. As the graph below shows, one key component of the mission of the JTS is to utilize data to improve processes which guide uniform decision-making for best practice guidelines.

Operational Cycle

Bold, Responsible Practice of Battlefield Medicine

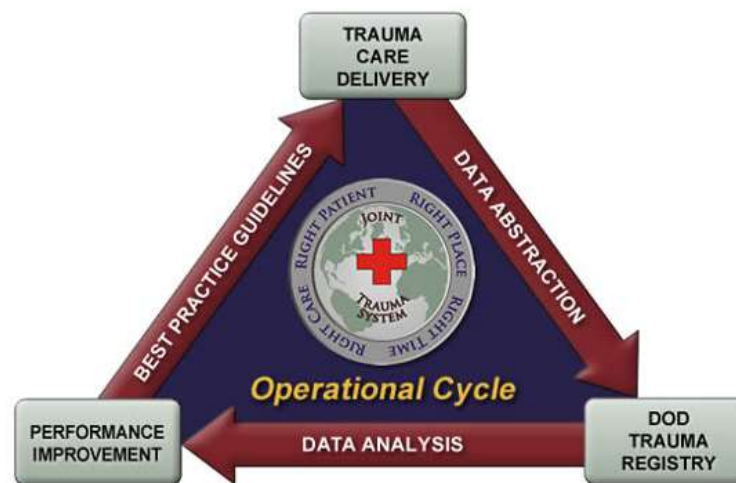


Figure 3. Joint Trauma System Operational Cycle⁴⁴

Another lesson that was identified from conflicts in Iraq and Afghanistan was lack of command and control, communication, and coordination. This may be alleviated with standardized training and having a single-agency oversight, but the guidelines must be current and updated with planning for the future battlefield, otherwise it will be like 2001-2004 casualties again, lacking standard guidelines for treatment and evacuation of casualties. When building on lessons learned, it is important that the MHS encompass the DoDs mission to maintain national security with a prepared Joint Force. In alignment with the 2018 National Defense Strategy, “This increasingly complex security environment is defined by rapid

technological change, challenges from adversaries in every operating domain, and the impact on current readiness from the longest continuous stretch of armed conflict in our Nation's history."⁴⁵

While wars have been fought far from the U.S soil, "it is now undeniable that the homeland is no longer a sanctuary."⁴⁶ There are increasingly more complex challenges influencing global military operations from terrorism to nuclear threats. Additional threats include rogue regimes and revisionist powers that may "leverage by seeking a mixture of nuclear, biological, chemical, conventional, and unconventional weapons and a growing ballistic missile capability to gain coercive influence."⁴⁷ According to the NDS, "We face an ever more lethal and disruptive battlefield, combined across domains, and conducted at increasing speed and reach-from close combat, throughout overseas theaters, and reaching to our homeland."⁴⁸ In preparing for future conflicts, medical personnel must be prepared that a rapid evacuation may not be possible for hours to days and prepared to sustain care for a prolonged period. New guidelines and exercises must be implemented for future operations. Some of these may include field trauma centers, shipboard care, or collaboration with local host nation partnerships.

The military health system has drastically improved access to care from point of injury to overall increase survivability rate. From World War II it took approximately 10 hours for a medical evacuation, to five hours in the Korean War, down to one hour in Vietnam.⁴⁹ "The case-fatality rate -- the percentage of the wounded who succumb to their injuries -- in Afghanistan is 8.5%. In Vietnam, 15.8% of the wounded died, while in World War II more than 19% didn't survive their injuries, according to a 2010 paper in the *Journal of Surgical Orthopedic Advances*."⁵⁰ Dr. R. Adams Cowley termed this time between access to care from point of injury to survivability, "Golden Hour" concept. Dr. Cowley's vision was the framework for battlefield medicine in the early 2000's. The *Journal of the American Medical Association* completed a

study of 21,089 U.S casualties in Afghanistan from September 11, 2001 to March 31, 2014.⁵¹ In an interview Dr. Cowley explained, “There is a golden hour between life and death. If you are critically injured, you have less than 60 minutes to survive. You might not die right then; it may be three days or two weeks later- but something has happened in your body that is irreparable.”⁵²

In Iraq, the one-hour window was sustainable compared to Afghanistan which had more challenges due to the terrain. Due to this, former Defense Secretary Robert Gates said on June 15, 2009, that the goal for point of injury to trauma center be reduced from the two hour goal to one hour.⁵³ With direction from Gates, the services increased medical evacuation helicopters in Afghanistan positioning more forward bases and small surgical teams that were mobile to the battlefield⁵⁴. In early 2019 *JAMA Surgery* published data that “fatality rates were high during early periods of war in Afghanistan (20.4 percent in 2001) and Iraq (14.5 percent in 2003).”⁵⁵ As training improved for medical personnel, care provided at POI also improved with using tourniquets and whole blood transfusions.⁵⁶ Medical evacuation of casualties to a higher level of care became a priority.⁵⁷ The report also contributed these measures “to saving thousands of lives, on and off the battlefield.”⁵⁸ “As a result, Payne explained that battle fatalities were nearly halved in both regions, falling to 8.5 percent in 2011 in Iraq and Afghanistan’s rate decreasing to 10.1 percent in 2017.”⁵⁹

While the golden hour framework implemented into the DoD by Secretary of Defense Robert Gates, followed a framework that saved thousands of lives, it could be perceived as a vulnerability in current and future operations for prolonged care as the MHS has modeled this concept in its planning for over a decade. There is an argument to be made that medicine and planning has improved the overall survivability, but there has also been changes in protective gear, tourniquets, and the type of wound inflicted by the enemy. As Air Force Maj. Gen Lee

