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AN EXPLORATORY ANALYSIS OF THE FEASIBILITY OF DEVELOPING A COMBAT MEDIC PRIMARY MILITARY OCCUPATIONAL SPECIALIZATION WITHIN THE USMC

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AN EXPLORATORY ANALYSIS OF THE FEASIBILITY OF DEVELOPING A COMBAT MEDIC PRIMARY MILITARY OCCUPATIONAL SPECIALIZATION WITHIN THE USMC

by

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March 2022

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13. ABSTRACT (maximum 200 words)

In this thesis, I investigate whether the United States Marine Corps (USMC) would benefit from producing and regulating its own medical support personnel. Currently, USMC troops rely on United States Navy (USN) corpsmen (HMs) for lifesaving assistance in battle. HMs are not trained riflemen nor permanently assigned to USMC billets. The Department of the Navy (DON) allocates "blue" and "green" monies to the USN and USMC. USN human capital (HMs and chaplains) and other direct support commodities not covered by green-dollar allocations are acquired using "blue-in-support-of-green" (BISOG) resources. Utilizing an ex-ante cost–benefits analysis methodology framework, I performed a feasibility analysis to compare two possible courses of action (COA). Each COA assumes annual throughput of 2,000 enlisted personnel and redistribution of existing USMC enlisted end-strengths to accommodate a combat medic primary military occupational specialty (PMOS). COA-1 uses the field medical training battalion platform to train USMC combat medics and would cost $24.3M annually. COA-2 utilizes the medical education and training campus training pipeline with an annual cost of $26.7M. Comprehensive cost comparisons between the status quo and COAs were not achieved due to ambiguity in BISOG budgeting toward procuring HMs. However, both COAs provide additional non-monetary benefits, including improved medical training interoperability, personnel continuity, force resilience, and diversity.

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In this thesis, I investigate whether the United States Marine Corps (USMC) would benefit from producing and regulating its own medical support personnel. Currently, USMC troops rely on United States Navy (USN) corpsmen (HMs) for lifesaving assistance in battle. HMs are not trained riflemen nor permanently assigned to USMC billets. The Department of the Navy (DON) allocates "blue" and "green" monies to the USN and USMC. USN human capital (HMs and chaplains) and other direct support commodities not covered by green-dollar allocations are acquired using "blue-in-support-of-green" (BISOG) resources. Utilizing an ex-ante cost–benefits analysis methodology framework, I performed a feasibility analysis to compare two possible courses of action (COA). Each COA assumes annual throughput of 2,000 enlisted personnel and redistribution of existing USMC enlisted end-strengths to accommodate a combat medic primary military occupational specialty (PMOS). COA-1 uses the field medical training battalion platform to train USMC combat medics and would cost $24.3M annually. COA-2 utilizes the medical education and training campus training pipeline with an annual cost of $26.7M. Comprehensive cost comparisons between the status quo and COAs were not achieved due to ambiguity in BISOG budgeting toward procuring HMs. However, both COAs provide additional non-monetary benefits, including improved medical training interoperability, personnel continuity, force resilience, and diversity.

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LIST OF ACRONYMS AND ABBREVIATIONS

BAH	Basic Allowance for Housing
BISOG	Blue in Support of Green
BRAC	Base Realignment and Closure
BUMED	Bureau of Medicine and Surgery
CBA	Cost–Benefits Analysis
CMC	Commandant of the United States Marine Corps
CNA	Center for Naval Analyses
DOD	Department of Defense
DON	Department of the Navy
DOW	Died of Wounds
E&T	Education and Training
FMF	Fleet Marine Force
FMST	Field Medical Service Technician
FMTB	Field Medical Training Battalion
HM	Hospital Corpsman
HSS	Health Services Support
KIA	Killed in Action
MAGTF	Marine Air-Ground Task Force
METC	Medical Education and Training Campus
MOS	Military Occupational Specialty
MTF	Military Treatment Facility
NPV	Net Present Value
PMOS	Primary Military Occupational Specialty
SAT	Systems Approach to Training
SOP	Standard of Practice
TCCC	Tactical Combat Casualty Care
T&R	Training and Readiness
USMC	United States Marine Corps

USN	United States Navy

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First, I want to thank God for his grace, which enabled me to complete this thesis. I would also like to express my sincere appreciation to Dr. Yu-Chu Shen and Dr. Chad Seagren for their selfless and unwavering support throughout this research process. Their guidance, creativity, and recommendations were incredibly constructive, and I owe them both a huge debt of gratitude.

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I. INTRODUCTION

Increases in global threats and appropriation divestiture cuts have compelled the United States Marine Corps (USMC) to make drastic changes to confront principal institutional challenges. The USMC is undergoing significant changes to address the organization's primary challenges and strengthen its capacity to deliver the healthcare needs of USMC service members. The USMC's *Force Design 2030* policy aims to modernize the Corps' bureaucratic culture, divest itself from obsolete warfare equipment, upgrade its technological inventory, and enhance the quality of its human capital. The objective is to evolve into a lethal and light war organization with a broader range of force options and capabilities to eventually achieve the benefits of mass without the drawbacks of being cumbersome (Williams, 2020). The USMC's doctrine relies heavily on expeditionary maneuver warfare, amphibious forcible entry, and sustained operations ashore (Augier & Barrett, 2020).

The USMC's approach to warfare distances combatants from staged facilities equipped to reduce Marine combat mortality; this concept of operations can create healthcare delivery challenges if troops are to operate within an hour of surgical access. To overcome such obstacles, the United States Navy (USN) and USMC developed mobile medical teams capable of bringing advanced medical and surgical care to the forward areas of the battlefield. U.S. Navy hospital corpsmen (HM), also known as field medical service technicians (FMSTs), are purchased personnel augmentations assigned to USMC battalions. FMSTs are frontline lifesavers and care extenders for USMC Infantrymen and women by their ability to deliver emergency medical intervention at the point of injury or attack.

A. RESEARCH PROBLEM

Although FMSTs receive extensive education and training to prepare them for assignment with the operational forces, they do not possess the weapons familiarity, warrior instincts, or tactical knowledge that qualify them as riflemen. FMSTs are not combatants, and as described by Article 24 of the Geneva Convention, medical personnel

are “protected in all circumstances” in war unless they commit “acts harmful to the enemy” (Mull, 2016, p. 496). FMSTs are also not permanently assigned to USMC billets for the entirety of their Navy career. Therefore, a lack of continuity inhibits FMSTs’ development of long-term, individual commitment to the USMC and the principles necessary to develop the USMC’s warrior ethos. These tenets are designed to instill an ethical dimension that places personal achievement within the framework of a time-tested, fearless warrior heritage (Singleton & Alan, 2012). Marines are taught mental discipline and mandated to continually study the art of war, including through professional military education (Singleton & Alan, 2012). The USMC emphasizes common skills training, decision-making at even the lowest ranks, maneuver warfare tactics and techniques, risk-management, force protection, and the USMC’s history. FMSTs are exposed minimally to these concepts, as their primary focus resides with delivering quality healthcare.

Most leaders understand how to construct cohesive units given adequate time and unit stability, but maintaining unit cohesion in the face of continuous rotations in and out of a battalion is difficult for even the most seasoned commander (Nash, 2011). Staff rotations are prevalent in the U.S. military. Following the typical three-year USMC (green-side) tour, FMSTs are frequently billeted back into conventional USN ashore (hospital and clinic) or ship (maritime) rotations. Although the USMC has thrived using this framework, it can be argued that constant turnover undermines unit cohesion and troop resilience. High staff turnover or transitions in the continuum of care could also pose a problem. Whether the patient is transported from one site to another, from the point of impact to the point of evacuation, or in the same area of operations, care transitions are unavoidable in healthcare delivery. Nevertheless, a patient’s overall treatment plan is influenced by how well medical providers and new caregivers communicate. Clinically critical information can prove detrimental if it is not provided effectively and swiftly during these transitional phases in patient care (Paine & Millman, 2009). Whether healthcare is provided in a brick-and-mortar military treatment facility or Tactical Combat Casualty Care (TCCC) is delivered in the field during combat operations, it is in the patient’s best interest to experience the fewest possible clinical staff handoffs during the treatment process.

As the USMC tackles organizational restructuring, assessing the current health services support (HSS) arrangement between the USMC and USN is of unique value. There is also limited information on how the USMC structure might benefit from generating and managing its enlisted combat medic inventory organically. Blue-in-support-of-green dollars fund the procurement of USN medical professionals while allowing the USMC the flexibility to staff other military occupational specialties (MOSs) and achieve lethality objectives. However, these monetary allocations may be more prudently invested in other initiatives.

B. RESEARCH QUESTIONS

This thesis conducts a cost feasibility analysis to identify the cost-effectiveness of developing a combat medic primary military occupational specialty (PMOS) within the USMC. The primary research questions of this thesis are as follows:

1. What are the cost and benefit components of developing a combat medic PMOS within the USMC?
2. How do the proposed alternate courses of action compare to the status quo?

Secondary research questions are as follows:

3. How would current USMC turnover practices affect a combat medic's clinical skills sustainment requirements?
4. What are the organizational and cultural impacts of having a combat medic PMOS within the USMC?
5. Has combat morbidity and healthcare delivery declined?
6. How can a combat medic PMOS affect diversity within the USMC?

C. PURPOSE OF THE STUDY

This study explores whether developing a combat medic PMOS for the USMC is more economical than maintaining the current status quo. By conducting an exploratory analysis of the cost-effectiveness and feasibility of implementing a combat medic PMOS

for the USMC, this study aims to bridge the information gap of modernizing the USMC per the National Defense Strategy while remaining within the organization's budgetary constraints. This research furthers the policy debate on whether allocating troops to accommodate a new enlisted PMOS in the USMC, utilizing the current congressionally approved end-strength, is more beneficial culturally and fiscally than paying the overhead costs associated with procuring human capital (medical staff) from the Navy. Affordable and accessible healthcare is vital for any government and, from a military perspective, can contribute to minimizing combat mortality on the battlefield, as well as become a force multiplier (Benov et al., 2016).

Therefore, this study may serve as a tool to equip USMC leadership with additional options to expand appropriation allocations as it seeks revolutionary ways to redistribute the force structure. If expenses can be significantly lowered, medical personnel (USMC combat medics) can continue to serve in USMC billets, the quality of care supplied will remain constant or improve, and pre-obligated resources may be reallocated to other initiatives that contribute to the goals of the USMC's *Force Design 2030* (United States Marine Corps [USMC], 2020).

