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Train for the Game: What is the Learning Environment of Deployed Navy
Emergency Medicine Physicians?

by

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Thesis submitted to the Faculty of the
Health Professions Education Graduate Program
Uniformed Services University of the Health Sciences
In partial fulfillment of the requirements for the degree of
Master of Health Professions Education 2020



UNIFORMED SERVICES UNIVERSITY, SCHOOL OF MEDICINE GRADUATE PROGRAMS
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May 19, 2020

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 Emergency Medicine Physicians?

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ACKNOWLEDGMENTS

I would like to thank my research partner, Dr. Daphne Morrison Ponce, for seeding the idea for this thesis project over a year ago in a dark Bushmaster tent at Fort Indiantown Gap, PA. Within 10 minutes of meeting you, the idea for this project had taken root. Thank you for your enthusiasm, dedication, and sense of humor during our writing sessions. This is truly the most interesting research I've ever done, in part, because you were there to share the experience.

I would like to thank my research advisors, Dr. Steve Durning and Dr. Ron Cervero, for their wisdom and encouragement as they helped grow this research idea into a cohesive thesis project. I am truly amazed by your ability to maintain focus, help me find clarity in a forest of qualitative data, and maintain such a positive “learning environment.”

Thank you to Dr. Anita Samuel, my HPE advisor, who somehow crafted my coursework schedule around the many schedule challenges of a new mother. Thank you for believing in me and for steering me in the right direction so I could charge forward and learn.

Finally, I would like to thank my Department Chairs, Dr. John Wightman and Dr. Francis O'Connor, for their support of my participation in the HPE program.

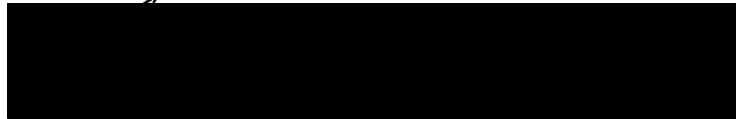
DEDICATION

I would like to dedicate this thesis to my husband, Dr. John Reynolds, who didn't bat an eye when I announced that I wanted to embark in a Master's program at the same time we were starting our family. The direction of our lives changed 2 1/2 years ago when I gave birth to our son at the same time I started my first HPE classes. It's been nonstop ever since.

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ABSTRACT

Train for the Game: What is the Learning Environment of Deployed Navy
Emergency Medicine Physicians?

Nicole Hurst, Master of Health Professions Education, 2020

Thesis directed by: Steven J Durning, MD, PhD, Director, Center for Health Professions
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Problem When the training environment differs from the practice environment learners may encounter situations for which they are unprepared. Additionally, medicine is a practice characterized by ongoing learning, and unique qualities of the operational learning environment (LE) may affect learner needs. Using a conceptual framework specific to the LE we therefore asked the following research question: what is the difference in LE for Navy Emergency Medicine (EM) physicians who train in US hospitals but practice in an operational environment, and how do these differences shape their learning needs?

Methods We interviewed Navy EM physicians who recently deployed to explore their perceptions of the deployed LE, how it differed from the LE they trained in, and the perceived effect this difference had on their learning needs. We used the constant comparative method to gather and analyze data until thematic saturation was achieved.

Results We interviewed 12 physicians and identified six interconnected themes consistent with the LE framework in the literature: 1) Patient care is central to the learning experience 2) Professional isolation vs. connectedness 3) A sense of meaningful practice engages the learner in the LE 4) Physicians as educators shape the LE 5) Team trust impacts the LE 6) The larger military organization impacts the LE.

Conclusions Our themes span the conceptual framework put forth by Gruppen et al. and did not find themes outside this framework. These interconnected themes describe the difference in LE between the stateside and deployed setting and impact the learning needs of Navy Emergency Medicine physicians. These results inform strategies to position the deployed medical unit for success.

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CHAPTER 1: INTRODUCTION

BACKGROUND

When the training environment differs from the practice environment health professionals may encounter situations for which they are unprepared. Navy Emergency Medicine physicians who deploy may encounter a practice environment unparalleled in the civilian environment in which they trained.¹⁻² Lifelong learning is ongoing and necessary for the successful practice of emergency medicine.³ Learning continues in the deployed practice environment, and most US military medical providers who have deployed will attest to the steep learning curve that occurs in the first few weeks, despite excellent professional and pre-deployment training. Learning continues in actual practice, so attributes of the unique deployed learning environment (LE) continue to affect learner needs throughout the duration of their deployment.

The practice of medicine in a deployed setting is filled with many unique challenges that can adversely affect patient care if the medical care team is not well prepared. Previously described challenges include learning to function with limitations in equipment, medications and support, new team structure and roles, and battlefield injury patterns that differ from those in civilian settings, to name a few.^{1,4-6}

In an attempt to prepare medical personnel for the unique challenges encountered in the deployed setting, multiple programs exist that attempt to close the gap between practice in a civilian setting and a deployed environment.⁷ These include pre-deployment training programs at places such as the Army Trauma Training Center (ATTC), conducted at Ryder Trauma Center in Miami, FL or the Naval Trauma Training Center in Los Angeles, CA.⁸⁻⁹ Additionally, some military residency training programs have

established locally developed military unique curricula (MUC). A MUC teaches topics thought to be important for deployment, but not taught during a typical residency experience, which prepares the learner for practice in a civilian setting.⁹⁻¹¹ Finally, qualifications for deployment have been established, such as taking the Tactical Combat Casualty Care (TCCC) course, holding an Advanced Trauma Life Support (ATLS) qualification, attending the Combat Casualty Care Course (C4) training for incoming military physicians, and requiring board certification or board eligible status for physicians to deploy.² Other training solutions have been suggested in the literature such as sending surgical residents directly to combat environments to train.¹²⁻¹⁵

Despite these efforts to ensure that deploying medical providers are prepared to practice in a deployed setting, the literature has found that recently deployed individuals continue to express concerns about the challenges of practicing in an operational environment.⁴ Unfortunately, when new patient care teams arrive in a deployed setting, a steep learning curve still exists while they learn how to provide patient care in the combat setting. During this time of accelerated learning and acclimatization for military providers, patient outcomes may suffer. For example, Riojas et al. reported 2 cases scenarios where lack of adequate team and leadership training resulted in adverse patient outcomes.⁴

If providers continue to describe a steep learning curve when they arrive in a deployed setting, then we must ask ourselves if we are meeting learner needs with our current educational programs. Herein lies an opportunity for improved educational content or methods to make the transition of practice from a civilian setting to a deployed setting more seamless.

In response to this challenge, the BUMED Medical Corps Career Planner tasked specialty leaders with developing a MUC in 2018 to address this problem. The intention of a MUC would be to promote readiness in the operational environment upon graduation from residency by providing education in specialty-specific areas that are critical to specialty performance in a wartime environment.