Payne articulated in August 21, 2019, “The DHA’s combat support role is an integral contributor to the National Defense Strategy’s prioritization of readiness: everything we do is aimed at building a medically ready force and a ready medical force.”⁶⁰

Air Force Col. Stacy Shackelford, director of the Joint Trauma System at the Combat Support Agency, uses triage events that are evidence-based when treating mass amounts of injuries.⁶¹ Shackelford believes the critical element in triage is time “citing data that shows most mortalities occur with the first hour of injury.”⁶² Shackelford states the goal “is to determine when we can save the most lives and she acknowledged that the first hour – the golden hour – is still critically important. However, by grouping casualty triage into three different levels, threat elimination, availability of medics, and medevac capability determine the best care for mass casualty events.”⁶³ Shackelford’s analysis presents another important factor for the success of the golden hour, and that is that resources are also needed.

Like resources that may be in short supply during mass casualty events, there is also a concern from both the civilian and medical communities in the United States about a shortage in doctors and medical personnel. Leveraging this projected military shortage and using it as a framework with the design of the military force, planning factors must be planning according to projections from the US Census, “between 2017 and 2032, the U.S. population is projected to grow about 10.3%, from about 326 million to 359 million. The population under age 18 is projected to grow by 3.5%; the population aged 65 and older is projected to grow by 48.0%; and the population age 75 and older is projected to grow by 75.3%.”⁶⁴ The need for healthcare professionals demand is increasing due to exponential population growth in addition to an aging healthcare population.⁶⁵ According to a report completed by the AAMC April 2019, the “Demand for physicians continues to grow faster than supply. Although physician supply is projected to

increase modestly between 2017 and 2032, demand will grow more steeply.”⁶⁶ Mainly effected by the projection of the “US population under age 18 is projected to grow by only 3.5%, while the population age 65 and over is projected to grow by 48%.” This demographic statistic is extremely vulnerable for the military services considering younger in age individuals are recruited into the military, and there are age restrictions of when an individual can join the military.

McCaffery stated one of three priorities that aimed at a medical force prepared to support combat force, “Our mission is to provide the team that is needed to support the warfighter before deployment, during deployment, and that when needed at point of injury, during casualty evacuation to resuscitative surgical teams and further en route care to definitive care.”⁶⁷ This statement suggest that goal is that of the entire medical force from medics to doctors and nurses. However, in the DoDs FY 2019/2020 budget it was proposed over the next year the services would eliminate about 18,000 billets to support the National Defense Strategy.

Defense Health Program Fiscal Year (FY) 2020 President's Budget Operation and Maintenance Personnel Summary				
	FY 2018	FY 2019	FY 2020	Change FY 2019/2020
Active Military End Strength (E/S) (Total)	79,228	82,296	84,265	-17,961
Officer	28,192	30,796	27,717	-7,079
Enlisted	51,036	51,468	40,548	-10,912
Civilian End Strength (Total)	67,328	61,326	63,380	-1,138
U.S. Direct Hire	61,357	61,072	59,936	-1,136
Foreign National Direct Hire	1,219	981	981	0
Total Direct Hire	62,576	62,053	60,917	-1,136
Foreign National Indirect Hire	1,199	1,267	1,267	0
Reimbursable Civilians	210	206	206	0
Active Military Average Strength (A/S) (Total)	80,750	80,744	78,261	-7,483
Officer	29,441	29,495	27,257	-2,238
Enlisted	51,309	51,249	46,004	-5,245
Civilian FTEs (Total)	62,362	61,628	60,264	-1,028
U.S. Direct Hire	60,868	59,259	58,164	-1,095
Foreign National Direct Hire	1,103	894	894	0
Total Direct Hire	61,971	60,213	58,118	-1,095
Foreign National Indirect Hire	1,183	1,225	1,225	0
Reimbursable Civilians	208	201	201	0
Average Annual Civilian Salary Cost (\$ in thousands)	95.4	98.2	98.3	0.1
Contractor FTEs (Total)	24,438	22,544	22,125	-419

Exhibit PB-318, Personnel Summary
DHF-1

Table 1. Defense Health Program Fiscal Year 2020 President's Budget⁶⁸

The extreme reduction in military medical personnel is not evenly replaced by civilian medical personnel. “The medical force reduction effort, however, isn't being funded for a mass conversion of military billets to civilian medical positions. Instead, the emphasis is on providing more effective and efficient care, on battlefields and through military treatment facilities to troops, families and retirees, using smaller staffs that are sized to gain more experience and be better trained for military operations.”⁶⁹ DOD’s plan to implement these reductions would: “ (1) transfer UMB-funded positions from the MHS to new health service support positions in deployable or warfighting units, military service headquarters, or combatant commands; (2) transfer personnel billets from the MHS to the Military Departments for repurposing as nonmedical billets; and (3) convert certain military positions to civilian positions.”⁷⁰ These billets are proposed to transition from medical to operational force. The model of using smaller staff may result in key staff being overworked. Although the reductions are modeled to support the NDS, this needs to be carefully planned to ensure that beneficiaries such as retirees and family members are receiving the level of care per their entitlements.

Pending Congresses approval of proposed billet cuts, the reductions will begin in 2021. To put it into perspective, “preliminary Navy documents show uniformed staff at Walter Reed National Military Medical Center falling by 534 personnel, with, for example, 82 taken from director of clinical support, including 28 of 39 corpsmen, 5 of 12 radiological diagnosticians, 4 of 7 pharmacists, 8 of 19 pharmacy techs, and 9 of 45 medical lab technicians.”⁷¹ There could also be shortcomings as this shift may make it less desirable for specialized doctors and nurses to commit to service in the military.