D. STUDY DESIGN

The overall strategy employed to carry out this research was to first identify all stakeholders and programs within the scope of this feasibility study, including the Department of Defense (DOD), the Department of the Navy (DON), the USMC's and USN's leadership, the Medical Education and Training Campus (METC), and DON servicemembers. It also captures existing inventory from the commandant of the United States Marine Corps (CMC) 's Budget Submitting Office 27, calculates current medical training costs, and compares them to the recommended course of action. This thesis discusses a USMC medical education and training (E&T) taxonomy for categorizing activities—initial training, sustainment training, and professional development—as well as the sort of medical capabilities they provide—contemporary medicine, military medicine, or service-specific military medicine. In addition to identifying inventory, this study

examines each E&T stakeholder's organizational structure, mission, resources, and shared E&T functions.

Last, this thesis examines various options for the USMC to consider if the organization is willing to develop an enlisted force to replace traditional FMST personnel without degrading other MOSs currently accounted for. This research also examines ways to maximize fiscal constraints by considering interservice medical training pipelines. Finally, an analytical framework in the form of a feasibility analysis is provided for the USMC to decide whether the alternative course of action improves the enterprise's ability to fulfill USMC objectives, ensures combat effectiveness and readiness, and is practicable and cost-effective.

E. SUMMARY OF RESULTS

The costs of developing a combat medic PMOS depend on the modality used for initial training. The USMC has already established the Field Medical Training Battalion (FMTB) at two U.S. locations. Utilizing this option is the most cost-effective approach. The other alternative would be to tap into the METC platform and use the U.S. Army combat medic 68W training pipeline. This route would be more expensive to the USMC, with a net present value of $934 per student, a difference of $1.87M annually with a student throughput of 2,000.

Historic USMC turnover practices are problematic in developing a ready medical force, and healthcare practitioners require continuous clinical skills sustainment. Separating 75% of the combat medic inventory on an annual basis would leave the Fleet Marine Force (FMF) with an inexperienced HSS. Such a scenario could drastically reduce the combat survivability of USMC personnel in combat operations. However, combat morbidity continues to improve at rates exponentially better than what was experienced during the Vietnam War. Improved medical intervention at the point of injury, coupled with technological advances, has substantially increased survivability on the battlefield and healthcare delivery overall.

Moreover, instituting a combat medical PMOS would inadvertently increase diversity based on trends in recurrent USN hospital corpsman demographics and healthcare

organizations within the private sector. Women and minorities continue to gravitate toward health sciences, and there is a clear clinical advantage to having culturally competent healthcare delivery.

Furthermore, continuous rotations of healthcare personnel negatively affect esprit de corps and resilience, and these are not guaranteed personnel outcomes. Esprit de corps and resilience are essential components in warfare, unit cohesion, and combat effectiveness. Having Marines serve the healthcare needs of fellow Marines ensures that institutional expectations remain intact and the warrior ethos is taught and nurtured, likely resulting in a decrease of post-traumatic stress among healthcare providers after serving in combat operations.

F. THESIS OVERVIEW

Chapters II and III of this thesis discuss the study's institutional context and current state of affairs and then present literature on military learning best practices, medical training interoperability enhancement and measurement, the use of virtual/3D technology to aid medical training, and the social science behind unit cohesion. Several challenges that are difficult to quantify are discussed in subsequent chapters—including implementation concerns, interoperability issues in the DOD, unilateral billet reductions, assignment optimization, and human-capital maximization in the USMC—and highlighted to provide a clear perspective on the current state of affairs within the DON.

Chapters IV and V examine the USMC's turnover strategy, clinical sustainment requirements for medical personnel, resiliency, and the psychological impact of deployments on healthcare professionals compared to the combatants they serve alongside. This research also delves into the importance of diversity and inclusion and why introducing a combat medic PMOS would likely increase multiculturalism among the USMC's enlisted ranks. The final section of this thesis discloses the implications of the feasibility analysis, recommends a course of action, and addresses the study's shortcomings.

II. INSTITUTIONAL BACKGROUND

This chapter addresses the status quo between the USMC and USN regarding HSS. It will explain how DON monetary allocations are distributed, discuss the FMTB training pipeline and provide an overview of combat morbidity trends since the Vietnam War.

A. CURRENT HSS ARRANGEMENT BETWEEN THE USMC AND USN

The USMC is the only branch within the DOD that does not possess its own medical department. Therefore, the budgetary provisions, personnel, and training structure are unique. This portion of the thesis addresses distinctions exclusive to the USMC and USN HSS arrangement.

Both the USN and USMC are part of the DON. In the DON's budget, "blue dollars" and "green dollars" refer to appropriations for the Navy and Marine Corps. USN blue-dollar funding allocations for the USMC are called "blue in support of green" (BISOG). BISOG funding is used to acquire, operate, and maintain USMC aircraft and to purchase USN human capital (e.g., HM and chaplains) and other direct support items not covered by green-dollar appropriations (Harrison & Daniels, 2020). Approximately $15 billion is spent annually in support of BISOG initiatives, representing one-third of DON dollars expended to fortify USMC objectives. These estimates are based on the DON's funding by service component from FY19 to FY21. Still, they do not capture the precise breakdown of blue-in-support-of-green monetary contributions toward the USMC's HSS. Figure 1 illustrates DON budget allocations between blue, green, and BISOG funding.

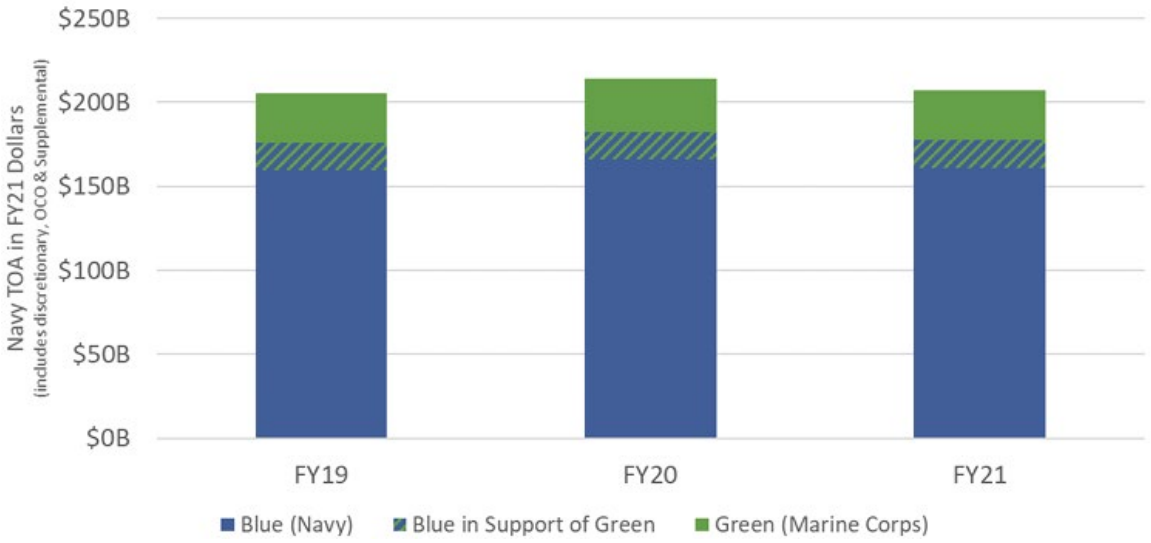


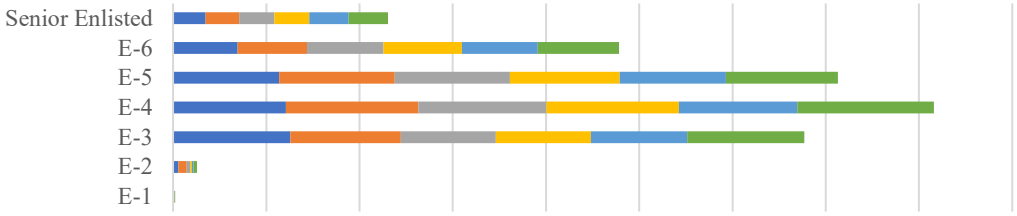
Figure 1. DON Funding by Service Component, FY19–FY21.
Source: Harrison and Daniels (2020).

The Bureau of Medicine and Surgery (BUMED), at the Navy Medicine's headquarters, is overseen by the surgeon general of the Navy. The CMC and USMC staff agencies receive guidance on all USMC health-related issues from BUMED, which is responsible for all Defense Health Program resources allocated to the DON (Mallon, 2019). Personnel assigned to BUMED are accountable for providing medical support to the FMF across four Marine Air-Ground Task Force (MAGTF) components, including command, ground combat, air combat, logistics combat, and logistics elements. HSS utilizes healthcare practitioners, technical innovation, and logistics to support the servicemembers of the FMF (USMC, 2012). Through HSS, on-demand healthcare capabilities—personnel, facilities, and equipment—are delivered to the warfighter to maintain a healthy, fit, and medically ready force. The goal of HSS is to protect the deployed force from health hazards and provide essential care for battle casualties. This thesis focuses only on the personnel component.

HM is a highly specialized enlisted occupation within the USN. HMs receive initial Bootcamp Indoctrination Training and Basic and Advanced Hospital Corpsman School and then attend the USMC-sponsored FMTB, previously known as Field Medical Service School. The FMTB is the USMC's designated training pipeline to prepare sailors (HMs)

to provide HSS to the FMF during combat operations and ashore in garrison. Based in Camp Pendleton, California, and Camp Lejeune, North Carolina, the FMTB is eight weeks long and divided into didactic instruction and practical clinical applications. The training emphasizes field medicine by applying TCCC principles (Kotwal et al., 2013). Before reporting to the USMC operational forces, all enlisted medical department personnel who have not previously served in an FMF billet must attend an approved course of study at one of the schools (USMC, 2012).

HMs who have completed the FMTB curriculum receive a Navy enlisted classification of HM-L03A and are considered qualified FMSTs (USMC, n.d.). Upon graduating from the FMTB, FMSTs are sent to one of four combat elements under the MAGTF. After one year of service with a USMC unit in which the sailor has assimilated into USMC culture; demonstrated an understanding of USMC history, fundamentals, doctrine, and other applicable subjects relevant to the FMF; and applied this knowledge in practice, the FMST is authorized to take a written and oral assessment to achieve official designation as an FMF warfare-qualified HM. Figure 2 details the inventory of HMs attached to USMC units from FY16 to FY21.



