Airmen test hazmat equipment for functionality during emergency medical response exercise at Joint Base San Antonio-Lackland, Texas, May 19, 2019 (U.S. Air National Guard/Derek Davis)

Joint Integrative Solutions for Combat Casualty Care in a Pacific War at Sea

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American maritime forces currently conduct theater security operations through rotating carrier strike groups in the Western Pacific where shadowing Chinese surface combatants hinder and harass their activities. Given China's militarization of the South China Sea, escalation of tension and conflict are all but inevitable. Although current engagements and interactions with our competitors in the Western Pacific fall short of open military conflict, a war at sea (WAS) in which maritime adversaries fight for sea control appears probable. Integration of scalable, adaptive joint force medical capabilities will address our lack of preparedness, together with those impediments encountered in providing combat casualty treatment in a contentious disseminated maritime environment, such as a WAS.

Ensuring regional stability in the Pacific theater is a national security

priority complicated by unique components threatening U.S. expeditionary forces, such as China's rise as a global competitor possessing multidomain anti-access/area denial (A2/AD) capabilities. The joint force must stand prepared to deter competitors and defeat any adversarial threat across the full range of military operations by employing "concepts and capabilities to win without assured dominance in air, maritime, land, space, and cyberspace domains."[1] The health service support mission must follow suit, aligning with the operational joint force across the full spectrum of warfare. They must be trained, manned, and equipped to render lifesaving resuscitative and health-sustaining capabilities to engaged warfighters in all domains and operational environments.[2] We address (1) the rationale for preparing for a Pacific WAS; (2) doctrinal guidance from lessons learned in combat casualty planning in U.S. Central Command (USCENTCOM); and (3) utilization of joint integrative solutions critical to maintaining a competitive advantage with casualty treatment when supporting contentious maritime operations.

Preparing for a Mass Casualty Scenario

Current National Security Strategy (NSS) guides U.S. defense of our global security interests, assessing China's portentous emergence both as a global competitor and within the international order. China's singular determination to dominate world markets leads it, inexorably, seaward. Its expansion threatens the sovereignty of our partner nations and hinders our freedom of maneuver and access to the Western Pacific. China's actions warrant expeditionary forces prepared to deter aggression while safeguarding collective interests abroad. In response to U.S. theater security operations, the People's Liberation Army Navy (PLAN) has continued to implement concepts of classical Western maritime strategists from Alfred Thayer Mahan and Sir Julian Corbett in defense.[3] China's maritime strategy includes aggressively building military outposts on the Spratly Islands in the South China Sea and accelerating modernization of its maritime capabilities.[4] Through expansion of sea control to the First Island Chain (Inner), China is postured to preserve its economic resources at sea, restrict the free flow of maritime commerce, and deter adversaries from threatening its sovereignty.

China's multidomain capabilities present a formidable A2/AD strategy comprising missiles, submarines, and fighter aircraft poised to both intimidate and exploit vulnerabilities of forward postured U.S. maritime forces.[5] According to one analysis, "Chinese military writings suggest that in the event of conflict, they would conduct large-scale preemptive attacks designed to inflict severe damage on U.S. forces based or operating in the Western Pacific."[6] Until the PLAN is prepared to contest sea control to the Second Island Chain (Outer), China is braced to do so through employment of integrative multidomain A2/AD capabilities. Should a WAS commence, the environment within the Second Island Chain is further convoluted by the tyranny of distance and time inherent to the enormity and geophysical features of the Pacific theater.[7]

A multidomain, multifunctional environment in the Western Pacific inhibits the transfer of health service support planning and processes from land-based conflicts to a WAS. China's maritime strategy, along with its continued advances in military armament and capabilities, can viably generate a mass casualty scenario at sea. Lack of preparedness and shortfalls with our current combat casualty treatment plans and capabilities for a potential WAS expose us to the loss of hundreds, if not thousands, of Servicemembers in the event a ship is critically damaged. Maritime commanders must therefore balance coordination of healthcare support with maneuver warfare and force protection efforts with disseminated operations in a contested environment.