III. Addressing Key Vulnerabilities in US Military Medical Services

The U.S. military health system is going through two major transformations. One is the historic reform of the MHS into an integrated Combat Support Agency, the Defense Health Agency (DHA). This large-scale reform includes severe cuts in funding and personnel. The other major change is the switch from fighting militarily and technologically less advanced adversaries, to preparing for challenges from near peer competitors in much more contested contingencies. This new security environment will likely deprive the MHS of its unprecedented high survival rate for military casualties and exposes vulnerabilities in combat medical services.

The U.S. should therefore make sure that the reforms it is implementing of its military medical services continue to provide high quality medical care to its military personnel and the reforms address existing vulnerabilities that will produce even more negative consequences against near peer competitors. The key reforms necessary include: more centralized billets to more effectively place skilled expertise where needed, improving sustained care and increasing the number of qualified personnel in operational units, and resolving the shortage of trauma surgeons and emergency physicians. Secretary of the Army Ryan McCarthy emphasized the need for the ongoing reforms of U.S military health services to be implemented properly. “Health care of our people is one of the most important things that we do. So how we conduct this merger and understand the operating model of the Defense Health Agency, how you’re going to transition the responsibility to them is incredibly important.”⁷²

Centralization of Billets

As the MHS and DHA are going through a transformation, the services were mandated to identify billets to either decrease active duty and increase civilian and how to align this best with the NDS’s goal of a “ready force.” As Lieutenant General Place describes, force readiness is by

what the services require for readiness “Whether it’s the readiness of an individual Soldier, Sailor, Airman, or Marine, the Services set the requirements. Our responsibility is to turn the readiness requirement into actionable results that lead to a fully functional Airman, Marine, Soldier, or Sailor.”⁷³ To prepare ready medical personnel force, DHA will set the requirements for their facilities in regard to licenses and certificate, while the Services set the description of the medical job requirement.⁷⁴ If the MHS were to centralize the billets that are being realigned to match this model, the Services need to ensure to meet their definition of readiness as these highly specialized individuals are being recruited in hopes of being retained.

For enlisted medical personnel to become Medics, Corpsmen, and Technicians, they need to attend the Medical Educations and Training Campus (METC) in San Antonio, Tx. The METC program was realigned in the initial phases under the DHA Education and Training Directorate on August 10, 2014 and is today known as DHA J7 Education and Training Directorate.⁷⁵ For example of the capacity of turnover in the medical community, “About 16,500 students are projected to graduate each year, with an average daily student load of 5,500.”⁷⁶ The services breakdown of students is “approximately 51 percent Army, 32 percent Navy and 17 percent Air Force.”⁷⁷ There are 49 medical programs for enlisted, with the longest being 52 weeks for Cytotechnologist and the shortest being at 4 weeks for Healthcare Administration Specialist.⁷⁸ Despite DHA consolidating the services enlisted medical programs, the services outline the “title” of these individuals along with the funding/applicability of national certifications. To give an example it is universally known that Registered Nurses (RNs) and Medical Doctors (MDs) are national registered, credentialed, or board certified to be “titled” as such. Yet for entry-level trained medical specialist in the military, each service has a different “title.” Yet despite completing similar programs, the services determine if credentialing is

required for readiness. The Navy's program requires 560 hours to be titled Hospital Corpsman Basic (HCB) and requires credentialing in Basic Life Support (BLS) for Healthcare providers and Tactical Combat Casualty Care (TCCC), yet does not provide training for or require National Registry Emergency Medical Technician (NREMT) certification.⁷⁹ The Air Force's similar program is Aerospace Medical Service Apprentice (AMSA) at 544 hours, and requires credentialing in BLS for healthcare providers, and graduates must successfully complete NREMT exam, yet does not provide or require TCCC.⁸⁰ The Army's program is the Department of Combat Medic Training (DCMT) at 640 hours, and requires BLS for healthcare providers, TCCC, EMT, and in addition completes a Field Training Exercise (FTX).⁸¹ It is important to understand that these differences between the services in credentialing highlight the need for billet centralization in DHA to meet operational demands. For example, if a minimum requirement is entry-level services medical training, this may be someone that is or is not an EMT, because some services require it and others do not. This is a vulnerability for the services as MTFs and clinics merge, it is important to communicate the same language among entry-level medical personnel because it is currently not the same.

This priority to centralize billets to standardize care becomes increasingly more relevant for future operations as the services work uniformly for the mission. As an example, if a minimum requirement for a billet is to be an RN, the services know the scope of an RN. However, if a minimum requirement for a billet is to have completed entry-level military medical training, this scope can vary from a service member that is certified as an EMT or TCCC. DHA, as the credentialing body requirements for facilities, should require a standard position description for medics just as there is for RNs and MDS. The services should require this as an investment into professional development of individuals who commit to serve. Also,

by providing national registration, it serves as a means of retention for these medical military members. After serving their enlistment time or retirement, they can continue to serve as medical professionals in their communities.