We aim to close this educational gap with particular attention to the LE. Currently, learners are provided with a curriculum in one LE and then sent to a different LE to practice. By understanding the unique attributes of the deployed LE, we can shape educational content and methods for pre-deployment training and tailor strategies for ongoing education in the deployed LE.

The challenge of training in one environment and practicing in another is common to health professions education. The BUMED Medical Corps Career Planner's tasking applies to all specialties, and there may be overlap in the deployed LE among multiple specialties and services; a better understanding of the deployed Navy Emergency Medicine LE may translate to improved understanding of the LE for other specialties. It may also have implications for other physicians who transition from one LE to another LE such as physicians in other military services or civilian physicians who practice in austere settings.

Our goal as military medical providers is to provide excellent care to all patients, irrespective of the place, time or team providing the care. In order to identify the curricular content or methods missing from our current residency, pre-deployment and in-country training, we can start with a better understand the deployed LE, how it differs from the training LE, and how this affects learner needs.

CONCEPTUAL FRAMEWORK

We used the Kern conceptual framework as a general conceptual framework to recognize that conducting a targeted needs assessment is a first step in designing and implementing curriculum.¹⁶ Kern's 6 step method for curriculum development in health professions education involves a general needs assessment which we conducted by performing a literature review and which BUMED has established by calling for a MUC across all specialties.

Using the Kern framework, the general needs assessment is followed by a targeted needs assessment, which consists of 2 parts: targeted learners and the targeted LE. Our targeted learners are defined by my area of interest, as I am a Navy Emergency Medicine physician and I have an interest in bettering my specialty. Our problem is defined by a difference in LE, when the physician transitions from the civilian to the deployed setting. A better understanding of the deployed LE is a main focus of my thesis, and can be used to inform the targeted needs assessment.

More specifically, we used a conceptual framework from the literature that addresses the LE. Gruppen et al proposed the following definition of the LE: "the social interactions, organizational culture and structures, and physical and virtual spaces that surround and shape the learners' expectations, perceptions and learning."¹⁷ Gruppen et al published a conceptual framework that could be used to understand, study, and design interventions to improve the LE. We used this conceptual framework as a lens to shape our study to understand the LE of the deployed setting, and how it may differ from the training LE.

The Gruppen framework describes the LE in 2 dimensions: the psychosocial and the material dimensions. These dimensions are composed of 5 components. Their relationship is depicted in Chapter 2, Figure 1 of this thesis. For each dimension, they identified interventions or factors positively or negatively associated with the LE. Time focused on direct patient care, having a community of peers, and learning in a “meaningful” practice are three examples of factors positively associated with the personal component of the LE.

We evaluated the psychosocial dimension (personal, social, and organizational components) and the material dimension (physical and virtual space components) of the unique LE, which is the deployed setting. We used the Gruppen framework to guide the crafting of our interview guide. We revisited this framework as we interpreted our data and modified our interview guide.

RESEARCH QUESTIONS

The goal of our study was to understand the differences in the LE experienced by Navy EM physicians who recently transitioned from a stateside practice environment to a deployed practice environment. Our specific research question was, what are the differences in the learning environment for Navy Emergency Medicine physicians who train in US hospitals but practice in an operational environment, and how do these differences shape their learning needs.

CHAPTER 2: TRAIN FOR THE GAME: WHAT IS THE LEARNING ENVIRONMENT OF DEPLOYED NAVY EMERGENCY MEDICINE PHYSICIANS?

Hurst ND, Cervero RM, Durning SJ, Morrison Ponce, D. Train for the Game: What is the Learning Environment of Deployed Navy Emergency Medicine Physicians?

Academic Emergency Medicine Education and Training

ABSTRACT

Background When the training environment differs from the practice environment learners may encounter situations for which they are unprepared. Additionally, medicine is a practice characterized by ongoing learning, and unique qualities of the operational learning environment (LE) may affect learner needs. Using a conceptual framework specific to the LE we therefore asked the following research question: what is the difference in LE for Navy Emergency Medicine (EM) physicians who train in US hospitals but practice in an operational environment, and how do these differences shape their learning needs?

Methods We interviewed Navy EM physicians who recently deployed to explore their perceptions of the deployed LE, how it differed from the LE they trained in, and the perceived effect this difference had on their learning needs. We used the constant comparative method to gather and analyze data until thematic saturation was achieved.

Results We interviewed 12 physicians and identified six interconnected themes consistent with the LE framework in the literature: 1) Patient care is central to the learning experience 2) Professional isolation vs. connectedness 3) A sense of meaningful

practice engages the learner in the LE 4) Physicians as educators shape the LE 5) Team trust impacts the LE 6) The larger military organization impacts the LE.

Conclusions Our themes span the conceptual framework put forth by Gruppen et al. and did not find themes outside this framework. These interconnected themes describe the difference in LE between the stateside and deployed setting and impact the learning needs of Navy Emergency Medicine physicians. These results inform strategies to position the deployed medical unit for success.

BACKGROUND

Lifelong learning is ongoing and necessary for the successful practice of emergency medicine.¹ It is well understood that the learning environment (LE) impacts learning.²⁻⁴ The LE can be defined as “the social interactions, organizational culture and structures, and physical and virtual spaces that surround and shape the learners' experiences, perceptions and learning.”⁵

Navy Emergency Medicine (EM) physicians practice in a stateside LE and deploy to the operational military setting, which would be expected to represent a unique LE.⁶⁻⁷ When physicians enter a different LE they may encounter situations for which they feel unprepared. These differences can also impact a physician's ability to learn and practice effectively.

The challenge of moving between LEs is likely common to health professions education. This phenomenon is highlighted by the ongoing COVID-19 pandemic which demonstrates how this new learning environment has created many opportunities for physician learning.⁸

In military medicine, multiple training programs exist in an attempt to prepare for the unique challenges encountered in the operational environment.⁹⁻²⁰ Despite these efforts to prepare deploying physicians there are continued concerns about practicing in a deployed environment, and examples of resulting adverse patient outcomes exist in the literature.¹⁰ Herein lies an opportunity for improved educational content or methods to facilitate transition of practice.

Gruppen et al. described a framework to conceptualize the LE in health professions based on personal, social, organizational dimensions and physical/virtual spaces (Figure 1).⁵ This framework was based on a literature review, proposed that these

four elements likely interact, and that the framework should be tested empirically. We used this framework to guide our qualitative study which provided a lens to examine how the LE differs in the deployed vs. stateside settings. More specifically the deployed setting is a different physical space than the stateside setting that likely also impacts the three other elements which we sought to explore.