Applying Lessons Learned in Combat Casualty Care

Military operations have increasingly become more dispersed, disaggregated, and complex, most notably throughout USCENTCOM over the last decade. In support, the joint force adapted its medical capabilities into more flexible, versatile, and scalable platforms. In 2009, Defense Secretary Robert M. Gates traveled throughout Afghanistan, observing the level of care afforded wounded Servicemembers. Following his battlefield circulation, he ordered casualty treatment to occur within the "golden hour" to mirror treatment administered in Iraq.[8] The golden hour directive emerged as strict policy that wounded Servicemembers receive resuscitative and surgical care within an hour from the moment of injury. This soon became doctrinal as the medical literature demonstrated improved patient outcomes when combat injuries were properly treated in the first several minutes combined with high-quality en route care during patient evacuation.[9] To support this requirement for even more disaggregated operations, our medical platforms scaled down further while increasing mobility and adaptability in order to deliver advanced care within this golden hour. By forward positioning of damage control resuscitation (DCR) and damage control surgical (DCS) capabilities and enhancement of aeromedical evacuation (AE) assets, the medical forces increased responsiveness to meet operational needs. Ultimately, the rapid removal of casualties from the battlefield and early surgical intervention vastly improved survival rates.

Despite advances in trauma stabilization, resuscitation protocols, and evacuation procedures improving survival rates from combat injuries, implementation of these improvements within the context of WAS will be impeded by our competitors' cross-domain offensive capabilities. Given the austere conditions and the vast area of operations involved in the Western Pacific, our maritime forces require freedom of maneuverability to counter China's A2/AD capabilities. The golden hour requirement applied to the Western Pacific theater will be more difficult to achieve related to challenges inherent to a WAS. Our joint force must, therefore, determine what capability gaps

remain and how best to circumvent any obstruction to access throughout the combat casualty care continuum through joint integrative solutions.

Integrative Solutions for Casualty Care Support

Executing a health service support plan commensurate with a mass casualty scenario in the Western Pacific requires innovative solutions and the integration of the following joint force medical packages and capabilities. We next discuss the following six proposed solutions for mitigating the complexities in delivering combat casualty care in a WAS:

- allocation of additional forward surgical resuscitative trauma packages (Role II capabilities) aboard surface combatant ships to provide care within the golden hour
- employment of maneuverable afloat Role III *Mercy*-class hospital ships
- adaptation of Combat Logistics Force (CLF) platforms within the seabasing concept for augmentation of afloat Role II/III capabilities
- integration of expeditionary adaptive force medical packages afloat and ashore
- commitment to the delivery of dedicated medical evacuation (MEDEVAC) platforms for patient recovery and evacuation from the sea
- delegation of responsibility to a medical command and control system required for regulating and coordinating patient movement from point of injury to definitive care treatment facilities.

It is imperative that the joint functional commander (JFC) provide the necessary forward resuscitative/surgical platforms and dedicated medical evacuation assets with the capacities suitable to transporting large numbers of casualties expeditiously without limiting maritime forces engaged in sea control operations.

Golden Hour Mitigation Through Forward Postured Role II Capabilities

In a WAS, limited availability of damage control resuscitative and surgical capabilities, lack of dedicated MEDEVAC assets, and adversarial A2/AD efforts will cripple maritime medical planning to guarantee care within the golden hour. Lack of sea control and air superiority will further impede "the application of a 'Golden Hour' standard in a medical treatment/evacuation paradigm."[10] Component commanders innately hold Service responsibility for treatment and evacuation of casualties from the point of injury to a dedicated Role I or Role II facility.[11] Normally, each ship within a maritime task force has limited Role I capability and is ill-equipped to contend with multiple causalities from a major shipboard incident at sea. A surface commander is also currently hampered by coordinating medical support through surface or air lifts of opportunity since the Navy has no dedicated MEDEVAC capabilities. Thus, a maritime task force commander (TFC) would typically be limited to supporting surface commanders and subordinate ships with major damage and multiple casualties by air or sea evacuation to the nearest Role II capability. These surgical capabilities have limited capacity and are typically limited to employment on carriers in a Carrier Strike Group or on large-deck amphibious platforms as part of an Expeditionary Strike Group. In a contested environment, a decision to medically support subordinate ships becomes more perilous if sea control or air superiority has not been established. Given the limited means to stabilize and manage complex trauma patients, the addition of added forward placed surgical capabilities on nondoctrinal surface ships could satisfy the golden hour mandate while alleviating the need for the TFC to redirect combatant assets to health support missions.