Medical personnel must also be able to respond to the new battlefield that may resemble less of a “large, centralized, unhardened infrastructure to smaller, dispersed, resilient, adaptive basing that include active and passive defenses.”⁸² As different services have different training requirements (EMT, TCCC), this creates a lack in standardization and centralization of military billets. The billets are currently not prioritized to meet the needs of operational medicine. If the force is adapting a small, dispersed based battlefield, the forward deployed operational medical billets should be aligned to match this model. When planning for future operations with interstate competition as the U.S. primary national security concern, the operational domains may be contested requiring specialized teams to be embedded POI to provide sustained care.⁸³

In the US hospital systems, one of the best practices has been to use a small team of specialized Intensive Care Unit (ICU) doctors (possible surgeon, pulmonologist, or cardiologist) nurses, pharmacist, lab technician, and respiratory therapist to respond to critical patients that are rapidly deteriorating, but not to the point of cardiac arrest. These specialized, consolidated team members are called at the onset of patient deterioration and are known as the Rapid Response Team (RRT). This is a different team than what most individuals identify with when they hear “code blue,” which is for respiratory or cardiac failure arrest. The MHS could adopt a similar model of consolidated, highly specialized medical team members for future operational support. When examining the five operational domain levels of ground, air, sea, space, and cyber, the MHS must be prepared to achieve a fully ready medical force to support the Services readiness

requirements. The key to this is to prepare for prolonged field care (PFC), and the have the right personnel qualified and ready to meet the domain demands of the operation.

A unique capability of the MHS from civilian healthcare services is that the military is prepared for global deployments with short notice, while also being prepared to care for beneficiaries on the home front. This will give military medical personnel a time to prepare for what may be a contested operational environment without command and control. This alteration of billets may be an opportunity for the MHS to align jointly as a joint uniformed medical force.

Need for Sustained Care and More Qualified Personnel in Operational Units

In future conflicts, medical personnel must be prepared to sustain care in or near the combat zone for a prolonged period before evacuation will be possible. This means that in contested environments, U.S. forces need medical services deployed with frontline/operational units and these medical personnel need to be able to provide sustained care due to obstacles to transporting wounded troops to better facilities behind the lines. One factor for the reorganization of billets in the DoD FY 2020 budget, was to identify key warfighting personnel⁸⁴. In preparing for future conflicts, medical personnel must plan for the possibility that a rapid evacuation is not possible. The 2009 DOD policy of meeting the “Golden Hour” to get from the initial point of injury (POI) to a higher level of care should be reconsidered. The MHS could disperse small teams such as the RRT model for acute onset deteriorating conditions to ensure in smaller operational units medical personnel are postured to respond. Currently care rendered at POI, may be a medic or corpsman that provides initial, life-saving stabilization (Role 1) and then a medical evacuation to the next level of care (Role 2 or 3) occurs. However, in a contested environment getting ground or air transport to evacuate the patient from POI in the “golden-hour” will be

much more challenging and may not even be possible. Utilizing the Role 1 to 4 capabilities in the chart below, the new “gray-zone” area of conflict that medical planners should focus on, is the area between a Role 1 and Role 2.

Chapter II

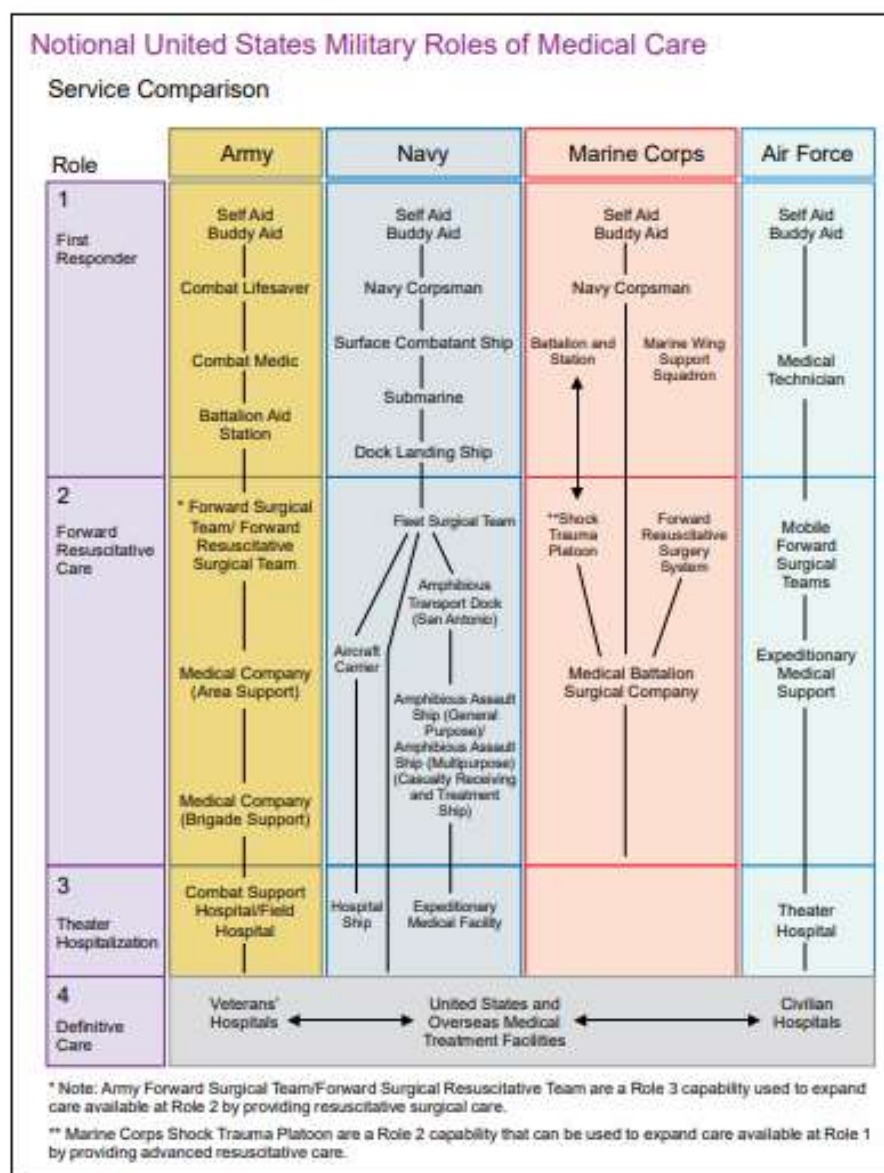


Figure II-1. Notional United States Military Roles of Medical Care

Figure 4. Notional United States Military Roles of Medical Care ⁸⁵

New capabilities of care must focus on impending operations that align with smaller, disbursed units consisting of highly specialized individuals to provide POI along with advanced

resuscitative care. Some of these hybrid, smaller, forward resuscitative teams may be aligned with the operational domain to include ground field trauma centers, shipboard care, airlift capable units, or collaboration with local host nation partnerships.