The goal of our study was to understand the differences in the LE experienced by Navy EM physicians who recently transitioned from a stateside practice environment to a deployed practice environment. We evaluated the psychosocial dimension (personal, social, and organizational) and the material dimension (physical and virtual spaces) of the operational setting and compared it to the training environment.⁵ Our specific research question was, what are the differences in the learning environment for Navy Emergency Medicine physicians who train in US hospitals but practice in an operational environment, and how do these differences shape their learning needs.

METHODS

Interview guide

We developed our interview guide based on the existing literature whereby we identified the Gruppen et al. framework and through conversations with physicians who have deployed.⁵ Our initial interview guide consisted of 16 open-ended questions that addressed the psychosocial dimension and the material dimension of the different clinical settings. Additionally, interviewees were asked to identify any other differences in the two LEs. The two researchers (NH, DMP) conducting interviews piloted the interview guide and used the experience to modify the interview guide. We also piloted the

interview guide with a Navy Emergency Medicine physician who did not meet inclusion criteria, which lead to additional revisions in the guide.

Recruitment and consent

We recruited Navy EM physicians who had deployed in a military capacity as an EM physician with the first day in the country of deployment on or after Jan 1, 2017. Study subjects were required to have completed at least 90 days of a deployment scheduled to be at least 180 days long. Navy EM physicians were recruited by email and phone interviews were conducted from January to March, 2020. The Institutional Review Boards at the Uniformed Services University of the Health Sciences and University of Michigan approved this study.

Data collection

Subjects completed demographics, deployment characteristics, contact information, consent and confirmation of the inclusion criteria via online form. We performed individual phone interviews. All interviews were conducted with two members of the research team. The interviews lasted from 60-90 minutes.

Data analysis

All interviews were transcribed and recorded. We used the constant-comparative method to analyze the interview data. This consisted of an iterative approach of frequent team member conversations between interviews to identify themes, and review the interview guide.²¹ We continued this process until thematic saturation was achieved.

RESULTS

Six themes that pertain to the LE were identified, prioritized by the frequency of being mentioned: 1) Patient care is central to the learning experience 2) Professional isolation vs. connectedness 3) A sense of meaningful practice engages the learner in the learning environment 4) Physicians as educators shape the LE 5) Team trust impacts the LE 6) The larger military organization impacts the LE.

We interviewed 12 Navy Emergency Medicine physicians. Individual's rank ranged from Lieutenant (O-3) to Commander (O-6). Subjects had a range of prior deployment experiences and backgrounds (Table 1).

Patient Care is Central to the Learning Experience (Patient is Central)

Some patients were different in the operational setting. A portion of the care provided was typical of emergency presentations in the stateside environment, however study subjects described seeing more primary care visits and increased trauma severity. Additionally, infectious pathogens, environmental exposures and antibiotic resistance differed based on deployment location.

“This was different from the US...patients would get prehospital meds and could be altered. Everyone gets pan scanned. More liberal with antibiotics, assume everything is contaminated and resistant organisms. More blood transfusions.”

Uniformly, all respondents reported lower patient volumes and less time focused on patient care in the operational LE. Participants stated that low patient volumes impacted their learner needs. For example, without delivering continued patient care,

physicians expressed concern about skill decay that would impact their ability to care for patients in the operational setting and upon return to the United States. They stated that their engagement in the clinical LE was driven by exposure to patients.

“Despite bringing books out here...without having that person in front of me to look at and bring the knowledge all together I am deteriorating...I need the hands on, I need the patient in front of me to really tie it together.”

Generally, providers felt a connection with active duty patients; the shared deployment experience engaged physician learning at an emotional level.

“Taking care of injured Americans was harder emotionally...there was just something about having [the patient] talk to you...I felt more connected. I’m active duty and they’re active duty.”

In contrast, language and cultural barriers were a barrier to learning; some physicians reported difficulty connecting with patients when a translator was necessary.

“They’re [Americans] actually speaking to us and we’re speaking to them and having a conversation. Versus the Afghans you’re looking to this third party to do the communicating for you...you could still develop a [patient-physician relationship]. The language barrier automatically makes you less connected.”

These differences in LE challenged physicians and inspired active learning. Physicians reported learning from subject matter experts, like those with primary care, field medicine or operational experience.

“It had been like two years since I had done trauma...On the way out there I was terrified, so I was reading the clinical practice guidelines non-stop...Right when we got there, our team got briefed by the outgoing team, thank goodness, on how that facility accepts traumas and the process that they had identified to try and get them through as quickly as possible. And they showed us, it was like a "crawl walk run" kind of thing. And fortunately, we did that with them because within 72 hours we had that rollover vehicle guy and then 12 hours after that we had a mascas. Because we drilled with them and then did this actual scenario then I felt like I had my feet wet, so I was good to go.”

Physicians adapted in various ways (Table 2). Specifically, to low patient volumes, they worked to maximize learning opportunities from each patient encounter. They were able to learn from longitudinal exposure not available stateside.

"Ask more questions and take more time to go over patient encounters...I actually took more time with my patients than I would here because I didn't feel rushed. I didn't really have any more patients to have to move through unless we were in a mascas situation...I would stop over in the ortho clinic and some of the people we had seen previously for mascas would be following up...I'd see how they were doing and touch base with the ICU.”

Professional isolation vs. connectedness (Isolation)

Physicians who previously trained or worked in large hospitals typically experienced a sense of professional isolation due to a limited number of physician colleagues, whereas physicians from smaller hospitals often expressed having increased connectivity. In stateside emergency departments, physicians step onto a team with different team members each shift. In the deployed setting, team members usually remained the same, so physicians developed a strong sense of connection with their teams.

“[At home] I can go an entire shift and not talk to [another doctor]...I could go weeks without talking to any other doctors in the hospital...On deployment I was with the same group of doctors every third day and so not just me but I’d have an intensivist, a trauma surgeon, same anesthesia team, same nurses...we a had really great relationship.”

Similarly, the consultants available were typically the same person for the entire deployment, thus exposure to fewer perspectives led to decreased learning opportunities.

“There’s only so many times that my orthopedic surgeon can teach me how to put on a splint...There’s only so much stuff that you can teach me without being able to expand any further on it, since your opinions on the matter are always the same.”

Professional isolation and limited resources typically experienced in the deployed setting can result in a different standard of care. For those who had practiced in a resource-limited environment, this was an easier transition. For those who had only practiced in large, resource rich academic centers, learning to adopt a different standard of care was more difficult.

“Your idea of what good medicine is, is based on being at an academic facility and having access to every single thing.”

Additionally, this professional isolation challenged providers to practice medicine in new ways. For example, delayed patient transport challenged them to manage conditions in the ED for longer periods of time, rather than admit the patient for continued care.