	E-1	E-2	E-3	E-4	E-5	E-6	Senior Enlisted
FY16	6	56	1,259	1,212	1,140	691	349
FY17	3	92	1,183	1,419	1,238	746	359
FY18	6	37	1,020	1,374	1,235	821	379
FY19	1	18	1,019	1,420	1,177	840	374
FY20	2	17	1,032	1,269	1,140	813	421
FY21	2	37	1,256	1,467	1,199	873	423

Figure 2. USMC Hospital Corpsman Inventory, FY16–FY21.
Adapted from U.S. Navy Personnel Command (2021b).

Table 1 itemizes the cost incurred for an E-2 with fewer than two years of service and attending the USMC's FMTB.

Table 1. Annual Billet Costing Summary for an FMST (Status Quo). Source: DOD Cost Assessment Data Enterprise (2021).

Billet Costing Details (Annual)	
Cost Type	Annual Cost
Base pay	$24,008.40
Retired pay accrual (RPA)	$8,378.93
Basic allowance for housing (BAH)	$3,999.62
Basic allowances for subsistence (BAS)	$4,638.00
Training	$5,712.00
PCS/Relocation	$2,270.65
Miscellaneous expenses	$5,648.48
Medicare-eligible retiree health care (MERHC)	$4,911.00
Education assistance	$298.00
Recruitment & advertising	$755.00
Additional labor cost	$0.00

Note. Cost calculations are based on an E-2 with < 2 years of service.

Table 2 shows the average monthly enlisted end-strength for the USMC in FY21. End-strengths represent congressionally approved human capital by rank within the USMC. To accommodate an additional (new) PMOS, the CMC would need to redistribute from forces previously allocated towards other enlisted military occupational specialties. The strategic, operational, and tactical apportion of the USMC enlisted workforce is beyond the scope of this thesis. However, it is crucial to understand how the scarcity of human resources influences the likelihood of implementing a combat medic PMOS due to implications that could positively or negatively affect mission readiness.

Table 2. Average Monthly USMC Enlisted Personnel End-Strengths by Pay Grade, FY21. Adapted From Military Personnel, Marine Corps (2021).

Sergeant Major of the USMC	1
E-9	1,576
E-8	3,962
E-7	8,519
E-6	14,632
E-5	24,215
E-4	55,465
E-3	44,871
E-2	19,242
E-1	9,708

Note: Courses of Action 1 and 2 would require reallocation of personnel from congressionally approved USMC enlisted end-strengths.

B. COMBAT MORBIDITY TRENDS IN CURRENT USMC HSS

Combat casualty care is evolving. The DOD and its subordinate service branches regularly benchmark best practices from the private sector and coalition partners to ultimately reduce battlefield mortality. It is vital to understand how casualty care has matured over time when assessing whether organizational practices must be reformed.

In considering the viability of establishing a new USMC PMOS to address HSS, it is critical to evaluate present battlefield healthcare delivery to determine whether institutional changes are needed. The USMC Inpatient Data File contains information on 78,756 Marines who were injured or incapacitated in battle between 1964 and 1972 during the Vietnam War. This group was responsible for 120,017 combat-related inpatient admissions, including for one or more classifications of accidents, poisonings, or assaults (Palinkas & Coben, 1985). Demographically, most Marines sent to Vietnam had fewer than three years of service and were under the age of 25 (Palinkas & Coben, 1985). Casualties were highest in the First and Third Marine Divisions. Multiple open wounds were the most common primary diagnoses, with the majority affecting the lower extremities. More than half of the wounds and injuries were caused by gunshots, explosives, and tripwires. Three-quarters of those injured were treated at naval hospitals, naval hospital ships, medical dispensaries, or the Da Nang Naval Support Activity (Palinkas & Coben, 1985).

Other injuries sustained were treated in battalion aid stations and field hospitals operated by the USMC. Half of the patients, who could eventually resume combat operations, were brought directly from the battlefield, and the remainder were triaged and relocated from other medical facilities. Peculiarly, the mortality rate of Marines trended lower than their Army counterparts in Vietnam and previous conflicts. Although a precise explanation cannot be ascertained, it is reasonable to assume that the quality of combat casualty treatment offered to the USMC was superior to that provided to Army combatants.

Combat operations in recent wars (i.e., Iraq and Afghanistan) have highlighted both accomplishments and opportunities for further developing casualty care. Out-of-hospital care for war casualties is an essential component of battlefield emergency medicine. Maintaining accurate patient information during armed engagements can assist medical professionals and researchers in revising treatment regimens that improve patient outcomes. For casualty-tracking purposes, the USMC's TRAC2ES Tracking System is used to document the wounded, ill, and injured. TRAC2ES provides real-time patient tracking from the point of injury throughout the echelons of medical care and is critical for the safe movement of patients. The system is a web-based technology that optimizes internet usage while safeguarding personally identifiable patient information, force strength, and ground intelligence. It superseded previous iterations of patient movement software such as the Defense Medical Regulation Information System, the Automated Patient Evacuation System, and the Theater Army Medical Management Information System, as the medical regulation paradigm (USMC, 2012). Data gathered from TRAC2ES feeds into the Navy-Marine Corps Combat Trauma Registry (Bridges & Evers, 2009).

According to Holcomb et al. (2006) in an article for the *Journal of Trauma, Injury, Infection, and Critical Care*, as of the fourth year of the Afghanistan campaign, the combat fatality rate among U.S. servicemembers was nearly 50% of mortality in Vietnam and 33% of mortality in WWII. In Afghanistan, 6.7% died of wounds (DOW), while in Iraq, 4.7% did; the percentage killed in action (KIA) in Afghanistan was 18.7% yet 13.5% in Iraq. In contrast, of the servicemembers who died in WWII and Vietnam, 88% were KIA, and only 12% DOW (Holcomb et al., 2006). DOW rates would have likely been more significant if not for new damage control techniques and technology, such as improved intensive care

unit practices, faster detection of abdominal compartment syndrome, and unrestricted utilization of blood products (Holcomb et al., 2006). These and other adjustments in medical procedures undertaken on the battlefield have led to a considerable drop in the four-year case fatality rate across the theater compared to earlier conflicts (Holcomb et al., 2006).

Nevertheless, it is fair to assume that some of this reduction is due to widespread usage of improved body armor, as preliminary data indicated that chest wounds were relatively lower than in past conflicts. The decrease in KIA percentages demonstrates this finding. Additional causes may include the successful deployment and transfusion of blood products and a greater emphasis on prehospital TCCC training, combined with timely troop evacuations (Holcomb et al., 2006). Tables 3 and 4 provide a snapshot of the statistics previously mentioned.

Table 3. U.S. Military Combat Casualties in WWII, Vietnam, Iraq, and Afghanistan, October 2001–October 2005. Adapted from Holcomb et al. (2006).

Casualty Type	WWII[a]	Vietnam[b]	Iraq/ Afghanistan
KIA	152,329	38,281	1,266
DOW	20,810	4,983	383
Admitted & evacuated[c]	581,586	148,323	7,548
RTD	~150,000	82,092	8,304
WIA	752,396	235,398	16,235
TOTAL	904,755	273,679	17,501

Note. KIA = killed in action; DOW = died of wounds; RTD = returned to duty in 72 hours; WIA = wounded in action. (WIA = RTD + Evacuated + DOW.)
[a] WWII data do not include air combat wounded.
[b] Vietnam data do not include 653 MIA or air combat wounded.
[c] Admitted and evacuated = not RTD in 72 hours.

Table 4. U.S. Military Combat Casualties in Iraq and Afghanistan, October 2001–October 2005. Adapted from Holcomb et al. (2006).

Combat Operation	WIA	RTD	Evacuated	DOW	KIA
Iraq	15,575	8,061	7,159	355	1,170
Afghanistan	660	243	389	28	96
Total	16,235	8,304	7,548	383	1,266

Note. KIA = killed in action; DOW = died of wounds; RTD = returned to duty in 72 hours; WIA = wounded in action; admitted and evacuated = not RTD in 72 hours. (WIA = RTD + Evacuated + DOW.)

Another noticeable trend is that despite significant decreases in observable KIAs, larger percentages of service members died after being evacuated to military treatment facilities (MTFs). Case fatality rates have gone down, but the number of people who die at MTFs has nearly doubled (Holcomb et al., 2006). Many of the more severely injured casualties who would have been killed before accessing MTF care (KIA) now perish following prompt evacuation to MTFs, altering their categorization to DOW. These discoveries reveal that further resources and research should be concentrated on post-evacuation types of casualties.

C. CHAPTER SUMMARY

The DON includes the USN and USMC. Blue dollars and green dollars comprise Navy and Marine Corps appropriations in the DON's budget. BISOG funds are used to purchase USMC aircraft, USN human capital (e.g., HMs and chaplains), and other direct support commodities not covered by green-dollar appropriations. The Navy's surgeon general reports to the chief of naval operations and oversees BUMED, which manages the DON's Defense Health Program resources and advises the CMC and USMC staff agencies on all USMC health matters.

HM is a highly specialized enlisted USN occupation. HMs who serve with the USMC attend the FMTB prior to their tour of duty. The FMTB is the USMC's approved training pipeline for sailors (HMs) to support the FMF.

Overall, it is evident that developments in field medicine and technological advancements on the battlefield have significantly reduced combat morbidity in the USMC. TRAC2ES and the Navy-Marine Corps Combat Trauma Registry use forward clinical datasets to investigate the long-term rehabilitative effects of combat injuries. Data suggest that the current USMC HSS arrangement continues to reduce the rate of preventable deaths and battlefield mortality.

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III. LITERATURE REVIEW

This overview of the literature briefly examines best practices in military learning, ways to improve and measure medical interoperability, the future of combat medic training, and perspectives on unit cohesiveness. Subsequent chapters tie these topics to impact categories to evaluate the feasibility and discuss challenges of the USMC's developing its own medical support.

A. THE MILITARY AS A LEARNING ORGANIZATION: ESTABLISHING BEST-PRACTICE FUNDAMENTALS IN LESSONS LEARNED

Military learners adapt and persist in educational settings by leveraging deeply ingrained military traits and dispositions such as self-discipline, mission-first emphasis, and dependence on knowledge and experiences from fellow uniformed service members. Developing a combat PMOS would require an investment in Training. This includes but is not limited to military learner retention models that have multiple learning modalities and delivery methods, student resources as are necessary for success, recognition of military learner paths across various institutions, and generalizable applications that benefit military students.