The forward surgical team (FST), expeditionary resuscitative surgical system, forward resuscitative surgical system, and Role II light maneuver team constitute variable damage control surgical Role II capabilities within the Navy inventory and can be incorporated on surface combatant ships to deliver treatment within the golden hour. Scarcity of these packages obliges the JFC to consider other Service components for augmentation and sustainable requirements and should, therefore, consider employing medical resources across the entire joint force through globally integrated health services, defined as "the strategic management and global synchronization of joint operational health services that are sufficiently modular, interoperable, and networked to enable their quick and efficient combination and synchronization by a JFC."[12] Through integrated joint operations, we can palliate critical gaps and shortfalls with purely Navy-centric Role II capabilities available to sustain disseminated maritime operations by augmentation from other Service components' DCR/DCS medical packages.

Fortunately, the Army and Air Force have followed suit with their operational forces as well by becoming more expeditionary and adaptable in nature. The recent transformation of the Army and Air Force medical units toward scalable resuscitative and surgical platforms aligns with current Navy and Marine Corps concepts supporting expeditionary operations. Although typically deployed on land, the Army-based FST, as well as the Air Force–based mobile forward surgical team, small portable expeditionary aeromedical rapid response teams, and expeditionary medical support system (EMEDS) Basic Role II teams could be positioned afloat since they provide similar limited DCR/DCS capabilities.[13] Their basic composition and similar footprint provide a suitable solution and sustainment resource for supporting disseminated maritime operations with an afloat Role II capability.

Forward placement of advanced damage control resuscitative and surgical capabilities on surface vessels not typically allocated Role II capabilities from any of the Service components could attenuate expectations for treatment within the golden hour. However, delays in patient transport after initial

Aviation boatswain's mate (handling) prepares to enter simulated casualty environment while wearing "hot suit" in USS *John C. Stennis*'s hangar bay during general quarters drill, Bremerton, Washington, July 27, 2017 (U.S. Navy/Luke Moyer)

resuscitation to Role III facilities inexorably decreases survival rates due to lack of MEDEVAC capabilities. Complexity of disseminated operations in the Western Pacific combined with the tyranny of distance and time constrains the JFC to plan for forward placement of dedicated MEDEVAC and Role III capabilities to achieve casualty survival. This could be accomplished through maneuvering *Mercy*-class hospital ships or by careful positioning of expeditionary medical units afloat or ashore to support the Role II capabilities positioned on surface combatant ships engaged at sea.

Afloat Role III Capabilities in Support of Disseminated Maritime Operations

Complications arising from lack of sea control must be reduced before accepting the risk inherent in employing the Navy's limited *Mercy*-class hospital Role III platforms within the operational reach of a combative environment. Historically, the hospital ships are the only war-proven solution for compensating for the time and distance concerns in a war in the Pacific. During the initial phases of World War II, Vice Admiral William Halsey converted floating ambulances into acute surgical hospitals staged near proposed amphibious landing sites. This tactile conversion "proved successful, and despite more than 21,000 casualties at Iwo Jima, the care and evacuation of casualties was handled better than any previous operation in the central Pacific area."[14] Given their maneuverability, proficiency with advanced surgical and medical care, and capacity to treat large volumes of combat casualties, they remain our only proven proficient afloat Role III capability.

The U.S. Navy currently has two *Mercy*-class hospital ships in its inventory, USNS *Mercy* and USNS *Comfort*, operated by Military Sealift Command (MSC). Each is capable of rendering "rapid, flexible, and scalable support to a specific requirement or mission as determined by the Combatant Commander" across the full range of military operations, including major contingency operations.[15] Hospital ships provide requisite forward employed Role III medical care capabilities, vertical lift enabled flight decks capable of patient movement, and 30-day self-sustainment function. Each ship can support 12 surgical rooms, 100 intensive care beds, 400 intermediate care beds, and 500 minimal care beds dedicated to combat casualties anticipated from a WAS.[16] Their large capacity to treat mass casualties sustained from major combat operations at sea makes them the ideal afloat Role III platform in any

theater. However, major engagements between conventional naval powers to achieve sea control last occurred during World War II; therefore, there exists no contemporary risk assessment on the forward employment of hospital ships for major combat operations.[17] Despite their past performance and current capability and capacity for mass casualty treatment, many view the hospital ship platform as an anachronism ill-suited for a WAS in a contemporary multidomain environment.