“I had a sick contractor, STEMI, cardiogenic shock who was in the department for 24 hours. I never had this problem back home. I had a renal failure patient in the ED for upwards of 24 hours. Typically, I had never managed these conditions on my own for that long.”

Participants reported that there was a greater proportion of male than female patients in the operational setting. Some female physicians reported that some patients from different cultures did not recognize them as physicians. This impacted the way they learned from their patients.

“A lot of them were very adamant that we not look at their genitalia. They got very upset when you were trying to expose them in the trauma bay. They [would say] ‘no...my fiancé is the only person who’s allowed to look there’.”

For some, professional isolation was tied to personal isolation.

“I think at that point the learning had ended...I did go into a very emotional, very dark place, and I was just surviving at that point. I really isolated myself, I stayed away from people, I stopped going to as many meals as I could...I didn't want to be around anyone.”

Physicians attempted to adapt to the professionally isolated LE in many ways (Table 2). Commonly they laid out individual study plans, but these almost uniformly failed. Self-motivation was difficult without regular patient contact or interactions with peers. Intermittent patient interactions spurred individual self-study efforts resulting in a yo-yo effect.

“[Motivation to learn] is like a waxing and waning thing...when I got out here, I felt super motivated. I’m going to get all these CMEs. I was going to read Rosen's front to back, twice. I’m going to go through Roberts and Hedges. I brought all of this out here. Because I knew that I’m not going to see things, but I’m going to make sure my

mind is there. It worked out really well for the first few weeks. Then I fell into this pit of why am I reading all this stuff when I can't utilize it."

Some physicians described innovative ways they successfully adapted to the LE by learning in groups. This was locally with other deployers, as well as globally within their network.

"...at night I'd read some of my own CTs and then the next morning I'd go review them [with the Radiologist] and discuss my thought process..."

A sense of meaningful practice engages the learner in the LE (Meaning)

Finding meaning in one's daily work can encourage engagement in the LE by bringing a sense of professional satisfaction. Physicians who were actively seeing patients reported having a tangible understanding of the mission. Physicians with few patient interactions sometimes searched for meaning in their daily work.

"We were saving people who were over here prepared to give their lives for other people, it was a different feeling, it was a feeling of pride."

"A lot of times you just felt like you didn't know why you were there."

Physicians reported that a sense of cooperation seemed to dominate while taking care of combat injured patients.

“I personally felt very connected with my team when we were resuscitating the critically ill patients that we did have...Everybody was on the same page and the results of that were phenomenally rewarding for everybody...Corpsmen were just as important as the physician and everybody had something to offer and the patients benefited and then at the end we'd have a really nice debrief and it would make our team cohesion soar.”

Those involved in contingency planning knew their work was important, but found it difficult to remain enthusiastic about planning for events that might never occur. They reported struggling to remain actively engaged in the LE, reporting that enthusiasm often waned for engaging in simulation drills or self-study plans. They longed for the immediate professional reward associated with seeing patients.

“We have a mission, but our mission is only if something happens.”

Physicians who filled leadership positions found meaning in communicating a broader sense of mission to the medical unit. They found purpose in ensuring the medical unit was prepared to support the warfighting effort. Those in leadership positions worked to create an environment of open communication and awareness about

how medical care impacts unit readiness. This brought meaning to work activities and engaged learners of varying seniority.

A sense of meaningful practice and mission engages the learner in the learning environment. This theme was highly interactive with the centrality of the patient, because patient care is closely tied to a sense of purpose. When this tangible aspect was missing, it was harder to recall the mission and engage in the LE.

Physicians as Educators shape the LE (Educator)

In the deployed setting, physicians assume the additional responsibility of ensuring the readiness of their care team. Physicians reported that they were challenged to lead educational efforts for corpsmen and nurses with a wide range of prior experience, skill sets and medical knowledge. Many members of the care team had minimal experience in their deployed role. Stateside, the education and training of corpsmen and nurses is not a primary physician responsibility, but it is in the deployed setting.

“They [corpsman or nurse] discussed thoracotomy. I reviewed that CPG and then went over the equipment in our set.”

This additional role as educator required physicians to develop medical education skills and shape the LE for individuals in different roles. Many physicians found that being an educator was a meaningful part of their job, as they taught basic nursing skills,

developed simulation cases, and ran mass casualty drills. Most physicians established a LE in which all members of the care team participated in daily group education events and teaching that was unique to the deployed setting. They empowered subject matter experts from all professional backgrounds to teach within their domain.

“None of our corpsmen and none of our nurses actually had any trauma experience. Our ED nurse didn't have any ER experience...We reviewed CPGs lecture style. We did trauma drills...It was usually me or the other ER doctor giving the lectures.”

Turnover was typically planned by the off going team, and varied widely in duration and quality. Physicians considered the most valuable parts of turnover to be MASCAL exercises and observing the prior team functioning. Jetlag presented a challenge to effective turnover.

Team trust impacts the LE (Trust)

Physicians must work to understand the unique attributes of the deployed clinical environment, establish roles and foster an environment that promotes trust and healthy conflict. While this challenge also exists in stateside clinical settings, the unique clinical environment and the consistency of team members requires that conflict be actively managed.

“You feel like you become a family and you’re just stepping on each other’s toes...the other doctor would write an order and then I’d hear the nurses complaining about it in front of the corpsmen...little grumbings.”

Team members' brought expectations from prior experiences, and physicians worked to understand and integrate with physicians with different backgrounds and expectations.

“The cultures from other specialties are all different; it’s like we’re all in our own gang. The cultures of other specialties are completely different from emergency physicians. We're used to rolling with a resource limited posture. Anesthesiologists are completely different. They don't intubate unless everything is perfect. If it's not perfect, they cancel the case.”

This ambiguity also exists in defining who runs codes, as many different specialties have experience in this realm. This forces the team to explicitly define roles, build trust and manage conflict to effectively function in this unique setting.

“The casualty receiving area of a role 2 unit, is that an OR? Is that an ER? Is it an ICU? Nobody really knows...It's different.”

Stateside, team roles are well defined and each day the EM physician joins a team with new members, each filling a predetermined role on the team. Teams function

differently on deployment, in part because the team members tend to stay the same and fill flexible roles established by the team.

“We had it [team roles] ironed out ahead of time, the team that I was on was going to take bed 1...overflow would go to pulmonary/critical care, our ICU doctor...or the ghost team...or the PA from primary one was going to come over and help...once we got beyond beds one two and three there was not so much clarity about who was going to be running the bed...”

Prior to deployment, team members typically do not know one another. To establish new roles, team members needed to build trust. Physicians often described an initial period of competition leading to conflict. Often, there was an event that allowed the team to build trust in each other and work through conflict with a positive outcome.