Field medicine training is critical for USMC to establish its own medical support. An article by Dyson (2019) in *Defence Studies* reviews the literature on dynamic organizational skills to define an "ideal form" of military learning. It reveals critical components of best practices in structured military learning procedures. Dynamic organizational skills are defined as the ability to "integrate, build, and reconfigure internal and external competencies to address rapidly changing conditions" (Dyson, 2019, p. 108). They enable educators to contribute to the body of academic knowledge required for military learners by identifying critical processes and activities that promote formal organizational education and support field-based military adaptation while integrating fundamental knowledge into more extensive military activities (Dyson, 2019).

Surprisingly, Dyson (2019) dismisses the notion that previously acquired knowledge or lessons learned in blood will help the military overcome its inclination to

adjust, improvise, and reproduce. Instead, the author suggests that factors such as bureaucracy, culture in the workplace, and sociopsychological dynamics can obstruct the acquisition of new information. Therefore, understanding the underlying characteristics of efficient formal learning methods helps military organizations adapt, replicate, and innovate (Dyson, 2019).

B. ENHANCING AND MEASURING MEDICAL INTEROPERABILITY FOR ENLISTED MEDICAL PERSONNEL

The call for standardized training and a mechanism for military medical personnel to interact efficiently and comprehend each other's expertise is strengthening as medical professionals are increasingly blended in forward-deployed clinical settings (Thie et al., 2009). This thesis offers a course of action that capitalizes on a joint training environment that may provide long-term integration and efficacy of medical forces.

The initial push for medical interoperability reform began in 2005 with the Base Realignment and Closure (BRAC) Commission's proposals, followed in 2006 by reiterative recommendations in the *Quadrennial Defense Review*. These two resources advocate restructuring healthcare E&T pipelines to improve interchangeability and interoperability among medical professionals and organizations throughout the armed services (Thie et al., 2009). The BRAC study suggests medical training consolidation and identifies Fort Sam Houston, Texas, as the ideal destination to capitalize on economies of scale and collaborative training opportunities. The *Quadrennial Defense Review* emphasizes the importance of preparing health care professionals for success in collaborative, performance-based settings.

Wilson et al. (2017) explain, "While there are adequate definitions and objectives for interoperability, no recognized scale exists to analyze or explain the various levels of interoperability among military medical units" (p. 1735). While the *levels of conceptual interoperability* model are helpful for modeling data exchange in software applications and simulation analysis, it is an ineffective tool for measuring joint forces' medical interoperability (Wilson et al., 2017). This disparity restricts the ability to analyze the compatibility and efficiency of medical personnel or opportunities to enhance the

interoperability of forces through research and development. Wilson et al. (2017) present a methodology with a defined system of measurement to identify and improve interoperability, proposing that interchangeable collaboration is superior to interoperable functionality but admitting that achieving a synonymous workforce is unlikely.

C. FUTURE COMBAT MEDIC TRAINING MODALITIES

Medical professionals can learn non-technical skills through simulation, reducing the risk of patient harm and increasing patient safety. Research has shown that high-fidelity simulation programs can improve organizational performance and teamwork. Technological advances in trauma training and simulation are practical teaching tools with numerous medical field applications and could significantly minimize combat medic training costs.

Mannequins are an essential aspect of combat medic training; however, they are not always readily available or fully functional. As Brown et al. (2016) explain, "In the absence of an instructor, 3D virtual settings can provide a risk-free environment for teaching, practicing, and reinforcing triage and treatment skills" (p. 1). The combat medic application developed for U.S. Army combat medics (68W MOS)—a software platform for trauma simulation—takes an incremental approach to field medicine. It focuses on the top three preventable causes of death among coalition forces on today's battlefield: tension pneumothorax, massive hemorrhage, and airway management (Brown et al., 2016). Brown et al. (2016) maintain, "The application's goal is to simulate a standard simulation experience without the requirement for instructor-driven physiological responses" (p. 1). The program offers a variety of training modes, such as self-directed role-playing and group training and instructor-guided simulations for groups and individuals (Brown et al., 2016). Each game session is available for remote or on-site access, and it is available for instructor review once simulations are completed.

D. FULL-SPECTRUM SOCIAL SCIENCE FOR A BROADER VIEW OF COHESION

Military members who have strong social ties tend to be better able to deal with stress, sadness, and other forms of trauma. Individuals from varying backgrounds,

perspectives, and ideals can work together to form a cohesive team. To foster cohesion, one must participate actively in meaningful discussions and take advantage of opportunities to build trust with your colleagues. Marines who care for Marines (medically) are more likely to achieve unit cohesion that benefits combat effectiveness and lethality than service members from peripheral service affiliations.

Coherence is critical for any armed group that specializes in organized violence. Cohesion is at the heart of every military's strategy—and vital in developing force as well as its control and use. Thus, all armed forces must consider cohesion and invest in it (Käihkö & Haldén, 2020).

Military cohesion is vital to both practitioners and researchers. Military planners must determine how to prepare their troops for future battles. Notably, immediate post-war academic interest in military cohesion has expanded, but subsequent research has emphasized the relevance of groups that fulfill soldiers' urgent needs. Micro-level theories of military cohesion persist despite broader and critical viewpoints (Käihkö & Haldén, 2020). In sum, Käihkö & Haldén (2020) argue that military cohesion needs to be broadened by harmonizing its micro, meso, and macro levels.

E. CHAPTER SUMMARY

Recognizing the fundamental principles of efficient formalized learning processes, as well as identifying an "ideal form" of military learning, can help military organizations adapt, replicate, and innovate. Technology in education saves costs and could benefit when implementing a new PMOS. In the absence of instructors, 3D virtual environments provide a low-cost training option for teaching, practicing, and reinforcing triage and treatment skills.

A practical framework that allows military medical personnel to collaborate efficiently and understand one another's knowledge becomes increasingly important when medical professionals are integrated into forward-deployed medical environments. Moreover, consolidating enlisted medical E&T exploits economies of scale and enhances collaborative training opportunities. Even while interoperability standards and objectives exist, there is no recognized scale for assessing or explaining military medical unit

interoperability. With this gap, medical interoperability cannot be evaluated appropriately. A scale with defined metrics can help identify deficiencies and improve interoperability.

Furthermore, any armed group that specializes in coordinated violence requires a strong sense of unity within its personnel. Unit cohesion is critical to combat effectiveness, and this concept is necessary for any successful military force.

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IV. ANALYSIS OF ALTERNATIVE COURSES OF ACTION

A cost-benefit analysis (CBA) is a systematic, analytical process for comparing advantages and disadvantages in determining the acceptability of a project or program, typically of a social character. CBAs attempt to answer problems such as whether a proposition is worthwhile, how to determine the appropriate size of a given project, or what the relevant constraints are. A CBA is critical to policymaking and has emerged as a formal business method for obtaining educated decisions about allocating society's scarce resources. It helps to illustrate the essential effects of various regulation choices—both favorable and unfavorable—and inform an agency and the public about whether the advantages of a policy are likely to outweigh the costs, or feasible alternatives are the most cost-effective. According to the Office of Management and Budget's (2003) Circular A-4, CBAs provide decision-makers with clarity on the "alternative" that provides the "largest" benefits to society.

According to Boardman et al. (2017) *Concepts and Practice,* CBAs are grouped into three categories: ex-ante, ex-post, and medias res. Ex-ante analysis—the most common CBA—assesses a project as it is being considered, ex-post analysis studies a project after it has been completed, and medias res analysis is performed during implementation. The analysis of this thesis follows the framework of an ex-ante CBA method, although an official CBA was not undertaken due to a lack of information.

The data provided in this thesis do not offer monetization of benefits—an essential piece of most CBAs. As a result, only a cost feasibility analysis is provided. If a CBA were employed, the steps taken would closely follow those detailed by Boardman et al. (2017) in their book *Cost-Benefit Analysis: Concepts and Practice*.

1. Specify the Set of Alternative Projects

In Step 1, the analyst "must specify the list of suggested alternatives" (Boardman et al., 2017, p. 7). In this instance, the USMC would be reconsidering the status quo—utilizing the USN's HMs for HSS—and instead, contemplate relying on USMC combat medics trained at the FMTB or METC.

2. Decide Whose Benefits and Costs Count

Following the establishment of the alternatives, Step 2 involves "determin [ing] who has standing, i.e., whose benefits and expenses should be examined" (Boardman et al., 2017, p. 9). This thesis takes a national perspective in which American taxpayers, the DON, and USMC have standing and are in the best position to decide on this scenario.

3. Catalog the Impacts and Select Measurement Indicators

In Step 3, the analyst defines the measurement indicators, lists the immediate consequences of the options as benefits or costs, and "use [s] the term impacts to refer to both inputs (necessary resources) and outcomes" (Boardman et al., 2017, p. 9). The predicted benefits of the proposed alternatives are medical training interoperability, personnel continuity, unit cohesion and combat effectiveness, troop resiliency, and diversity.

4. Predict the Impacts Quantitatively Over the Life of the Project

Step 4 involves calculating the total effect of each choice across all periods. This step was not conducted for this analysis because feasibility is based on the current cost comparison.

5. Monetize All Impacts

Moving forward, the analyst in Step 5 must monetize each of the outcomes. To monetize something implies giving it a valuation or financial worth. This thesis monetizes all costs associated with each course of action, with the exception of force reallocation, which necessitates a tradeoff of strategic objectives that surpasses the scope of this study's research. The benefits of the suggested measures are not monetary in nature but represent considerable institutional upgrades over the status quo.

6. Discount Benefits and Costs to Obtain Present Values

For Step 6, Boardman et al. (2017) describe a method for "aggregating the benefits and costs that arise in different years . . . required for a project with costs or benefits that increase over time (years)" (p. 14). In a CBA, future benefits and costs are discounted in

relation to existing benefits and expenses to determine their present values because "the need for discounting stems from most people's proclivity to consume now rather than later" (Boardman et al., 2017, p. 14). When initiatives are consumed immediately, there are usually resource relinquishments, known as opportunity costs. Although inflation must be considered, discounting has nothing to do with this concept. Because benefits cannot be monetized, no discounts or present values are used in this thesis.