Given the A2/AD capabilities possessed by China, the Navy must anticipate escalated risk to our hospital ships in a combative environment in which our adversary may regard them as opportune targets. Hospital ships display large red crosses signifying Geneva Convention protection; conversely, these emblems also invite attack, signaling lack of defensive countermeasures and symbolizing American power. Thus, hospital ships demand force protection assets and meticulous movement and maneuver consideration for operations in a contested environment. Despite these constraints, they proved invaluable in our last WAS as a Role III commodity. While 15 hospital ships operated at the end of World War II, only 2 such vessels remain in inventory, with discussions aimed at retiring one of them in the near future.[18] Degradation of this unique, flexible, self-sufficient afloat medical platform for disseminated operations in the Pacific restricts available options for theater medical planning. Therefore, consideration of alternative concepts or innovative joint solutions to answer this degradation warrants careful consideration.

Augmenting Afloat Medical Capabilities

Seabasing is a joint integration concept for future operations that implements maneuverable, scalable, distributed, networked platforms that enable global power projection of offensive and defensive forces from the sea without reliance on land bases within a joint operational area.[19] Seabasing's pillar emphasizes forward posture with prepositioned capabilities supporting and sustaining warfighting forces in disseminated operations.[20] By providing a maneuverable defensive power projection shield, it can contribute support functions, including logistical sustainment, fire support, and health service support from the sea. It reduces requirements for intermediate staging bases or amassing large shore infrastructures, particularly during the early stages of combat operations.[21] Seabasing allows maritime commanders the means to exploit fully sea maneuverability while extending the operational reach for support functions. This concept provides the JFC an innovative methodology that enables interoperability and augmentation of joint medical Role II and Role III medical capabilities from the sea.[22]

Operationalization of the seabasing concept toward lines of effort supporting medical operations requires internal modifications and structure reconfiguration within the various support ships owned by Military Sealift Command. MSC employs various supply and service support ships attached under the CLF, as well as the Service and Command Support Force. The CLF imparts logistical support through underway replenishment of fuel, ordnance, food, and other supplies, as well as afloat medical facilities supporting Navy combatant ships worldwide.[23] However, they would require reconfiguration and restructuring before medical operations can be functionally executed while at sea. The Service and Command Support Force include the *Mercy*-class hospital ships, as well as Afloat Forward Staging Bases, Expeditionary Mobile Bases, and Expeditionary Fast Transports (EPFs). As with hospital ships, these service support ships use the sea as maneuver space to sustain fighting forces abroad where overseas access may be limited.[24] Their large capacities and ability to support vertical lift operations render them ideal alternative platforms as afloat Role II/III assets, if reconfigured to support combat casualty care operations. Although the MSC has multifunctional logistical capabilities, their ships would also require augmentation with medical personnel and equipment typically found in any of the Service component expeditionary medical force packages. Before they can be redesignated as afloat medical capabilities, training and integration of the necessary medical force packages afloat must occur in conjunction with the certification exercises of the carrier and amphibious strike groups.

The EPFs, previously known as Joint High Speed Vessels, could address two additional shortfalls with our current maritime combat casualty plan: personnel recovery and patient movement of mass casualties by sealift. The design and afloat characteristics of the EPFs make it a plausible sealift platform for personnel recovery and evacuation capability of mass casualties that the Navy currently lacks. Currently, they are designed for rapid transport of personnel and supplies for maritime operations, and they even complement the hospital ship during humanitarian assistance missions, such as Pacific Partnership within the U.S. Indo-Pacific Command area of responsibility. If reconstructed and assigned as an afloat forward surgical or en route care team, the EPFs could also provide rapid transportation of medical personnel, supplies, and even patients between ships assigned to a maritime task force. This could afford the maritime TFC an alternate course of action for delivering Role II and evacuation capabilities among subordinate ships critically damaged in a WAS. Designating the EPFs to health support missions should be seriously contemplated and exercised prior to a WAS. The EPFs assigned to MSC could "bridge the gap between low-speed sealift and high-speed airlift" while "enabling the rapid projection, agile maneuver, and sustainment of modular, tailored forces in response to a wide range of military contingencies."[25]