This concept for sustained care after POI has been utilized with Special Operations Forces (SOF) that are forward deployed in small units remote from the next echelon of care. Each Service has their own SOF forces and require highly trained medical personnel to accompany them in operations. These specialized personal are known as special-operations-advanced tactical practitioner (SO-ATP).⁸⁶ “The SO-ATP is expected to provide long-term, trauma medical care, routine health care, and PVNTMED for troops in austere conditions where no other advanced medical provider is available.”⁸⁷ In addition to their high degree of specialty, SOF medics have advanced tactical paramedic training, are combat medics, have the capabilities to include “advanced trauma management, sick call, logistics support, blood, laboratory, patient hold, and transportation capabilities to support special operations bed-down locations.”⁸⁸ Since there is not an equivalent to this specialty such as “Paramedic” or “Emergency Medical Technicians” in the civilian population, SOF medics should be provided an annual bonus to compensate their high-level of training. In addition to physical stealth, this job requires detailed independent thinking and should be compensated for the intense training that is required. Some SOF medics may be able to take the registry exam to become an EMT or paramedic, but this is not a priority of all the services and should be a high priority to invest in and retain skilled individuals. The services should emulate the SOF model to support sustained care in remote or frontline operational areas. The figure below provides examples of specific challenges faced when there is an injured SOF troop requiring evacuation for care.

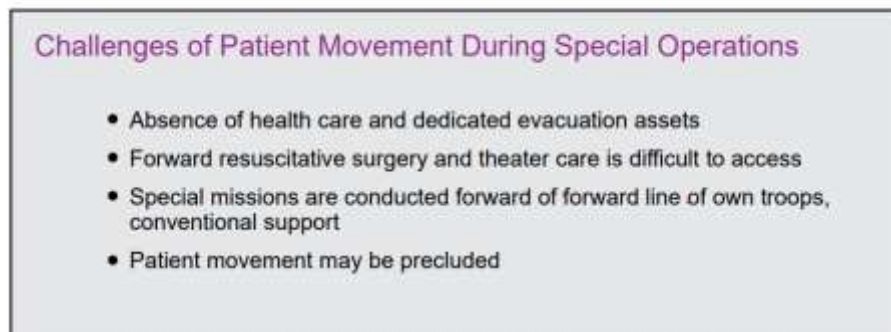


Figure V-3. Challenges of Patient Movement During Special Operations

V-22

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Figure 5. Challenges of Patient Movement During Special Operations⁸⁹

Another important factor in the reform of the MHS is the role of civilian partnerships. The goal of DHA and the MHS to build additional civilian partnerships will be beneficial to ensure that these specialists are maintaining skillsets and credentials. Because the reforms seem to depend on wartime medical specialties such as trauma and emergency care, it is critical for them to continue stay up to date and current in their field (TCCC, EMT). During field exercises, there may be extensive periods of training, but there also is a unique role for medical to have access for clinical sustainment. Through Section 708 Partnerships (c)(1), of the 2017 NDAA, Congress gave the Secretary of Defense the power to develop partnerships in order to provide properly trained trauma teams. “The Secretary may enter into partnerships with civilian academic medical centers and large metropolitan teaching hospitals that have level I civilian trauma centers to provide integrated combat trauma teams, including forward surgical teams, with maximum exposure to a high volume of patients with critical injuries.”⁹⁰ It also requires the Secretary to establish a plan for key wartime medical skills such as trauma and critical care. “The Secretary shall establish a personnel management plan for the following wartime medical specialties: (A) Emergency medical services and prehospital care. (B) Trauma surgery. (C) Critical care. (D) Anesthesiology. (E) Emergency medicine. (F) Other wartime medical

specialties the Secretary determines appropriate for purposes of the plan.”⁹¹ While there has been as expansion of military surgeons collaborating with civilian trauma centers through the Military Health System Strategic Partnership American College of Surgeons (MHSSPACS), this has its limits due to a national shortage of surgeons.

Shortage of Trauma Surgeons and Emergency Physicians

The Association of American Medical Colleges estimates that by 2032, there will be a shortage of 14,300 to 23,400 surgical specialist in the U.S.⁹² The education and training for physicians can take over a decade.⁹³ For specialist and experience, this can take even longer. This significant shortage in medical personnel needs to be confronted and planned for now because there are no short-term solutions. Per a GAO study referenced in the figure below, “All of the components experienced gaps in a number of specialties; several of these were below 80 percent of authorized levels and are in what are considered critically short wartime specialties.”