7. Compute the Net Present Value of Each Alternative

Step 7 typically involves the net present value (NPV) of an alternative, the difference between the present value of the benefits and the present value of the expenses (costs). There were insufficient data to perform NPV calculations in this thesis.

8. Perform a Sensitivity Analysis

There may be significant uncertainty regarding the expected effects and the proper monetary valuation of each impact unit. For example, uncertainty about the precise cost savings that implementing a combat medic PMOS in the USMC will provide affects how to apply the correct economic value to benefits. Boardman et al. (2017) highlight that in Step 8, the analyst may be unsure about the appropriate "social discount rate and level of standing" (p. 17). Sensitivity analysis attempts to address these concerns.

B. TWO COURSES OF ACTION

This thesis proposes two alternative courses of action (COAs) to the status quo. Student training throughput is 2,000 personnel per year, replicating the FMTB's current annual training objective. The assumption for both COAs is that the USMC utilizes its congressionally approved enlisted end-strength to provide staffing support to a newly established combat medic PMOS. PMOS staffing reallocations are based entirely on the CMC's priorities and foresight; this thesis does not address the USMC's specific PMOS personnel distribution or offer strategic recommendations. In COA-1, the USMC would train prospective USMC combat medics at the FMTB and reduce the amount of BISOG funding used to purchase USN HSS. This option would be the easiest to implement because the USMC already oversees the FMTB training pipeline. Historic cost components are also

readily accessible for the USMC to incorporate into its annual training budget. The notable difference between COA-1 and the status quo is that the human capital used to serve in combat medic roles are Marines and not USN HMs funded by BISOG dollars.

COA-2 involves training prospective USMC combat medics at METC, utilizing the U.S. Army's combat medic (68W) training curriculum. In this scenario, the USMC receives the interoperability benefit of using METC for combat medic training. The USMC would still reallocate manpower from its congressionally approved enlisted end-strength toward providing personnel to serve in combat medic roles and billets; however, cost components differ. COA-2 reduces BISOG funding toward HSS but increases training costs for USMC combat medics. Tables 5 and 6 summarize the costs and benefits of both alternate COAs.

Table 5. Course of Action-1: Combat Medic PMOS through FMTB Implementation

Costs	Benefits
Training	Personnel Continuity
PCS/Relocation	Combat proficiency and lethality
Miscellaneous Expenses	Cohesion and combat effectiveness
Education Assistance	Resiliency in combat
Recruitment & Advertising	Diversity

Table 6. Course of Action-2: Combat Medic PMOS through METC Implementation

Costs	Benefits
Training	Personnel Continuity
PCS/Relocation	Combat proficiency and lethality
Miscellaneous Expenses	Cohesion and combat effectiveness
Education Assistance	Resiliency in combat
Recruitment & Advertising	Diversity
	Interoperability of joint medical training

Note. This COA assumes the reallocation of forces from existing USMC end-strength.

C. COST COMPONENTS

Table 7 illustrates the cost components of the two training alternatives in per-student costs. These costs were obtained from the DOD Cost Assessment Data enterprise. Base pay, retired pay accrual, and Medicare are shown but not included in the cost analysis because they are assumed to be incurred regardless of the scenario since the USMC would have these service members in another MOS under status quo. Notable differences between COA 1 and 2, aside from the cost of training, include basic allowance for housing (BAH), funding toward education assistance, recruiting, and miscellaneous expenses. Differences in BAH are based on established allowances predicated on geographic locations. Educational assistance variances are service branch and program-specific, and recruiting nuances differ by the department of service and are influenced by a myriad of other circumstantial variables not considered in this thesis. COA-1 involves the annual costs of the USMC training pipeline, whereas COA-2 calculates costs for the U.S. Army's METC combat medic training program.

Table 7. Course of Actions 1 and 2: Annual Billet Costing Summary for USMC FMTB Training and U.S. Army Combat Medic (68W) Training at METC. Source: DOD Cost Assessment Data Enterprise (2021).

Cost Type	FMTB	COA-1	METC	COA-2
Base pay	$24,008.40	$0.00	$24,008.40	$0.00
Retired pay accrual (RPA)	$8,378.93	$0.00	$8,378.93	$0.00
BAH	$3,999.62	$0.00	$2,884.38	($1,115.24)
Basic allowances for subsistence (BAS)	$4,638.00	$0.00	$4,638.00	$0.00
Training	$5,712.00	$5,712.00	$8,098.00	$8,098.00
PCS/Relocation	$2,270.65	$0.00	$2,797.90	$527.25
Miscellaneous expenses	$5,648.48	$5,648.00	$3,155.30	$3,155.30
Medicare-eligible retiree health care (MERHC)	$4,911.00	$0.00	$4,911.00	$0.00
Education assistance	$298.00	$298.00	$456.00	$456.00
Recruitment & advertising	$755.00	$755.00	$2,226.00	$2,226.00
Additional labor cost	$0.00	$0.00	$0.00	$0.00
COA cost totals compared to status quo	$12,413.00 per student		$13,347.31 per student	

Note: The costs calculation is based on an individual E-2 student with < 2 years of service, and the annual student throughput is 2,000 personnel

The cost components analysis reveals that COA-2 has a higher net cost per student of $934.31. Assuming that 2,000 students are processed each year, the total cost per student for each COA should be multiplied by 2,000 compared to the current status quo's expenditures.

D. BENEFIT COMPONENTS

The benefit components of both COA-1 and COA-2 cannot be monetized but represent considerable institutional advantages in either scenario.

1. Improved Medical Training Interoperability (COA-2 Only)

METC was established by the DOD in 2005 as part of the BRAC process "to provide interservice medical training for enlisted servicemembers" (Farrell et al., 2014, p. 1). The rationale behind METC was to obtain a reduction in overall medical training expenditures. The DOD, however, could not "assess whether consolidating medical education and training at METC was a more reasonable solution since it had not established a baseline for education and training expenses prior to the establishment of METC" (Farrell et al., 2014, p. 2). METC has since evolved and is working to improve mechanisms for measuring the success of its training pipeline.

Although there appears to be substantial potential for cost savings through the DOD's mandate to combine training at METC, as required by the National Defense Authorization Act for Fiscal Year 2013, the DOD did not delineate how this approach would save taxpayer dollars. Evaluating monetary savings toward training enlisted medical service members requires transparency during and after the allocation and execution of METC funds. The U.S. Government Accountability Office highlighted that the inability of the DOD to justify the cost-saving effect of the reform effort stems from the lack of a comprehensive baseline cost analysis that integrates metrics for gauging METC's success (Farrell et al., 2014). The Defense Health Agency's director has been advised to carry out a business case analysis that focuses on the reform effort's goals. The study is expected to define cost-related issues that must be addressed, delineate how the processes set forward by the directive will solve the identified problems, and prepare and document a cost-benefit

and risk analysis report (Kirby et al., 2011). The Government Accountability Office also recommended that the director of the Defense Health Agency mandate necessary baseline cost information, including all relevant metrics for evaluating the success of cost-saving measures, to ensure that the DOD obtains critical information regarding the financial performance of consolidation (Farrell et al., 2014).

Besides being more economical, transforming medical E&T can achieve high interoperability across medical units. RAND Corporation's methodology, a unified standard of practice (SOP), applies to all medical specialists and subsequent outcomes. RAND's joint rather than service-specific SOPs facilitate METC's goals and take a reasonable step toward ensuring that medical specialists on the same level have the same level of proficiency (Thie et al., 2009).

2. Improved Personnel Continuity

FMSTs currently serve for 2–3 years in USMC billets before returning to typical USN assignments. This is beneficial to the USN for various reasons: sustaining clinics, reopening USMC billets for FMSTs who have not completed operational tours with the USMC, and revitalizing the USN culture and ethos for sailors who have been detached from USN units or commands. However, these benefits are not in the best interest of the USMC because replacements are typically clinically unproven and inexperienced. The USMC must reengage its distinctive indoctrination practices when integrating new human capital, making unit cohesion more challenging and diminishing the quality of healthcare delivery. The formation of a combat medic PMOS reverses this dynamic and ensures that combat medic Marines will always remain on USMC platforms and billets.

3. Greater Cohesion and Combat Effectiveness

Military effectiveness requires unit cohesion and esprit de corps. As shown in this thesis, the DOD's knowledge of cohesion and its relationship to military performance has developed, but the concept of cohesion remains vital in the military. Personal relationships can undoubtedly play an essential role in fighting motivation. To comprehend how the inclusion of ethnically, sexually, and gender-diverse troops will affect military performance, one must first grasp the concept of cohesion (Segal et al., 2016). Intensified

affection bonds are frequently a situational response to a threat, and they are not, in any event, a prerequisite for trust or dependability. Military professionals quickly build this type of relationship in high-stakes performance (combat) settings, even when they do not know each other (Segal et al., 2016).

4. Improved Resiliency in Combat

Marines are built for combat from the moment they leave boot camp. The resilience to combat stress and the psychological consequences of military service differ significantly from those who provide care on the battlefield and combatants who inflict harm to the enemy—a dynamic rarely discussed (Hickling et al., 2011). Deployed military health professionals experience clinically relevant mental health consequences, including post-traumatic stress disorder, depression, anxiety, and adverse psychosocial repercussions that outnumber those of combatants with which they serve in battle.

5. Increased Diversity

The changing face of the country necessitates that the DOD changes. As the demographic makeup of the American population evolves, the DOD must focus its efforts on emerging talent to successfully attract, recruit, train, and retain a highly competent total force capable of satisfying current and future mission requirements. In the healthcare arena, race, ethnicity, and religion have become more critical variables in the delivery of patient care. Since the early 2000s, much has happened to raise the profile of cultural competency among providers. Diversifying the healthcare workforce is commonly mentioned as a technique for reducing racial and ethnic health disparities, and it is desirable to improve responsiveness to patient heterogeneity.

Figures 3 and 4 illustrate current racial and gender demographic differences between the USN hospital corpsmen and the USMC enlisted force. One-third of HMs are female, and 40% represent minority demographic categories. Among the USMC's enlisted force, 81% of personnel are White, 19% represent minority demographic groups, and fewer than 10% are women. These data support that a combat medic PMOS would likely infuse more diversity into the USMC's enlisted ranks, minimizing the racial and gender gap that presently exists.