“We had a code...I was running the code and the CRNAs jumped in and they started barking med orders at the nurse that was assigned to do medicine...I had to say everybody stop, med orders are going to come from me...Afterward we huddled up about it and I said this could have been a lot better...at first they took offense, but then by the end of the conversation we were much more on the same page...this is what I think I could have done better, this is what you could have done better, do you agree or disagree, and if you disagree let's have that conversation...Effective teams you have to be able to criticize each other vocally...[but you] have to press each other and encourage each other...I'm not perfect, you're not perfect if we disagree let's hash it out.”

Others describe continued unresolved conflict and persistent lack of trust.

Unresolved conflict also contributed to the theme of isolation.

“My job as the emergency medicine physician was to wait outside of the tent at the casualty collection point and just triage patients...I didn’t understand why no one understood that I had more skills than just to be able to say this patient is sick or this patient is not sick or this patient is dead. So instead of me wanting to be cooperative, helping, I wasn’t.”

“I hated going to work so I wouldn’t...I would go hang out in sick call...I would go to the BAS and there were times I would just roll my ultrasound around and find some random Marine that wanted something ultrasounded.”

The larger military organization impacts the LE (Larger Military Organization)

In the deployed setting, physicians describe heightened awareness of the interaction between the larger military organization and their clinical practice. All naval officers have a dual role as military officers and clinicians, however the balance of these dual oaths can be more palpable in the deployed environment.

Traditionally, sailors are taught “Ship, shipmate, self” to describe priorities. The Hippocratic Oath requires that physicians prioritize the needs of their patient. In the deployed setting, physicians must make clinical decisions with a new balance of

priorities. They learn a new set of operational considerations, as they make patient care decisions. Physicians reported that at times this led to internal conflict.

“situations where you were required to do things the “military way” and not the “medical way”...I’m supposed to be a naval officer first and a physician second.”

Resources available through the larger military organization’s supply chain impacted the LE. The limited availability of tests, equipment, medical evacuation capabilities and personnel challenged physicians to adapt. For example, stateside patient transfer systems are well established.

“The [modus operandi at the] MTF (military treatment facility) is stabilize and call the transfer center and they pretty much take care of everything for you”

In the deployed setting medevac capabilities required constant physician attention and a balance of multiple external factors impacting transfer.

“I’m going to my CO and explaining to them they need medivac...it became a logistical burden to explain why...a lot more coordination. You are the transfer center and the doctor”

Physicians learned a new role in maintaining supplies in the deployed setting. They learned to navigate intricate supply chains and consider delivery times, expiration dates, and consumption rates.

"the blue top tube expired in 9 months and it took 6 months to get stuff...the tubes often arrived expired"

Participants also reported that international clearance for medical supplies was a new consideration as well as equipment compatibility.

With increased exposure to the specific nuances of the operational setting, physicians functioned more easily. Physicians with deployment experience were able to adapt faster; similarly, those with mentors who had deployment experience were able to learn and adapt faster.

"The fact that I had deployed before allowed me to move past that [low patient volumes] more quickly".

DISCUSSION

We sought to explore the differences in the LE for Navy Emergency Medicine physicians who practice in US hospitals but deploy to an operational environment, and how these differences can shape their learning needs. This study identified six interactive themes rooted in the conceptual framework described by Gruppen et al. Thus, our

research provides preliminary validity support for their proposed structure, as we found themes in each component and did not identify any themes that could not be hung on this. Our themes spanned the dimensions of the model and interacted in many ways. As an example, we will discuss how the patient care theme interacts with the other themes to either positively or negatively shape the LE.

We will discuss how a meaningful patient interaction creates a positive impact on the LE, through the lens of the themes identified. Patient interactions decreased isolation by increasing interactions with consultants and peers. Since all of our study subjects were active duty military, taking care of military patients led to a sense of meaningful practice by tangibly contributing to the common mission. As physicians molded the team, these patient interactions also provided opportunities for teaching. Team trust usually improved as members came together to care for a critically ill patient. Finally, the support of the larger military organization enabled physicians to stay engaged in patient care. This example shows how a single theme interacted with the other themes to positively shape the learning environment.

In contrast, themes also interacted to negatively impact the LE such as when a physician deployed without seeing any patients. Without patients to engage the physician professionally, there was less opportunity for patient centered learning, resulting in more isolation. Similarly, when the mission was to care for combat casualties but none existed, physicians lacked a sense of purpose. Physicians felt limited in their ability to create engaging learning opportunities without patients. Without patients to care for, teams struggled to work through conflict and establish trust. Finally, if the organizational leadership routinely utilized the medical compound as a contingency plan, this decreased

the number of patients in the LE. This example shows how themes interacted to negatively impact the LE. Themes interacted in numerous ways with other themes as illustrated in Figure 2.

In fact, the Patient is Central is a theme that was truly central to the other themes. Prior work has found that the centrality of the patient also dominates stateside LEs.²⁻⁴ We postulate that this theme would likely be foundational in other austere LEs such as geographically or socially isolated practice settings. The primacy of this theme suggests that it should be a central focus during curriculum development.

We were encouraged that learners adapted to meet the challenges of this new environment (Table 2). With these results in mind, we suggest proactive LE strategies to target specific learner needs. Physicians and organizations should constantly seek opportunities to increase exposure to a wide variety of patient encounters either in person or by using simulation or virtual exposure. When these opportunities arise one can maximize learning by, for example, engaging teams or providing longitudinal exposure. Encourage opportunities for physicians to connect personally and professionally and watch for signs of isolation. Look for ways to understand the contribution the medical unit makes to the larger military mission, and understand that physicians may struggle with a sense of purpose and meaning. Engage physicians as educators and supply them with educational strategies and resources for the deployed setting. Seek to understand the background perspective of team members as roles and responsibilities are established and use conflict as a tool for growth and to establish trust. Engage mentors and leadership to support a positive LE in the deployed setting.

Our study was limited by deployments during the study period having low patient volumes, thus these results may not apply to deployments with higher volumes. We suspect that the theme of centrality of patient care to the learning experience would be unlikely to change, however it would likely interact with the other themes differently. Second, while we had a small sample size of study subjects, we reached saturation after 12 interviews following an established conceptual framework which suggests that our results would apply to a larger volume of participants. Third, these participants did not include physicians from other services or those deployed to Navy and Marine Corps Role 1 (immediate first aid care) and Special Operations settings and it is unknown if these results apply to different deployment experiences. Finally, we specifically excluded humanitarian and disaster response deployments, thus it is unclear how these themes may apply.