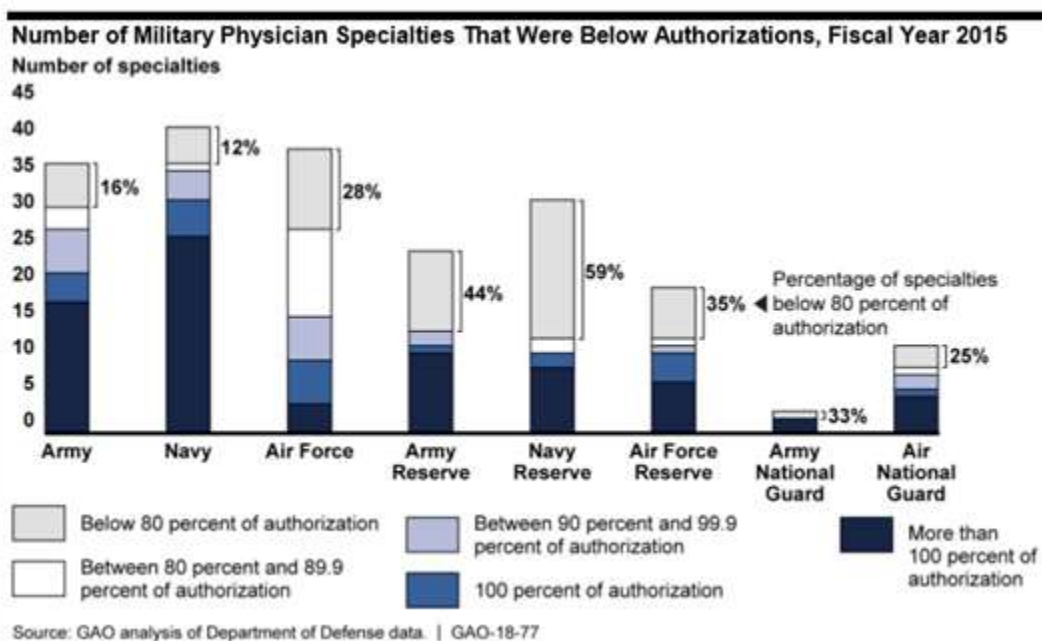


Figure 6. Number of Military Physician Specialties That Were Below Authorizations, Fiscal Year 2015⁹⁴ ⁹⁵

In addition to a national projected civilian physician shortage, there is a shortage of military physicians, and this has been particularly acute for key operational expertise. According to a GAO report, “for fiscal years 2011 through 2015, each of the service components were persistently below 80 percent of authorizations in 19 physician specialties, 11 of which are designated as being critically short wartime specialties.”⁹⁶ The DHA and MHS may be able to mitigate some of this reduction in physicians by utilizing Physician Assistants, Nurse Practitioners, and Independently Trained military specialist along with technologies such as telemedicine. In addition, the Uniformed Services University of the Health Sciences(USUHS) has a Federal school of medicine “educating physicians, public health practitioners, clinical psychologist and biomedical scientist to serve the United States as expert clinicians, innovators and leaders in times of peace and war.”⁹⁷

The DHA and MHS should leverage section 717 of the NDAA which sets the priority, “The primary mission of every military surgeon is to care for troops injured in battle.”⁹⁸ Military surgeons serve in combat and peacetime. When military surgeons are not directly involved in a conflict or combat, surgeons attain their skills through the MHS hospitals.⁹⁹ There are specific factors that limit the experience and training of surgeons in the MHS. The MHS is approximately a \$50 billion health care network serving approximately 1.4 million active-duty and their family, compared to the Veterans Administration (VA) which is a \$170-billion health care system serving approximately 9 million veterans.¹⁰⁰ The differences between military and civilian surgeons are the demographics of the people under their care. In the military the population consists of younger, healthier individuals typically with less underlying medical conditions. “Unlike civilian and VA hospitals, which serve large numbers of older patients needing surgery for heart disease, cancer and other ailments, military hospitals primarily serve active-duty

personnel and their families with an average age that is just under 30, at the peak of good health.”¹⁰¹ U.S. News completed a confidential survey of 140 U.S Army surgeons. Some of the questions in the survey were directed at maintaining skill set when not deployed, if they are performing as many procedures as their civilian counterparts, and when deployed if they were performing surgeries. Upon review, many of the Army surgeons felt they were not completing as many surgeries annually as their civilian counter parts, and when deployed were not practicing in their specialty area of surgery.¹⁰²

The military services face retention challenges once a fully qualified physician joins the service.¹⁰³ “The added stresses of deployments and the general perceptions of war, along with the potential for health care providers to earn significantly more money in the private sector, have caused some physicians to separate from military service once they have fulfilled their service obligation.”¹⁰⁴ In an attempt to improve the number of physicians needed in the military, Congress directed that, “The Secretary of Defense shall establish a Joint Trauma Education and Training Directorate to ensure that the traumatologists of the Armed Forces maintain readiness and are able to be rapidly deployed for future armed conflicts.”¹⁰⁵ Since Congress authorized the reform of the MHS in 2017, the lag in recruiting and training wartime capable physicians continues to be an issue for operational readiness. One option to alleviate this shortage is to consider reserve physician specialist, utilizing the reserve component, but the salary must be compatible with what physicians are making in their civilian jobs compared to the ranking promotions that the military uses. A shortfall of using the reserve component is that the reserve comes from the civilian workforce and is therefore limited by the already mentioned shortage of physicians in the civilian sector. The shortage of physicians in the military is a reflection of the shortage in the civilian sector, as Vice Admiral Bono previous director of the DHA stated,

“we’re very much a microcosm of what’s happening in the rest of the health sector in the United States.”¹⁰⁶