Whether MSC logistical forces engage with sustainment operations or reconfigure as secondary hospital ships, their capacity to provide expeditionary medical capabilities afloat is essential to compensate for the shortage of *Mercy*-class hospital ships. Adaption of MSC vessels provides a solution for the evacuation and treatment of mass casualties likely to occur in a WAS. Unlike hospital ships, none of the nonmedical designated MSC vessels are protected under the

Sailors learn about negative pressure wound therapy during skin and wound care course aboard USNS *Mercy,* in support of upcoming Pacific Partnership 2018 missions, Pacific Ocean, May 14, 2018 (U.S. Navy/Cameron Pinske)

Geneva Convention, exposing them to air, surface, and subsurface strikes. Their exposed status mandates additional force protection and defensive capabilities by the JFC while they are employed in the contested environment. Until this capability as a health service support platform is viable, joint expeditionary Role III medical capabilities should be placed ashore within operational reach to support major contingency operations in the Western Pacific.

Integration of Joint Expeditionary Ashore Role III Medical Capabilities

Given the complexity of conventional, irregular, transnational, and hybrid threats that beset our national security interests globally, our joint force transformed to an expeditionary model. It stands ready, trained, and equipped to fight our adversaries abroad in austere environments, without reliance on airfields, seaports, or other critical supporting infrastructures. Medical platforms from each Service component followed suit, buttressing military expeditionary operations with scalable, rapidly deployable, and highly mobile units trained and equipped to provide casualty care and preventive care globally.[26] An increased focus on maritime operations has shifted attention from open water to the littoral regions of the Second Island Chain, where the joint force will be challenged by China's A2/AD capabilities.[27] If conflict occurred, interoperable, integrated expeditionary medical units across all Service components would be required nearby ashore to support maritime operations occurring within the Second Island Chain. The forward posture of the maritime prepositioning ship (MPS) squadrons, consisting of various logistical support ships, enables rapid delivery and assembly of expeditionary airfields and Role III medical facilities to remote locations within any theater. The MPS squadrons would enhance our medical response, reinforcing crisis response and major contingency operations in the littorals of the Pacific. Further, they boast logistic capabilities to support vertical and surface arrival and sustainment of personnel and equipment affecting medical operations without the requirement of air or port infrastructure.[28] The Role III expeditionary medical units from each Service are modular, promoting interoperability of tailored joint forces requisite to supporting operations threatened by A2/AD capabilities.[29] They would represent the highest level of medical care obtainable ashore that could support maritime operations within the Second Island Chain, while supplementing the capabilities of hospital ships.

The Navy EMF is configured as a mobile deployable Role III platform, affording theater hospitalization in a secured forward area of operation receiving patients "directly from combat areas in order to provide full resuscitation and emergency stabilizing surgery within the prescribed evacuation policy throughout the range of military operations."[30] The Army-centric combat support hospital (CSH) administers identical Role III modular scalable capabilities, with evacuation capabilities generally absent from Navy EMFs. Land-based, it can strategically position in support of maritime efforts, thereby attenuating time and distance impediments to the casualty treatment continuum from the ship to definitive treatment facilities outside the combat zone. The Air Force also reconfigured its medical force into smaller and more adaptable packages across all levels of care. The EMEDS +25 forms the expeditionary equivalent to a Navy EMF and Army CSH, and its modularity allows it to be scaled as required to support contingency operations. Despite the Service component, all three can be enhanced with critical care transport and aeromedical force packages near expeditionary airfields, promoting patient movement to definitive treatment facilities with fixed-wing assets.[31] With the forward employment of Role III medical capabilities to complement afloat Role II assets aboard surface combatant ships, a dedicated evacuation capability would still be required for patient movement between the different echelons of care to improve survival rates.