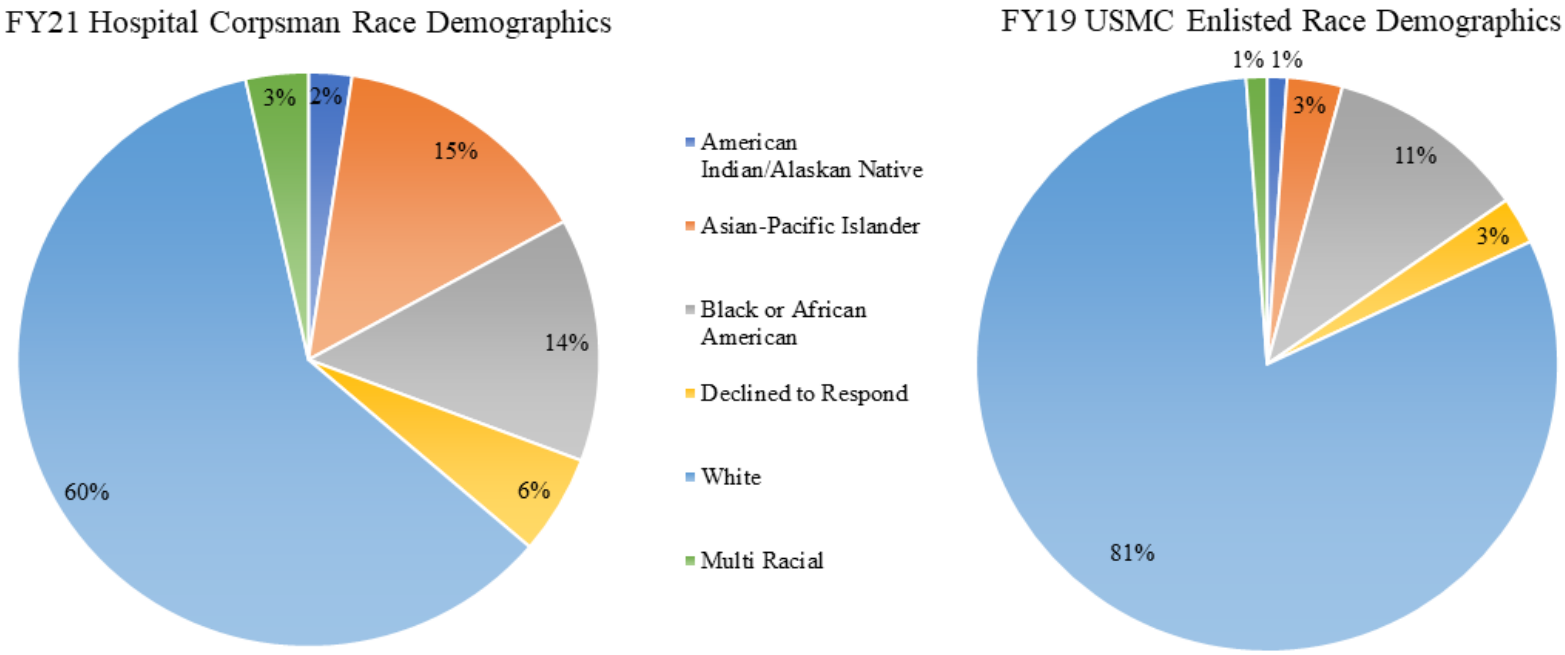

Figure 3. FY21 Hospital Corpsman versus FY19 USMC Enlisted Race Demographics. Adapted From U.S. Navy Personnel Command (2021a) and Office of the Deputy Assistant Secretary of Defense for Military Community and Family Policy (2019).

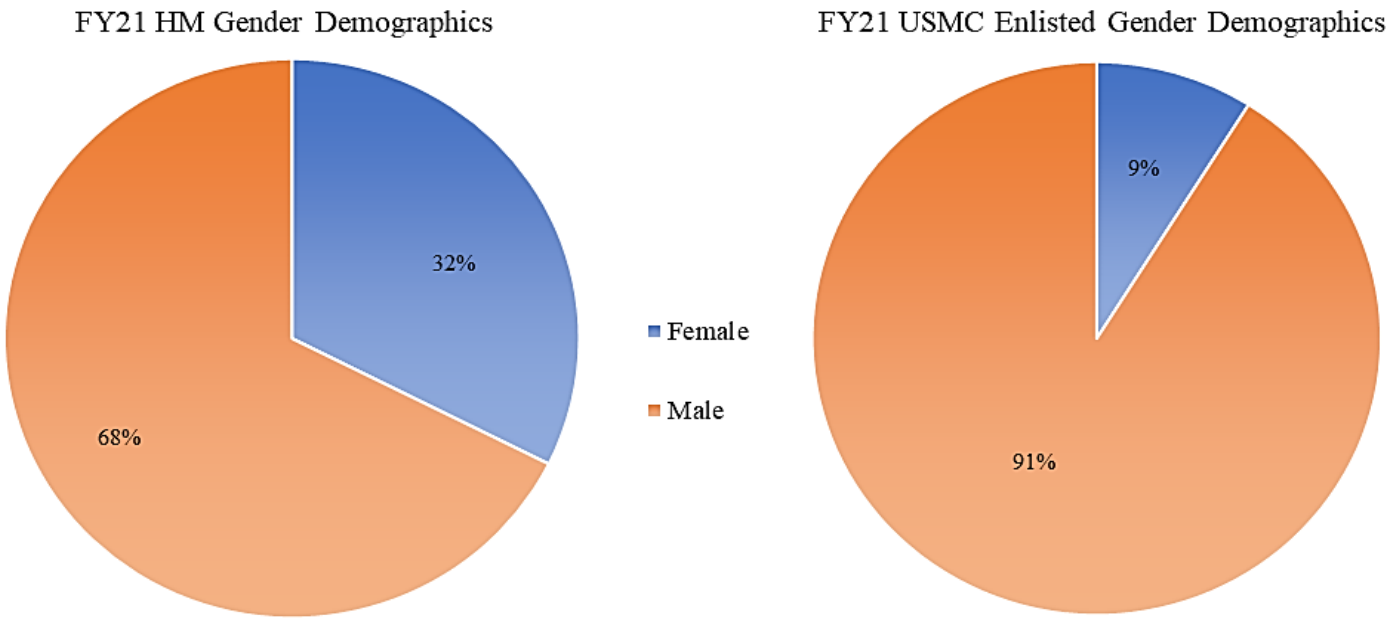

Figure 4. FY21 HM versus FY21 USMC Enlisted Gender Demographics. Adapted From U.S. Navy Personnel Command (2021a) and Military OneSource (n.d.).

E. CHAPTER SUMMARY

This chapter compares two alternative scenarios and finds that COA-2, which trains USMC medics under METC, would cost $934 more annually per student than COA-1. Assuming that the USMC will train 2000 medics per year, the cost difference is $1.87 million per year in current dollars. Specifically, COA-1 would incur $24.3M ($12,413 per student for 2000 students) compared to the scenario without a medic PMOS, whereas COA-2 would cost USMC $26.7M ($13,347 per student for 2000 students per year). However, COA-2 has the additional benefit of improved interoperability than COA-1 that cannot be monetized within the scope of this thesis. Additionally, we cannot compare the cost of each COA to the status quo because the actual price of BISOG funding used to purchase USN medical manpower is unknown.

METC was established in 2005 as part of the BRAC process. The goal was to reduce total medical training expenditures. Although the DOD's decision to integrate training at METC appeared to offer a significant cost savings potential, the DOD did not specify how this method would save taxpayer funds. However, the DOD may save money and increase interoperability between medical units by combining medical E&T.

The status quo HSS arrangement is disadvantageous to the USMC because high turnover results in replacement FMSTs who are typically unproven and inexperienced. Unit cohesion and healthcare quality will suffer as the USMC reengages its distinctive indoctrination practices when integrating new personnel. The formation of a combat medic PMOS reverses this dynamic and ensures that combat medic Marines will always remain on USMC platforms and billets.

Marines are combat-ready upon graduating from boot camp. Resilience to combat stress and the long-term psychological effects of military duty are vastly different for combatants and those who care for the wounded on the battlefield. USMC training would likely increase resiliency in combat and reduce the adverse psychosocial effects common among military health professionals who deploy and have not been trained to adopt the warrior ethos.

V. POTENTIAL CHALLENGES

This chapter addresses policies and procedures that exacerbate the prudent application of scarce human capital within the DON. Shoring up shortfalls in billeted assignments while ensuring that training is adequately optimized can undoubtedly assist the USMC in maximizing its congressionally approved end-strength while achieving the goals outlined in *Force Design 2030*.

A. DIVESTITURE BILLET CUTS IN DOD MEDICINE

The U.S. military constantly undergoes ebbs and flows in personnel end-strength. Following the force reduction guidance provided in the National Security Strategy, National Defense Strategy, and Defense Planning Guidance, the DOD submitted Section 719 of the National Defense Authorization Act for Fiscal Year 2020, a congressional proposal to reduce military medical personnel by 17,005. The rationale for lowering medical forces was to enhance the number of operational billets needed to achieve lethality.

In August 2020, the first joint medical estimate was completed. However, the DOD delayed this plan to focus on the global pandemic, and it revised its stance as it realized the need to maintain a ready medical force. As a result, medical staff reductions will be less severe than initially envisioned and spaced out over a more extended period. The DOD ultimately decided to lower the number of military medical personnel from 17,005 to 12,801, which comprises Army (2,948), Navy (5,169), and Air Force (4,684) billets. Most of the cuts are slated for FY2023 and will be phased out progressively until FY2027.

B. USMC FORCE RESTRUCTURING AND TRAVEL BURDEN

The USMC has also encountered various personnel challenges, so the organization has decided to adopt unique strategies to optimize USMC enlisted assignments. According to the DON, active USMC military manpower in FY22 has decreased by 2,700 to an end-strength of 178,500 (Cavas, 2021). This reduction reflects the Corps' modernization initiatives and the divestiture of obsolete programs such as tanks, bridging, and law

enforcement. Furthermore, over 85,000 Marines are projected to change duty stations or separate each year (USMC, 2021).

Table 8 shows the USMC's estimated and actual financial commitment toward travel costs from FY20 to FY22.

Table 8. Budget Activity 5: Permanent Change of Station Travel Summary of Requirements. Adapted from Military Personnel, Marine Corps (2021).