To adapt to the current operational environment, there have been small forward surgical teams created to maintain operational flexibility in regard to the golden hour mandate.¹⁰⁷ These teams are local to the POI when a higher level out of local area cannot be attained. These teams are comprised of about 20-30 people to include several surgeons known as Golden Hour Offset Surgical Treatment Teams (GHOST-T).¹⁰⁸ In addition to this an even smaller unit of one surgeon with an additional ten people or less is known as the Expeditionary Resuscitative Surgical Team (ERST).¹⁰⁹ The downfall of both GHOST-T and ERST is that the surgeons may be forward deployed but rarely performing medical operations in military missions with limited or no combat. Overtime, this can lead to a loss of key medical skills. “Frequent deployment without much operative experience combined with low volume, low acuity care when stateside makes military surgery increasingly unattractive.”¹¹⁰ This is where both the DHA and MHS can leverage their billets and capabilities to identify shortcomings in these areas to have less civilian surgeons at MTFs using active duty surgeons rotating them between high surgical volumes at MTF then rotating them to low-volume forward deployed area. The deployments timeframes vary depending on the service, but this is where the MHS and DHA can collaborate setting deployment timeframes for these specialized providers, and example of this may be for three months at a time.

There was also a bill, the Mission Zero Act (H.R.880), that was made to address this concern of funding military trauma teams embedded to work with and at civilian trauma facilities.¹¹¹ Unfortunately this bill passed by the House, but failed at the Senate on February 26,

2018.¹¹² It is strongly recommended for the MHS and DHA to consider the relevance and importance of such a bill to recruit and retain surgeons.

Additional Improvements to MHS Reform

The current COVID-19 crisis highlights the need for increasing the number of Respiratory Therapists (RT) in the MHS. The rise of lethal influenzas and other respiratory viruses such as SARS and MERS in the last century remind us that the current pandemic is not an isolated case. Therefore, any reform of the MHS should include training more RTs to protect the force and as in the current crisis, also help care for U.S. civilians.¹¹³

According to the Bureaus of Labor Statistics, RTs are one of the fastest growing occupations with a projected job increase of 21% from 2018 to 2028.¹¹⁴ While RTs entry level degree is an associate degree, some have a bachelor's degree. RTs hourly income is approximate \$29.48 a year or \$61,330 annually. In comparison Registered Nurses (RNs) entry level can be an associate degree RN, yet to serve as a RN in the military, entry level is a bachelor's degree. RNs hourly income averages \$35.24 or annually \$73,300, with an anticipated growth from 2018-2028 of 12%.¹¹⁵

Military RTs are Enlisted, and Military RNs are Officers. There are two recommendations to ensure the MHS is able to meet future needs of an increase demand in RTs . The first recommendation would be to raise entry level into the military as an RT to bachelor's degree and make RT's Officers to match the pay of what a civilian RT is generating. The second recommendation is entry level RTs with either associates or bachelor's degree enlist in the military and receive a retention bonus such as \$10,000 annually or \$40,000 for an additional 4-year commitment renewal with each reenlistment. RTs serve many roles in peace time at MTFs

from critical care to surgical areas. Currently for the enlisted RT pipeline for Army, Navy, is through three annual iterations at the Medical Education and Training Campus.¹¹⁶ Students will become Respiratory Specialist after completion of the two-phase program, which is an Associate's degree granting program, and have the chance to take National Certification to become an RT.¹¹⁷ With the DHA and MHS allocating civilian full-time equivalents (FTEs) in place of active duty FTEs, specialist such as RT that are mission critical for the future in an array of setting from combat casualty care, to prolonged care, transport of patient care, and to surgical care position should be prioritized for a ready medical force.

Adapting MHS Reform to the COVID-19 Crisis

Per LtGen Place, "Just as every Marine is a rifleman, every medical provider in our system is a generalist. While many of our health care providers normally do focus on specific diseases or specialties, they are trained to treat patients across the range of needs wherever they're called to serve. Agility is part of what we offer our nation every day."¹¹⁸ Although in a time of national shortage of medical professionals during the COVID-19 pandemic, military medicine is responding in unprecedented ways. The US military has been called to respond during this crisis from staffing field hospitals, augmenting civilian facilities, in addition to two hospital ships, the USNS Comfort and the USNS Mercy. Military medicine has responded when called, whether it be from the front lines or the home front. With the rapid response and development of a ready military force per Director, DHA, Lt.Gen Place, "It also means we must develop and sustain our own medical teams to be trained and ready to support the force. Shifting focus from this primary mission carries risk; however, after two decades of conflict, we are well prepared to both identify risk and develop strategies to mitigate it."¹¹⁹ A part of the rapid

response has been shifting healthcare professionals from administrative work to provide care for patients.¹²⁰ In addition, the Uniformed Services University of the Health Sciences, is graduating doctors and nurses early for the COVID response.¹²¹ The COVID situation and its response could potentially create second and third effects if commanders and not carefully considering each decisive action. The MHS goal is to maintain a ready force that is ready to deploy in support of the mission. Readiness is becoming harder to attain due to an “all-hands-on-deck” fight. As stated earlier, military specialist needs to be placed in the area of experience, but the current situation places them in a general area. The new nurses and doctors may be missing critical clinical experience that will ill prepare them for follow on assignments.

IV. Conclusion

The DHA oriented reform of the MHS is in the best interest of the country’s future if it medically prepares a ready force, improves patient outcomes, standardizes the delivery of care, provides cost-saving, while attaining the objectives of the NDS. It could also set the example for the civilian sector to follow. If transitioned appropriately, the DHA model can be successful in ensuring peacetime medical operations, but it must ensure that the reformed billets meet the most critical priorities of the U.S military health services, which are to provide world-class care, anytime, anywhere to its warfighters. The ongoing reform of U.S military medicine culture will take years, in the meantime the DHA will begin its transition from stateside to overseas military clinics and hospitals eventually administratively operating them by 2021.