Medical Evacuation Capabilities in Support of Maritime Operations

The U.S. Navy has no dedicated MEDEVAC capabilities, either afloat or ashore, and must rely on casualty evacuation (CASEVAC) for patient movement from ship to ship or ship to shore.[32] Within the contentious maritime environment, the TFC must decide between sea control operations to defeat the enemy or personnel recovery and CASEVAC missions to maximize survival rates of casualties at sea. Employing assets for CASEVAC not only increases the risk level to the patients, since they are transported on combatant platforms subject to adversarial attack by A2/AD capabilities, but also demands the TFC to spend assets eliminating this risk in lieu of operations to achieve sea control.[33] A reduced Navy medical evacuation footprint combined with increased patient movement complications arising in a WAS "demand[s] a more interdependent medical community, improved interagency and multinational partnerships, and joint solutions."[34] Delegation of responsibility to a supporting functional or Service component would enhance the flexibility and maneuverability required for disseminated sea control operations. Based on recent conflicts in USCENTCOM's area of responsibility, assignment of this responsibility to the Army would be the ideal integrative solution based on their historical success.

According to Army Field Manual 1-546, *Shipboard Operations*, "In nearly every major conflict and operation since World War II, Army aviation has been assigned missions in the maritime environment, either basing off naval vessels for land attack or operating from ships for sustained overwater missions."[35] Recently, the Army has been designated the intra-theater MEDEVAC authority because it is the primary Service component with dedicated air ambulances dispensing intra-theater AE between military treatment facilities.[36] MEDEVAC capabilities for removing all wounded Servicemembers from the battlefield within the golden hour were soon achieved by air ambulances operated primarily by Army and Air Force assets. Therefore, consideration should be given to exercising and employing Army rotary-wing platforms, as well as the Air Force search and rescue rotary-wing and the V-22 Osprey, to support mass casualty evacuation from the sea to alleviate Navy's MEDEVAC capability gaps.

The success achieved on land further contributed to the degradation of training programs and failure to innovate advanced patient evacuation capabilities by the Navy. "The lack of paramedic certification for Navy search and rescue medical technicians and Fleet Marine Force corpsmen serving as casualty evacuation flight medics calls into question whether the Service is fully prepared for a major war in which the force may not entirely control the battlespace."[37] Lessons learned from joint operations along with current gaps in Navy MEDEVAC have resulted in the need for "non-USN/USMC helicopters to operate from USN ships for combat search and rescue, combat support operations, medical evacuation, personnel transfer, and logistic support."[38] Given our competitor's A2/AD capabilities and potential for inflicting mass casualties, the Navy must decide either to commit to development of a self-sufficient MEDEVAC capability, or facilitate joint training for deck-landing qualification required for integration of Army and Air Force medical evacuation capabilities required to support a WAS.

Joint AE and Command and Control Systems for a WAS

Each Service component in the joint force has basic casualty evacuation capability in a combat environment. In addition to MEDEVAC and CASEVAC provided by the Army and Navy, the Air Force provides intra- and inter-theater fixed-wing AE capabilities, with the primary mission of patient transport along the casualty care continuum.[39] The Air Force medical packages can operate as far forward as aircraft are able to conduct air operations, across the full range of military operations, and in all operating environments.[40] However, to be effective in supporting maritime operations in the Western Pacific, expeditionary airfields must be established within operational reach of the Second Island Chain. The Air Force AE system requires secure airfields able to support fixed-wing aircraft to execute patient evacuations from the Western Pacific, and placement should consider vulnerability to offensive attacks by China's A2/AD capabilities. Although rotary wings will be utilized for ship-to-ship or ship-to-shore movement of patients, AE plans must integrate rotary- and fixed-wing assets with their

USNS *Comfort* on 11-week medical support mission to Central and South America as part of U.S. Southern Command's Enduring Promise initiative, October 10, 2018 (U.S. Navy/Daniel E. Gheesling)

associated command and control elements to coordinate patient movement from the sea to definitive treatment in the rear. Once expeditionary airfields can be protected, then a variety of evacuation airlift platforms, primarily C-130, KC-135, and C-17 aircraft, can be used to move patients from austere Role III locations.[41] Using the Pacific region, significant airfield capacity to support intra-theater transport of casualties is located in Guam, Hawaii, Wake Island, and the Marshall Islands. In addition, these airfields support large aircraft required for the inter-theater AE mission, such as the KC-135 and C-17.