These six themes aligned within the Gruppen framework, and we believe they can be used to inform strategies to successfully transition the navy physician into the deployed LE. For residencies, this information could be used to inform development of military unique curriculum (MUC). While these results are specific to Navy EM, as all Navy specialties work to develop their unique MUC, these themes could inform curriculum for other specialties deployed to this learning environment. This work could also help shape pre-deployment training curricula not only for physicians, but also for nursing and corpsmen communities. Finally, physician learning is ongoing during deployment, thus these results inform ways to continue professional growth by both the individuals and the organization.

Better understanding of the LE has implications for all health professions. The nature of our job requires flexibility in our training pipeline and in job transitions. As we have seen with the current COVID epidemic, this has required entire hospital systems to enter new LEs simultaneously with no warning. We believe that these themes could potentially be used for just in time training or preparation to ease the transition.

We identified six themes that describe the differences in LE between the stateside and deployed setting and discussed how they impact the learner needs of Navy Emergency Medicine physicians. These themes are consistent with a recent conceptual model by Gruppen and we believe our results inform potential strategies to position the deployed medical unit for success.

TABLE 1. Study Subject Demographics

		Number (%)
Gender	Male	4 (33%)
	Female	8 (67%)
	Total Subjects	12
Medical School Type	Civilian	11 (92%)
	Military	1 (8%)
Residency Type	Civilian	2 (17%)
	Military	10 (83%)
Deployment experience prior to the deployment discussed for this study	General Medical Officer (primary care physician for an operational unit with board certified/eligible physician oversight)	9 (75%)
	Deployed with their unit while serving in the capacity of a General Medical Officer	6 (50%)
	2 people deployed in a capacity other than as a General Medical Officer - 1 deployed as an Emergency Medicine physician, and one deployed as a non-medical naval officer	2 (17%)
	No previous deployment	6 (50%)
Description of deployment that was the focus of the interview for this study	Role 2 (damage control resuscitation and surgery)	3 (25%)
	Role 3 (definitive care hospital prior to evacuation out of country)	3 (25%)
	Special Purpose Marine Air Ground Task Force (land-based Marine Corps unit)	3 (25%)
	Marine Expeditionary Unit (ship-based Marine Corps unit)	3 (25%)

TABLE 2. Participant Adaptations and Leadership Strategies

Theme	Participants adaptation to the LE	Sample quotation	LE strategies for leadership
Patient is Central	Practice active learning	"I wouldn't say that I felt totally ready for it [massive transfusion protocol] when we arrived, but I feel like I felt ready for it by the time we had done a couple of drills and really talked about it with the trauma surgeon [in country]...When you verbalize 'okay, I want massive transfusion protocol, 1:1:1' and they [simulation instructors] are like 'check' versus actually seeing the blood product come out and get hung...[I ordered] 2 packed red blood cells and 2 FFPs, she [nurse] went blood, blood and the FFP never made it in...she didn't know she should do blood then FFP then blood...that was a learning curve as far as how to order it...learning why you give both products."	Match training and patient care exposure stateside as closely as possible to the LE of the deployed setting. Make training as realistic and detailed as possible.
	Use simulation for maintenance of knowledge and skills	see above comment	Provide simulation equipment in the deployed environment. Use the full potential of simulation by challenging physicians to perform detailed procedures, discuss complex medical decision making, and practice cases that include challenges unique to the LE.
	Maximize the learning potential from each patient encounter	"Ask more questions and take more time to go over patient encounters...I actually took more time with my patients...because I didn't feel rushed...I would stop over in the ortho clinic and some of the people we had seen previously for mascals would be following up...I'd see how they were doing and touch base with the ICU."	Establish systemic ways for providers to follow patient care through the echelons of care.
	Study Clinical Practice Guidelines (CPGs)	"I honestly didn't even know what CPGs [Clinical Practice Guidelines were]...The CPGs are evidenced	Ensure widest dissemination of CPGs, including those engaged in civilian residency.

		based medicine, it's very similar to what we do in the civilian world."	Integrate CPGs into stateside training.
	Seek out virtual patient cases to increase exposure to patient volume and diversity. Discuss patient cases with physician peers to explore the finer points and subtleties of the clinical presentation	"I have a good support system of two other awesome female navy ER docs [in the US]...whatever patients they see in garrison that are complicated...they run those patients by me so I can tell them what my management would be, and they would tell me if I'm right or not."	Encourage opportunities for providers to experience a wide range of virtual patient cases to maintain complex clinical decision making capacity. (virtual cases, chart reviews, case reports). Encourage physicians to discuss patient cases with peers to explore the finer points and subtleties of the clinical presentation.
Isolation	Connect to other physicians by participating in remote educational conferences	"We were pretty isolated, but we were able to call into JTS [Joint Trauma System] conference every week and those guys [2 known ED physicians] were online there. It was nice to hear familiar voices. It made you feel less isolated...we often talked about how to manage cases in a resource limited setting."	Provide resources necessary to remotely and securely connect physicians to educational conferences. Establish a network of conferences that will share their content virtually.
	Use simulation and MASCAL exercises to encourage team cohesion	"I think that practicing together as a team is really important which is why the mascal drills were good...just for team building...We got to see strengths and weaknesses...who could get along."	Provide medical units with pre-planned MASCAL drills and resources for simulation.
	Consult liberally	"I see shoulder pain every day in the ER...but when I know that my orthopedic surgeon is having coffee in the next tent over...I'm much more likely to do an exam and figure out what I would do...and then go over and get him and say look at this shoulder and let me know what you think and then test myself"	Reduce barriers to specialty consultants
	Watch for team members who are isolated and attempt to engage them; screen for depression	"At that point the learning had ended. I went to a very emotional, very dark place, I isolated myself, I stayed away from people...There was no learning, there was no nothing, I was just trying to survive the deployment."	Establish a system to screen for isolation, depression, anxiety and exclusion.