The DoD must align the DHA in identifying centralized billets that provide standardization across the MHS, preparing medical personnel for complex operational environments potentially requiring longer levels of sustained care, and preventing a shortage in

mission critical specialized providers. The time is critical for military members to get on board with the DHA implementation for a unified joint medical force to sustain the U.S. competitive military advantages. Military leaders must encourage their staff that DHA is more than administrative oversight, it is a unified force, and that is what the future of conflict high survivability rate relies on.

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²Defense Health Agency, *Stakeholder Report*, (Falls Church, VA, 2018),2, <https://www.health.mil/Reference-Center/Reports>.

³US Department of Defense, *Defense Budget Overview Fiscal Year 2020 Budget Request* (Washington, DC: Office of the Under Secretary of Defense (Comptroller)/Chief Financial Officer March 2019),2-6, <https://dod.defense.gov/Portals/1/Documents/pubs/2018-National-Defense-Strategy-Summary.pdf>.

⁴ Military Health System Communications Office, “Combat Support Role of DHA Unique within DOD,” (December 30, 2019), <https://www.health.mil/News/Articles/2019/12/30/Combat-Support-Role-of-DHA-unique-within-DoD>.

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⁶ Bryce H.P. Mendez. Congressional Research Service. DOD’s Proposal to Reduce Military Medical End Strength. May 10, 2019. <https://crsreports.congress.gov>, p.1.

⁷ US Department of Defense, *Defense Budget Overview Fiscal Year 2020 Budget Request* (Washington, DC: Office of the Under Secretary of Defense (Comptroller)/Chief Financial Officer March 2019), 2-4.

⁸ US Department of Defense, *Defense Budget Overview Fiscal Year 2020 Budget Request* (Washington, DC: Office of the Under Secretary of Defense (Comptroller)/Chief Financial Officer March 2019), 2-5.

⁹ Defense Health Agency. *DHA Strategy Map Trifold*, (Falls Church, VA, October 17, 2019), <https://www.health.mil/Reference-Center/Reports>.

¹⁰ Defense Health Agency, “Combat Support,” accessed May 4, 2020, <https://health.mil/Military-Health-Topics/Combat-Support>.

¹¹ Military Health System Communications Office, “Changes to Military Health Care System Aimed at Readiness,” (December 6, 2019), <https://health.mil/News/Articles/2019/12/06/Changes-to-military-health-care-system-aimed-at-readiness>.

¹² US Department of Defense, *Defense Budget Overview Fiscal Year 2020 Budget Request* (Washington, DC: Office of the Under Secretary of Defense (Comptroller)/Chief Financial Officer March 2019), 2-5.

¹³ US Department of Defense, *Defense Budget Overview Fiscal Year 2020 Budget Request* (Washington, DC: Office of the Under Secretary of Defense (Comptroller)/Chief Financial Officer March 2019), 2-5.

¹⁴ US Department of Defense, *Defense Budget Overview Fiscal Year 2020 Budget Request* (Washington, DC: Office of the Under Secretary of Defense (Comptroller)/Chief Financial Officer March 2019), 2-5.

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- ¹⁵ US Department of Defense, *Defense Budget Overview Fiscal Year 2020 Budget Request* (Washington, DC: Office of the Under Secretary of Defense (Comptroller)/Chief Financial Officer March 2019), 2-5.
- ¹⁶ US Department of Defense, *Defense Budget Overview Fiscal Year 2020 Budget Request* (Washington, DC: Office of the Under Secretary of Defense (Comptroller)/Chief Financial Officer March 2019), 2-5.
- ¹⁷ US Department of Defense, *Defense Budget Overview Fiscal Year 2020 Budget Request* (Washington, DC: Office of the Under Secretary of Defense (Comptroller)/Chief Financial Officer March 2019), 2-3.
- ¹⁸ Defense Health Agency, *Stakeholder Report*, (Falls Church, VA, 2018),2, <https://www.health.mil/Reference-Center/Reports>.
- ¹⁹ Military Health System, “MHS Transformation,” accessed May 4, 2020, <https://health.mil/Military-Health-Topics/MHS-Transformation>.
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- ²¹ Military Health System Communications Office, “Changes to Military Health Care System Aimed at Readiness,” (December 6, 2019).
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- ²⁶ Defense Health Agency, *Stakeholder Report*, (Falls Church, VA, 2018), 6.
- ²⁷ Defense Health Agency, *Stakeholder Report*, (Falls Church, VA, 2018), 6.
- ²⁸ Defense Health Board, Office of the Assistant Secretary of Defense Health Affairs. *Combat Trauma Lessons Learned from Military Operations of 2001-2013*. Falls Church, VA. March 9, 2015, ES-1, https://jts.amedd.army.mil/assets/docs/publications/TraumaCTLL_Final_Revised_Compliant.pdf
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- ³⁰ Tanisha M. Fazal et al., “How Long Can the U.S Military’s Golden Hour Last?” October 8, 2018, <https://warontherocks.com/2018/10/how-long-can-the-u-s-militarys-golden-hour-last/>.
- ³¹ Tanisha M. Fazal et al., “How Long Can the U.S Military’s Golden Hour Last?” October 8, 2018.
- ³² Sean Snow, “No Guaranteed ‘Golden Hour’ for Marines headed into the Next Big Fight,” *Marine Corps Times*, (February 15, 2018), <https://www.marinecorpstimes.com/news/your-marine-corps/2018/02/15/no-golden-hour-for-marines-headed-into-the-next-big-fight/>.
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