Travel Type	FY20 Actual		FY21 Estimate		FY22 Estimate	
	Moves	Amount	Moves	Amount	Moves	Amount
Accession Travel	25,865	$ 68,385	29,602	$ 82,221	29,799	$ 55,582
Training Travel	2,415	$ 20,108	2,061	$ 17,829	2,027	$ 17,895
Operational Travel	16,917	$ 161,897	16,786	$ 163,285	16,480	$ 163,526
Rotational Travel	9,417	$ 107,737	11,383	$ 122,780	11,196	$ 131,554
Separation Travel	30,450	$ 79,960	30,238	$ 80,805	29,109	$ 79,435
Travel of Organized Units	6	$44	6	$ 46	91	$ 734

Note. Figures are expressed in thousands of dollars.

C. TURNOVER STRATEGY OF THE USMC

The USMC transitioned to an all-volunteer force in 1973, and "since its initial 1985 Enlisted Grade Structure Review, the USMC has been committed to an idealized 'first-term' force with an inexperienced, bottom-heavy grade structure" (Reid, 2021, p. 17). The USMC's commitment to unusually excessive enlisted turnover to reduce personnel expenses diminishes aggregate expertise, competence, and continuity across the FMF (Reid, 2021).

The USMC's enlisted human resources management methods are incredibly detrimental to cohesiveness and talent retention, incompatible with modern combat requirements, and antagonistic to the USMC's warfighting mentality (Reid, 2021). The underlying preconceptions that drive how the USMC fills its enlisted ranks should be

revisited. During the Reagan administration, the USMC's enlisted management system was designed to address two distinct challenges. To begin, it aimed to "decrease average per capita pay and benefit expenditures by limiting the number of Marines who had served more than four years" (Reid, 2021, p. 1). Furthermore, it imposed pyramid-shaped grade systems aimed to ensure uniform promotion timetables across all MOSs. By any standard, this approach was a success in terms of resolving the apparent difficulties of 1985. On the other hand, persistence in that paradigm has imprisoned the USMC in a surprisingly resilient cycle that has demonstrated resistance to reform despite considerable technological breakthroughs, substantial shifts in American demographics, and mounting evidence of inefficiency (Reid, 2021).

Reid (2021) goes on to explain how senior officials have defended its high-turnover personnel structure by claiming that the younger "recruit-and-replace "method is less expensive and produces a Marine who is more fit, healthy, and effective than a "mature invest-and-retain" model that nurtures and capitalizes on Marines who have demonstrated on-the-job competence and experience (p. 6). While lance corporals are clearly less expensive than sergeants, the system's qualitative costs are significantly more complex than a traditional salary comparison. According to Reid, while the USMC lacks adequate financial metrics to make a reasonable argument, subjective analysis shows that a somewhat older force may be less expensive than previously projected. Furthermore, data suggest that younger enlisted Marines are physically inferior, less talented, and less cooperative than their older, more mature counterparts (Reid, 2021).

Most metrics indicate that the USMC's talent management system has met the internal success criteria established in its enlisted personnel management policy and directives (Reid, 2021). Recruiters and human resource professionals have satisfied the high-turnover, low-investment system's end-strength requirements. On modern battlefields, inexperienced Marines have often triumphed, and they have succeeded despite, rather than because of, the system in which they work. Reid's (2021) work questions whether current USMC enlisted human-capital practices deliver the best FMF capabilities utilizing the "logical pyramid" paradigm for a given personnel budget.

Responding to concerns about the fairness of promotion opportunities among MOSs, in the mid-1980s, the USMC subscribed to its present enlisted talent management paradigm. A decision was made to cut personnel expenses by restricting the number of Marines with tenure, typically those who had served for more than four years. Despite the fact that all four services faced identical challenges, the USMC's approach to its enlisted human-capital doctrine has remained strikingly different. According to Reid (2021), an "assumption is being made that the trained professional force must be 'controlled,' and large levels of cumulative experience and personnel cohesion are not required. It appears to be centered on the assumption that Marines are expendable, that a competent career force must be 'regulated,' and that 'high levels of aggregate experience and personnel stability are not required'" (p. 2). In contrast to the other U.S. military branches, the USMC has steadfastly refused to budge in relinquishing its policy. The USMC's career rewards and incentives have shifted resources from keeping high-quality noncommissioned officers to recruiting and training young civilians, which indirectly threatens the FMF's long-term viability (Reid, 2021).

The USMC's Physical Fitness Test data, which contradicts claims about the improved physical fitness of a "young and thin" force, is an essential consideration in the turnover plan. Similarly, advances in neuroscience have debunked the premise that junior Marines, usually teenagers, can demonstrate comparable judgment under duress to more seasoned Marines (Reid, 2021).

It is a startling waste of human capital that three out of every four Marines are released from service after demonstrating their military capabilities and entering the peak of their mental and physical performance potential. As outlined in the 38th CMC's Planning Guidance and goals set forth in the USMC *Force Design 2030*, reform efforts will likely fail unless the USMC has a fundamental paradigm shift in its turnover and retention strategy and begins to focus more heavily on how to fix deficiencies in organizational approaches to talent management.

D. EDUCATION AND TRAINING

The USMC's ability to carry out its mission depends on a well-trained, well-equipped FMF. A lethal force is the outcome of comprehensive planning and well-executed training programs. In a process improvement initiative endorsed by the USMC, such programs were analyzed by the Center for Naval Analyses (CNA). The study was divided into training assessment and training economics (Randazzo-Matsel, 2008). The CNA intended to answer the following questions in its training assessment: "Is what is being taught being learned?" and "Is what is being taught, what needs to be taught?" (Randazzo-Matsel, 2008, p. 1) The CNA employed a "skills-based approach" to defining essential abilities that a Marine must learn through specialized training and evaluated whether those skills were being delivered by instructors and comprehended by Marines (Randazzo-Matsel, 2008). The CNA explored how external factors such as encroachment and resource constraints affect the USMC's capacity to train for new or non-standard tasks, how training parameters were defined, and how external factors affect the USMC's ability to train for vital mission competencies.

Training and combat are two sides of the same coin for successful Marine units and are the foundation of USMC unit training (Randazzo-Matsel, 2008). This strategy combines a systems approach to training (SAT), training and readiness (T&R), and unit training management. The latter utilizes USMC training methods and the SAT for combat tasks. The SAT process guarantees that Marines obtain the knowledge and skills required to organize and execute training. MOS standards and T&R matrices are used to assess a Marine's or unit's proficiency in specific combat skills (Randazzo-Matsel, 2008).

The CNA analyzed the links between human resources and training pipelines in the study's training economics section. Specifically, it examined attrition rates among first-term non-end-of-active-service Marines and identified critical indicators to more efficiently track human resources across the training continuum better. The CNA also investigated and criticized the length of military training and its influence on personnel attrition. The CNA also explored the relationship between training and recruitment. The first component of the study focused on Marines' early career attrition while in the training

pipeline—the time it takes to train new Marines—and ways the USMC could make it more efficient. These studies are called "training economics."

Training programs, methodologies, and MOS pipelines that are well designed and executed, result in lethal and effective Marines. The USMC must commit significant time and effort to train both new recruits and long-term Marines to produce successful Marines. The skills-based approach is an excellent method for evaluating and improving USMC training. The CNA's research has allowed the USMC to assess its training methods and determine whether they need to be modified. By measuring training duration disparities over time, the USMC can better prepare future leaders.

E. READY MEDICAL FORCE

Medical readiness and force mix challenges can have a considerable impact on military costs because of the size and complexity of the medical force. Suppose healthcare staff are not ready for the operational task or employed in jobs that do not necessitate their level of expertise. In that case, they could be better utilized to support preparedness and modernization. When evaluating the readiness level of the current medical force, two factors should be considered: the ability to meet a numeric requirement for medical personnel and the clinical readiness of the medical personnel to establish the deployability of the individuals (Whitley et al., 2018).

All military medical personnel must regularly maintain or refresh their knowledge, skills, and abilities to ensure preparedness (i.e., continuing medical education). Providers returning from non-clinical roles or lengthy deployments with minimal high-acuity clinical exposure opportunities are particularly vulnerable (De Lorenzo, 2005). Many military medical institutions and clinics offer primary care, which can be highly beneficial. In the emergency department, intensive care unit, perioperative rooms, and operating suites, it is conceivable to conclude that most treatment strategies have direct military medicine application (De Lorenzo, 2005). Acute, surgical, and critical care are based on similar core concepts. However, the circumstances of the patients treated may be very different from those presented in combat operations. Furthermore, disease and non-battle injuries continue to exceed combat casualties, and MTF encounters may offer at least some training

for diverse clinical presentations than deployed healthcare providers may experience (De Lorenzo, 2005).

Ultimately, the commanding officer's responsibility is to ensure that all military personnel, including non-medical staff, receive adequate military and technical training, including clinical sustainment training for medical professionals. Individual and group HSS training can be developed, performed, and evaluated using the Training and Education Command standards. In the absence of published standards, commanders must ensure that training is conducted in accordance with approved doctrinal, tactical, and technical literature (USMC, 2012).

F. DIVERSITY AND INCLUSION

It is difficult to bring about change in the military because it encourages conformance to standards above individualism and encourages a commitment to structure. Risk aversion is highly valued, and a standardized, methodical approach to mission accomplishment and safety enables entrenched viewpoints and belief systems (Scoppio, 2012). However, because military culture prioritizes obedience, policy changes result in conformity. Suppose the same sense of commitment to conventional operations could be refocused to adopt new policies. In that case, the military's past could help highlight lessons learned about the difficulties of diversity and inclusion. Despite significant historical progress in establishing a diverse and cohesive force, the military faces persistent cultural diversity challenges.

G. WOMEN IN COMBAT

It has been a long and gradual process for American women to serve in the military, opposed at every step by those who claimed their participation in the armed forces would negatively affect unit cohesion. Women currently make up 15% of America's active-duty service members. Nearly 275,000 women deployed to Iraq and Afghanistan, many of whom served in combat roles. Since 9/11, nearly 800 women have been wounded in action and 130 killed while performing their duties (Elnitsky et al., 2013). Units with greater cohesion were considered more successful, particularly in warfare. Despite this belief, current research has cast doubt on these assumptions (Segal et al., 2016). Gender

integration has been the driving force behind many of the most recent efforts on cohesiveness and performance. Similar opinions regarding cohesion and effectiveness were made in the past to hinder integration based on race and sexual orientation, but they were proven wrong (Segal et al., 2016).