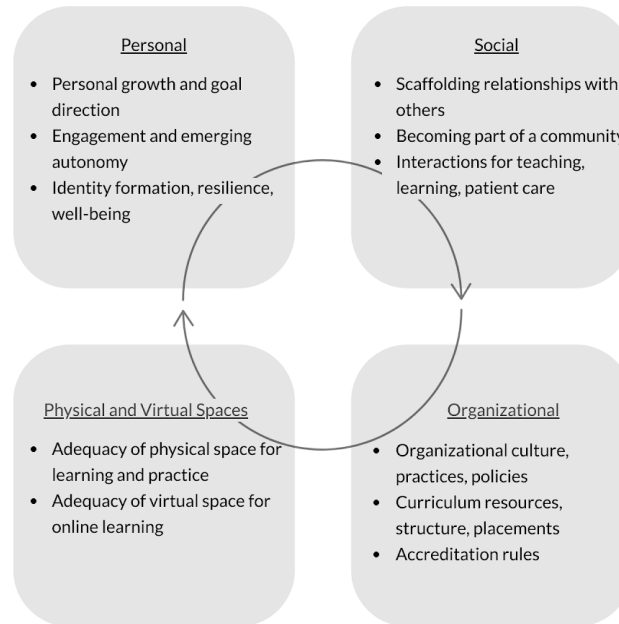
Meaning	Participate in group study plans rather than individual study plans	"We presented all the CPGs...we all read it and then we'd have a discussion on it [as a group]."	Encourage opportunities for group study
	Seek to understand the role of medical and its contribution to the greater mission of the deployed unit	"The more senior you get, the more you're in the room for the conversation about mission...I remember being an O-3 [lieutenant]...not really understanding. I'm constantly pushing that message down to the deckplate level."	Leadership should work to convey the mission and contributions of the medical unit.
	Look to find meaning in patient encounters	"When we actually had true trauma patients...The mission is more focused...You feel like you're doing something that's important."	Use patient encounters (when available) to highlight meaning.
	If struggling to find a sense of purpose, reach out to others to discuss.	"I felt meaningfulness as part of the organization, this is our duty to be here and be ready. But there definitely was a lot of the time that I felt like what am I doing here."	Openly discuss physician feelings about purpose. Make counseling resources available.
	Set expectations for what meaningful practice will look like both in high and low patient volume environments	"In the beginning of deployment I was excited, I was pumped up, I wanted to see what's going on in the world...very motivated...In the middle of deployment I got a little sad...I don't mind taking time out of my life to do something productive, but I felt like I left all my friends and family, and I'm not doing anything personally [or professionally] rewarding. That was the hardest part. I was very bored. I had all these skills I trained on but was not using."	Discuss mission and meaning in the predeployment period to set expectations. Talk openly about expectations and reality with regard to purpose.
Educator	Reach out to the broader network of experience and skills in your medical unit and engage them as teachers	"There was expertise that we could steal from, although we didn't have any ER nurses, there were two ICU nurses...they trained our ER nurses to do the ER role with guidance from us. One of our corpsmen...had deployed a bunch of times so he was the most familiar person in the group with how a role 2 runs and functions."	Create opportunities for medical professionals to learn the experiences and skill sets of one another and create opportunities for them to contribute to educational efforts.
	Consider what it means to be a medical educator		Set expectations that one responsibility of the deployed physician will be to set the tone of the LE and organize educational opportunities for the team. Provide them with

			resources for curriculum development.
Trust	Discuss the anticipated work environment and plan for team function	"A heterogenous group of people from different specialty cultures...Everybody's got various levels of experience. Everybody wants to show...how competent they are. Conflict always arises...If something comes in that can be managed by 3-4 people, who manages that?...We used the predeployment time...to talk through how these things should go."	Train teams on conflict resolution and team dynamics
	Attempt to understand the work culture and LEs of different specialties. Discuss integration of these expectations.	"I was the only Emergency Physician...I had physician peers, but we were "siloe specialties." We are great within our specialty, but there is a difference in understanding."	Explicitly educate teams about how roles are fluid and will need to be established. Provide an opportunity for team discussions.
	Engage leadership if you feel that rank or personality is precluding you from participation	"There was an O-4 ER physician but there was an O-6 anesthesia physician and the O-4 ER physician was trying to run the code but the O-6 anesthesia guy was like nope we're doing this."	Support physician contribution based on competency rather than rank or personality
	Debrief every patient encounter	"Everything we do we debrief."	Educate teams on debrief techniques and create the expectation that this will occur regularly
	Discuss roles and responsibilities in the predeployment period and revisit this discussion, especially early in the deployment, to make adjustments		Explicitly educate teams about how roles are fluid and need to be established. Provide an opportunity for team discussions.
	Work with your team to discuss clinical experience and identify knowledge gaps to focus training goals		Encourage physicians to discuss insecurities about competencies that they feel less prepared for (e.g. walking blood bank, subclavian lines, massive transfusion resuscitation).

	Get to know teammates personally and professionally during the pre-deployment period;		Create opportunities in the pre-deployment period for team members to discuss background, expectations, and experience.
Larger Military Organization	Graduated return to practice after deployment	"My first patient [after deployment] was a 9 yo with bacterial meningitis, who was completely altered and sick...if they [my colleagues] weren't there I feel like...I was slow to make decisions...I honestly felt like if I was on that shift by myself...it wouldn't have been a good outcome."	Physician scheduling should optimize conditions to support physicians as they re-enter the stateside workforce, to give them time to acclimate to the stateside LE.
	Familiarize yourself with local procedures and policies prior to re-integration to the stateside ED	"My biggest challenge with maintaining competency is not so much the science, it's the skill of managing multiple patients, multitasking, interacting with nursing, leveraging extenders...which is a skill...So jumping back to 30 patients a shift, I'm going to be rusty."	Minimize the time that physicians are away from stateside emergency departments. Consider shortened, more frequent deployments.
	If prior military experience is limited, actively seek to understand military structure and function	"I went from residency to a Marine Corps unit, with no medical mentor or Navy mentor...I didn't even know how to write a FITREP [performance report]...I had to figure it out on my own."	Maximize organizational support for civilian residency graduates and those without prior deployment experience.
	Engage mental health resources if needed	"I honestly didn't know if I was going to make it. I had to go speak to the chaplain at one point and he ended up being a huge support for me."	Embedded mental health personnel are essential. Ensure that members have confidential access.
	Understand the dual oath as officer and physician	"Is the decision that we're making going to make them no longer deployable? What is their function in that command?...If I take this person out, what's going to happen with their unit?"	Discuss case studies that highlight the ethical considerations of military medical practice
	Connect to mentors, those with prior military or deployment experience, and learn about the military organization.	"I was reaching back to my previous attendings [in the US] from residency [or other deployed doctors], "as a leader, how do you handle this kind of situation?"	Connect physicians to other deployed and recently deployed physicians

FIGURE 1. Learning Environment Framework

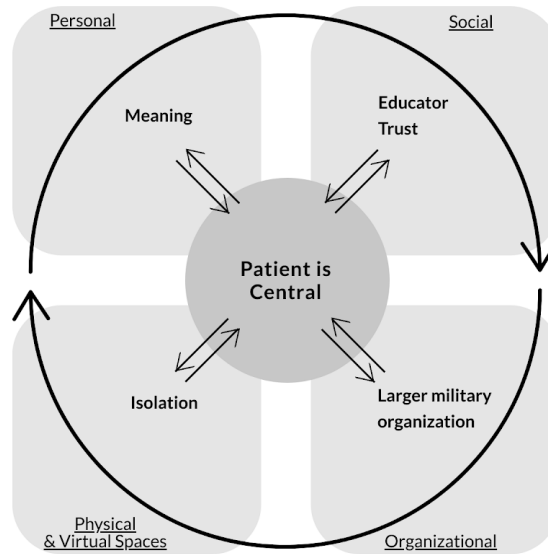
Figure 1: Learning Environment framework*