Despite the intra-and inter-theater AE capabilities possessed by the joint forces, communication and coordination of patient evacuation have been discouraging among the joint force in our recent conflicts in the Middle East.[42] Major contingency operations resulting in mass casualties in the maritime domain will stress the joint force communication and coordination gaps in AE. Clearly, it will be necessary to leverage the entire joint force to mitigate this command and control gap in order to effectively coordinate AE missions in a complex maritime battlefield. A joint theater trauma system "would embrace all aspects of trauma management, from prevention, training, and evaluation through all phases of care with command and control, as well as data collection, evaluation, research, and process improvement."[43] The system would ensure management by a joint force medical command and control system required for coordinating patient evacuation from the combat zone. As an added benefit, if implemented properly, a joint theater trauma system would provide specialized training to the joint force regarding automated patient evaluation decision tools. Current joint doctrine as it relates to AE and patient care requires modification in order to account for dynamic, contested environments such as a WAS.

Given the medical command and control capability of the Air Force, it would be the ideal Service provider for delegating this responsibility and oversight by the JFC. The Air Force provides an Air and Space Operations Center (AOC) capability at the operational level for command and control of air, space, and cyberspace operations. Within the Air Mobility Division of an AOC, an aeromedical evacuation control team (AECT) is assigned to plan and execute intra-theater AE missions. To support the forward user, the Air Force provides an aeromedical evacuation liaison team (AELT) to support the AE system in the form

Flight nurse and aeromedical technician course students care for simulated patient during aeromedical evacuation mission aboard C-130 mockup at Wright Patterson Air Force Base, Ohio, January 29, 2018 (U.S. Air Force/J.M. Eddins, Jr.)

of operational and clinical interface.[44] Integration of the AELT onboard the ship, or in expeditionary medical facilities, would supply direct communications to the end-user, ensuring a coordinated patient flow throughout the AE system. Inclusion of AELTs in the forward operations environment provides the means for effective patient movement coordination from the sea to definitive treatment facilities in the rear provided by the intra- and inter-theater AE mission. Inclusion of a joint theater trauma system and AECT/AELT integration in joint doctrine will result in a fully integrated AE system that is able to efficiently task and synchronize assets for the JFC to coordinate mass casualty evacuations in a WAS.

As forewarned by General Joseph Dunford, the joint force must seize the initiative through innovative joint solutions to stay ahead of a rapidly evolving complex operations environment. The joint force must remain postured to deter global competitors and defeat any adversary across the full range of military operations. The most significant deficiencies within the current combat casualty care system in support of this requirement occur within a contentious maritime environment. China's advanced modernization of A2/AD capabilities and militarization of islands in the disputed seas of the Western Pacific test our ability to render casualty treatment and evacuation throughout the continuum of care.[45]

To address hurdles uniquely inherent to a major conflict in the Western Pacific, the JFC can resolve the Navy's shortfalls through joint integration of scalable, adaptive joint force packages and capabilities. This includes incorporation of forward resuscitative and surgical Role II and Role III platforms, with dedication of medical airlift and sealift evacuation capabilities required to expeditiously treat large numbers of maritime casualties anticipated in a WAS. This includes supplementing the flexibility and maneuverability of the limited *Mercy*-class hospital ships by augmentation of afloat capabilities through seabasing and redesignation of MSC vessels toward personnel recovery, patient evacuation, and delivery of afloat Role II/III medical care. Finally, given the complexity of coordinating patient evacuation from the sea during operations for sea control, incorporation of a medical command and control system, such as organized by the Air Force through its AECT and AELT teams, should be implemented. Regardless of theater, joint integration of medical capabilities is a viable solution to resolving the Navy's lack of preparedness while maintaining a competitive advantage over our competitors in a WAS. **JFQ**

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[36] JP 4-02, *Joint Health Services*, A-6.

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[38] FM 1-564, *Shipboard Operations*, H-1.

[39] JP 4-02.2, *Joint Tactics, Techniques, and Procedures for Patient Movement in Joint Operations* (Washington, DC: The Joint Staff, December 30, 1996).

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[41] Ibid.

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