There is good reason to support a broader military outreach and equal opportunity policy whereby women are included in ground combat elements as a commercial practice that benefits the military. Moreover, fewer young adults are physically fit to serve in the military, yet many of the women who desire to wear the uniform are among the most physically qualified. These women are a priceless resource. The U.S. military has already begun transitioning women into traditionally male-dominated combat roles. However, additional work remains to be done before this model is fully implemented, and the military will reap the rewards of this investment. Successful integration of women into combat arms requires the military to understand the history and framework of women's health in warfare. Research efforts should focus on the specific health issues affecting women, governance challenges linked to their assimilation into combat units, and the unique medical challenges they face. Examining previous successful strategies in comparable systems is one way to ensure a speedier return on investment.

H. UNIT COHESION

Research suggests a relationship between cohesion and group effectiveness on occasion, but there are three critical qualifiers to this association (Segal et al., 2016). First, the direction of causality is unknown. Some findings demonstrate that causality works opposite of assumptions, i.e., a collective success produces cohesion. Second, the evidence indicating a link between cohesiveness and group performance implies that task cohesion is connected to success rather than social cohesion (Segal et al., 2016). The degree to which group members can collaborate to achieve common goals is task cohesiveness. It incorporates members' appreciation for the abilities of their coworkers (Segal et al., 2016). In combat, it translates into group members trusting each other, including assurance that the group can execute its task and protect its members from harm. Task cohesion can be vertical or horizontal—the former is the unit members' regard for and trust in their leaders'

abilities (Segal et al., 2016). A more affective dimension is social cohesion, which includes how much members enjoy each other and wish to spend time together. Vertical social cohesion (effective leadership) comprises competency—the degree to which unit members trust their leaders to do a good job—but it also requires compassion—the extent to which unit members believe that their leaders care about them (Segal et al., 2016).

Third, vertical cohesion influences horizontal cohesion and performance, defined by groups whose members believe their leaders are competent, care about their well-being, and are more likely to succeed (Segal et al., 2016). By definition, good unit leaders manage task activities in ways that promote mission effectiveness, respect, and caring among group members (Segal et al., 2016). Thus, even if cohesion improves performance (and the evidence is mixed), task cohesion is likely more responsible than social cohesion. Moreover, there is no statistical indication that gender-integrated units have inferior task cohesiveness (Segal et al., 2016).

I. DIVERSITY IN HEALTHCARE DELIVERY

Race, ethnicity, and religion have become more relevant factors in the delivery of patient care within the healthcare industry. Much has transpired since the early 2000s to elevate the profile of cultural competence among providers. Diversifying healthcare staff is frequently cited as a strategy for lowering racial and ethnic health disparities and is desirable to improve responsiveness to patient heterogeneity. Two arguments are presented to support the importance of an employee assortment. First, the workforce should reflect the general population. Second, staff diversity improves equity by allowing for greater linguistic and ethnic concordance between patients and staff.

Guidelines for Culturally and Linguistically Appropriate Service, released in 2000 by the U.S. Department of Health and Human Services, was the first federal law to establish criteria unique to the health care industry (Jhutti-Johal, 2013). As mandated in 2004 by the Association of American Medical Colleges, all U.S. medical schools must provide cross-cultural education in their curricula. As early as 2006, several states enacted legislation requiring physicians to undergo multicultural awareness training. In addition to addressing cultural and linguistic competency, the National Quality Forum, the Joint Commission, and

the National Committee on Quality Assurance have all produced cultural competency requirements while encouraging new projects to be considered and benchmarked (Jhutti-Johal, 2013).

Some hospitals, not necessarily of their own volition, subsequently implemented non-medical services, such as providing a complement of ethnic cuisines and unique clothing options to patients and incorporating chaplains of various faith groups to accommodate patients' religious requirements. However, healthcare providers frequently deliver care without regard to ethnic concerns, assuming minority groups are homogeneous blocks of people with similar necessities and fail to acknowledge that specific groups themselves encompass a wide variety of viewpoints and practices pertaining to their health (Jhutti-Johal, 2013). Nevertheless, an exclusive focus on "culture" is deceptive because responsive healthcare delivery necessitates consideration of cultural characteristics, social positions, and individual needs. Healthcare entities, including MTFs, must make a firm commitment to establishing responsive care, rather than merely employing superficial attempts to address disparities in healthcare with ideas not structurally embedded into the organization (Seeleman et al., 2015).

J. CHAPTER SUMMARY

To optimize end-strength and ensure operational readiness, accommodating billet reductions and revolving human capital while enhancing training necessitate judicial oversight and management practices at senior levels within the USMC. To evaluate the execution of policy goals, the USMC must establish and use clear, straightforward effectiveness indicators in workforce planning. The current system of discharging three out of every four Marines is a breathtaking waste of human capital, particularly when they have demonstrated their compatibility with military service and are entering their physical and mental primes. Thoroughly planned and well-executed training programs, procedures, and MOS pipelines result in a lethal and effective Marine. Since the USMC's objective is to develop competent warriors, it must invest significant time and energy in training recruits, maintaining and appreciating the institutional competitive advantage brought by career-minded Marines.

Despite progressive measures aimed at improving the military's understanding of diversity and inclusion, challenges have arisen from the coexistence of personnel from different backgrounds and cross-gender integration within combat arms specializations. However, there is seemingly untapped potential in enhancing cross-cultural competencies. This increased proficiency can then be applied in all mission sets, as forward power-projection and international collaboration continue to be significant national objectives.

Healthcare practitioners receive specialized clinical sustainment training that keeps them abreast of medical advances, technology shifts, and peer-reviewed clinical best practices. Commanders are ultimately accountable for ensuring clinical sustainment takes place. Healthcare delivery has continued to embrace ways to provide more responsive care, including having a diverse staff complement and implementing measures that recognize patient individualism.

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VI. CONCLUSION

The objective of this thesis was to determine the feasibility of USMC developing its own medical support. Both COAs require the USMC to pull from congressionally approved enlisted end-strength to staff a combat medic PMOS. COA-1 uses the FMTB training platform to prepare combat medics for operational assignments with the FMF and would incur $24.3M ($12,413 per student for 2000 students) compared to the scenario without a combat medic PMOS. Since the cost information is not available for the status quo (we do not have information on the cost incurred by USMC to purchase Navy health manpower), it is not clear whether COA-1 would be a more economical alternative to the status quo. However, COA-1 is the most economical solution and easiest to assimilate. The USMC already owns the FMTB training pipeline and would absorb costs previously covered by BISOG funding, such as training, education assistance, and miscellaneous recruiting and marketing. Assimilating into the USMC's culture and warrior ethos makes COA-1 a viable option and provides implementation simplicity. However, reallocating personnel from other MOSs necessitates a tradeoff that may negatively affect combat readiness and lethality. However, if adequately managed and employed, COA-1 increases operational readiness and the ability to project lethal intentions on the battlefield because combat medics will be trained riflemen while conducting their duties as healthcare providers.

COA-2 would likewise require the USMC to reallocate end-strengths toward staffing a combat medic PMOS but utilize the U.S. Army's METC combat medic training platform as its principal training modality. It would cost USMC $26.7M ($13,347 per student for 2000 students per year) compared to the scenario without a medic PMOS. Purely on the cost front, COA-2 is more expensive than COA-1 by $1.87M. COA-2's overriding value is its joint force standardization in medical training and interoperability and the potential for cost savings by using virtual/3D simulation training. The pipeline at METC exposes a combat medic to multiple platforms and theories that are unique to other service components, at a minimal cost compared to the long-term benefits. Both COAs, 1 and 2, reduce BISOG funding toward HSS within the USMC and allow for the diversion

of funds to other initiatives that support the USMC's *Force Design 2030*. However, they do necessitate compromises, namely personnel allocations. The USMC will need to divest from MOSs previously staffed based on historical budget models, tactical strategy, and congressionally approved enlisted end-strength to accommodate combat medic PMOS billets that USN FMSTs once filled.

USN FMSTs deliver quality healthcare in garrison and on the battlefield and have consistently improved combat morbidity since the Vietnam War. FMTB training and refinements in TCCC have saved countless lives during combat operations abroad, and the curriculum consistently implements best practices from coalition partners worldwide.

Yet the status quo has room for improvement. USN FMSTs do not possess the institutional warrior instincts instilled in Marines, and as a result, their mental health suffers at rates significantly higher than their combatant counterparts. Combat resiliency improves when esprit de corps is established at the unit/tactical level, but this is harder to achieve when personnel regularly rotate out of their assignments. Furthermore, the USMC turnover culture is detrimental to the development of healthcare practitioners, as the application of prudent and effective medical practices necessitates knowledge, skills, and abilities that are developed over time and revisited with sustained training and clinical exposure. A ready medical force demands a long-term commitment to clinical sustainment and continuous investment in E&T. Separating 75% of the combat medic inventory on an annual basis would result in substantial inexperience on the battlefield and could jeopardize troop welfare and combat effectiveness.

Unit cohesion is also an issue of concern with the status quo and alternative COAs. The demographics of America are changing, and the USMC must recruit people who exhibit the propensity to serve, regardless of their cultural background and assimilate them into the USMC ethos, which embodies trust and unit cohesiveness. Traditional recruiting wells are drying up, and servicemembers must cohabit alongside other fellow Americans who approach life from differing cultural perspectives. Women are ready to serve in combat roles, and they provide a competitive advantage, not just in terms of diversity. Yet, to adequately integrate women into combat arms, a concerted effort must be taken to address and accommodate this demography's physiological peculiarities.

One limitation of this study was the inability to monetize benefits and the lack of actual cost information reflective of BISOG spending towards USMC medical support. Although the benefits represent significant institutional advantages, there was no way to attach a value to them to exhibit a cost analysis against the status quo or between the alternative COAs.

Overall, this thesis explores the feasibility of setting up a medic PMOS under USMC and provides cost information for the alternatives that can be compared with the status quo when cost information under the status quo becomes available. There are several reform opportunities, but the historical bond and combat efficacy demonstrated between USN healthcare providers and USMC combatants took decades to build and are currently flourishing. In addition, combat morbidity has been the lowest since the Vietnam War. The status quo allows the USMC to orchestrate and maximize MOS personnel allocations that fit the needs of amphibious warfare doctrine and the concept of lethality while preserving lives on the battlefield. As the thesis demonstrated, the status quo and the two COAs all have their own cost and benefits. This thesis provides foundational knowledge for leadership to consider when determining an optimal arrangement of medical support for the USMC as we move forward to achieve the goals of USMC Force Design 2030.

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