*adapted from Gruppen et al. [5]

FIGURE 2. Thematic Results on Learning Environment Framework in the Deployed Setting

Figure 2: Thematic results on learning environment framework in the deployed setting



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CHAPTER 3: DISCUSSION

DISCUSSION

This thesis explores the differences in the LE for Navy Emergency Medicine physicians who normally practice in US hospitals but deploy to an operational environment, and how these differences shape their learning needs. We identified six interactive themes that describe the deployed LE: 1) Patient care is central to the learning experience 2) Professional isolation vs. connectedness 3) A sense of meaningful practice engages the learner in the LE 4) Physicians as educators shape the LE 5) Team trust impacts the LE 6) The larger military organization impacts the LE. These themes are rooted in the Gruppen et al. conceptual framework, and span the dimensions of the model with multiple interactions, reflecting the complex nature of the LE.

The centrality of the patient to the learning experience is a well-known theme in medical education. When patients are absent, a significant ripple effect may influence all the other themes we identified, demonstrating the importance of this theme. Low patient volumes expressed by our study participants in the deployed setting is a significant difference from the stateside LE. Individual adaptations and leadership strategies should encourage maximum patient exposure, optimize learning from each patient interaction, and seek to approximate patient interactions as closely as possible. Techniques such as simulation, case discussions, or virtual encounters, may be helpful, to name a few.

Table 2 in Chapter 2 of this thesis demonstrates individual adaptations and implications for leadership within each theme. These adaptations highlight individual changes we learned about during interviews as well as ideas generated by the authors

following the interviews. The strategies are suggestions, and not proven to be effective at meeting learner needs or improving educational outcomes. However, further research may investigate the effectiveness of these adaptations and strategies, and explore other innovative ways of meeting learner needs.

The Accreditation Council for Graduate Medical Education (ACGME) evaluates and accredits residency programs in the United States. They establish educational standards and requirements for training program accreditation. The ACGME offers six Core Competencies for Graduate Medical Education (GME) programs to use to evaluate their residents in training. Residents are required to meet milestones at different stages of their training.

In addition to the Gruppen framework (ref), there is significant overlap between the themes we identified and the ACGME Core Competencies. This suggests shared foundational components of the stateside and deployed LE in order to maintain quality education and safe care for patients. Curricular innovations during residency may strive to meet the ACGME Core Competencies with the themes we identified in mind, in order to prepare residents for success in the deployed LE.

For example, Patient Care is the first Core Competency, and overlaps with the theme we identified, Patient is Central. Patient care is defined as providing care that is compassionate, appropriate, and effective for the treatment of health problems and the promotion of health. One of our findings within the Patient is Central theme is that the patient population is different because language, culture and patient demographics differ. This impacts the way physicians interact and learn from their patients. One curricular solution during residency could be to seek out training sites which serve a diverse

population and frequently require translators. This would meet the ACGME Patient Care Core Competency while giving the resident experience interacting with a population from a different culture and language background, preparing them for practice in the deployed setting.

Another example is the overlap between the ACGME Core Competency, Systems-Based Practice and our theme, Larger Military Organization. Both relate to understanding and responsiveness to the larger context and system in which the health care is delivered. They convey that effectively operating within a larger organization is necessary in order to optimize patient care. One curricular solution may be to engage residents in a systems-based project related to understanding the supply chain, leadership structure, or broader goals of the health care organization.

This overlap suggests that curriculum developed to address deployed learners should be informed by the Gruppen LE conceptual framework and the well-established ACGME framework. This would augment existing ACGME training without deterring from the larger training goals.

Our findings may be used to inform a targeted needs assessment for physicians preparing to deploy and for those currently deployed. The adaptations and strategies we suggested may be useful for both individuals and groups. It is our hope that these themes can be used to identify curriculum content and methods that will positively impact the LE.

Future areas of research may include studying the experience of other military services or physician specialties, as their perceptions of the LE may significantly differ. Other health professionals, such as nurses or corpsmen, may also have a different

experience of the deployed LE. One might investigate some of the simulated training environments of military medical training to evaluate for the themes we identified. Finally, the adaptations and strategies we discussed are suggestions with unproven effectiveness; these ideas require further exploration to verify that they are effective methods for enhancing the LE.

MILITARY RELEVANCE

This project was designed to better understand the LE of deployed Navy Emergency Medicine physicians and how it affects learner needs. The results can be used to inform a targeted needs assessment and inform educational curricula for this specific population both before and during deployment. With a better understanding of the deployed LE, we can improve educational content and methods to enhance physician learning. Ultimately, we hope that improved physician learning will result in better care of patients both in the deployed setting, and after physicians return to the US.

Most military physicians train in one LE, but ultimately practice in another setting. Physicians from other Navy specialties may experience a similar change in LE when they deploy, and may find meaning in our findings. Our findings may also apply to physician learning in other branches of the military, as the deployed experience may have similarities across the services.

Physicians are joined in the deployed setting by other members of the health care team, including nurses and corpsmen. These military members also experience a similar deployed LE, and may benefit from our findings, as their leadership seeks to develop curricula for their learning.

LIMITATIONS

Our study included 12 Navy Emergency Medicine physicians with perspectives that may not represent the full range of deployed experiences for deployed EM physicians. The deployments they described had low patient volumes, so our results may not apply to the LE of deployments with higher patient volumes. The deployments they described had low patient volumes, so our results may not apply to the LE of deployments with higher patient volumes. It is likely that the centrality of the patient care to the learning experience would persist as a theme, but the way it dominates the other themes (that may also differ in a higher patient volume setting) may change. Additionally, it may interact with the other themes differently.

Second, our study participants did not include physicians from other services or those deployed to Navy and Marine Corps Role 1 (immediate first aid care) and Special Operations settings and it is unknown if these results apply to different deployment experiences. We specifically excluded humanitarian and disaster response deployments, thus it is unclear how these themes may apply to these situations.

CONCLUSIONS

This study identified six themes that describe the differences in LE between the stateside and deployed setting. We identified ways Navy Emergency Medicine physicians adapt to this unique LE and suggested implications for individuals and leadership. These themes are consistent with the conceptual model proposed by Gruppen, suggesting validity of their framework and also align with the ACGME core competencies. Our results inform potential strategies to position the deployed medical unit for success.

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