Combat Casualty Care

Engaging Allies and Partners in a DoD Global Trauma System

Mason H. Remondelli
Ryan M. Leone
Collin Todd
Natalia K. Barzanji
Jennifer M. Gurney
Teresa Duquette-Frame
Jason B. Brill
Derek J. Licina

As the US national security strategy focuses on Sino-American campaigning in the Indo-Pacific, enhancing the US DoD combatant command trauma system by incorporating Ally and partner nations represents a critical opportunity for improving geostrategic alliances and building partner-nation capacity. With the potential for a theater-wide war, the current security environment highlights the importance of developing a robust trauma system capable of (1) optimizing global health engagement, (2) increasing trauma care readiness, (3) enabling interoperability between the United States and partner nations, (4) enhancing interagency partnerships, and (5) supporting integrated deterrence. This article offers a framework to transform the existing command trauma system into a global trauma system that allows the Department of Defense, working with Allies and partners, to support casualty care in the Indo-Pacific and beyond.

Over the past twenty years, the United States, its Allies, and partners focused on counterinsurgency operations in the Middle East, which encompassed small-scale and unconventional warfare. These operations centered on defeating nonstate actors including Al-Qaeda, ISIS, and the Taliban. Yet, with the withdrawal of US and partner military units from Afghanistan, the 2022 expanded invasion of Ukraine by the Russian Federation, and the continued rise of the People's Republic of China (PRC), the

Second Lieutenant Mason Remondelli, USA, is a fourth-year medical student at the Uniformed Services University.

Second Lieutenant Ryan Leone, USA, is a third-year medical student at Columbia University and a visiting scholar at the National Center for Disaster Medicine and Public Health.

Ensign Collin Todd, USN, is a second-year medical student at The Ohio State University College of Medicine.

Captain Natalia Barzanji, USA, MD, is a general surgery resident at the Walter Reed National Military Medical Center.

Colonel Jennifer Gurney, USA, MD, is a trauma surgeon and the director of the Department of Defense's Joint Trauma System.

Colonel Teresa Duquette-Frame, USA, Retired, is the deputy director for clinical operations of the Department of Defense's Joint Trauma System.

Commander Jason Brill, USN, MD, is a trauma surgeon at Tripler Army Medical Center who also serves as the trauma medical director of the US Indo-Pacific Command Combatant Command Trauma System.

Colonel Derek Licina, USA, Retired, DrPH, is a contractor supporting and leading the Global Trauma System initiative within the Department of Defense's Joint Trauma System.

2022 *National Security Strategy* transitioned to a new era of global strategic competition.[1] Fused within this grand strategy is the critical priority to out-compete the PRC through integrated deterrence, employing a range of unilateral to multilateral efforts to promote a free and open Indo-Pacific.

China's advancing military capabilities and aspirations increasingly challenge the United States' longstanding position as the sole global superpower. Conventional wisdom holds that the tensions between the two nations could reach the point of conventional military conflict in the near future over a challenge by China to Taiwan's independence. PRC President Xi Jinping has the party's sights on "reunification" with Taiwan, an objective that would require a large-scale amphibious military assault.[2]

Although the United States preserves the notion of strategic ambiguity surrounding the potential defense of Taiwan amid a PRC invasion, an attack could hypothetically lead to large-scale combat operations (LSCO) requiring distributed maritime operations—the strategic dispersal of naval units, sensors, and weapons across a large area within the operations theater—in the Indo-Pacific.[3]

A conventional force-on-force fight within theater-wide multidomain environments has crucial implications for not only the United States but also for regional Allies and partners in the Indo-Pacific area. Conflict with a peer adversary such as the PRC will likely disrupt the system of combat casualty care the United States has created during the past 20 years of conflict in the Middle East. That period saw the lowest case fatality rate and percentage of killed in action in history.[4]

As studies have estimated—including one wargame suggesting 6,960 American casualties in the first three weeks of conflict—future LSCO casualties will likely overwhelm current capacity and clog the evacuation chain.[5] A predicted lack of air superiority coupled with the tyranny of distance, novel precision fires, and gray-zone activities will hinder battlefield trauma care of US, Ally, and partner-nation military and civilian casualties. Consequently, delays in reaching casualty care points, compounded by lengthy time and

1. Joseph R. Biden Jr., *National Security Strategy* (Washington, DC: White House, October 2022), https://www.whitehouse.gov/.

2. Dzirhan Mahadzir, "Xi Jinping Pledges Reunification with Taiwan in New Year's Message," *USNI News*, January 1, 2024, https://news.usni.org/.

3. John Dzwonczyk and Clayton Merkley, "Through a Glass Clearly: An Improved Definition of LSCO," *Military Review*, November 2023, https://www.armyupress.army.mil/; and "Distributed Maritime Operations (DMO)," US Marines [website], August 2, 2021, https://www.marines.mil/.

4. Shawn C. Nessen et al., "Unrealized Potential of the US Military Battlefield Trauma System: DOW Rate Is Higher in Iraq and Afghanistan Than in Vietnam, but CFR and KIA Rate Are Lower," *Journal of Trauma and Acute Care Surgery* 85, no. 1S (July 1, 2018), https://doi.org/.

5. Mark F. Cancian, Matthew Cancian, and Eric Heginbotham, *The First Battle of the Next War: Wargaming a Chinese Invasion of Taiwan* (Washington, DC: Center for Strategic & International Studies, January 9, 2023), https://www.csis.org/.

distance movements to fixed US facilities for definitive care and rehabilitation, will degrade force lethality and decrease the regeneration of combat-capable units.[6]

To care for wounded US, Ally, and partner-nation personnel in this new era, the militaries in question must emphasize evaluating and strengthening globally integrated casualty care. During the Global War on Terror (GWOT), the US military medical system adapted to the operating environment with the support of the DoD Joint Theater Trauma System, which was developed for the US Central Command (USCENTCOM) area of responsibility and modeled after civilian trauma systems that offered integrated care across a geographic region to better organize battlefield care in theater. In 2013, the Joint Trauma System (JTS) was deemed a Defense Center of Excellence, and today it provides battle-injury and nonbattle-injury trauma patients with organized care "at any area of conflict."[7]

In the same manner, the US military medical system must once again adapt to meet the challenges posed by the future battlespace. Bridging the gap between geostrategic security concerns and trauma care in the Indo-Pacific region will require the United States to establish a DoD global trauma system (GTS) led by the JTS. This can be achieved by transforming existing combatant command trauma system capabilities.[8]

US DoD global health engagement is defined as the

> interaction between individuals or elements of DoD and those of a [partner nation's] armed forces or civilian authorities, in coordination with other US Government departments and agencies, to build trust and confidence, share information, coordinate mutual activities, maintain influence, and achieve interoperability in health-related activities that support US national security policy and military strategy.[9]

Within this context, employing global health engagement focused on a DoD GTS can enhance resilience related to global casualty care across a range of military operations.[10] This article aims to describe the evolving geostrategic security environment with relation to the battlefield trauma system, discussing the implications of Sino-American competition on casualty care in the Indo-Pacific. In analyzing how trauma systems support integrated deterrence and augment casualty care systems, this article constructs a

6. Mason H. Remondelli et al., "Casualty Care Implications of Large-Scale Combat Operations," *Journal of Trauma and Acute Care Surgery* 95, no. 2S (May 31, 2023), https://doi.org/.

7. "About JTS," Joint Trauma System, last modified March 5, 2019, https://jts.health.mil/.

8. Defense Health Agency, *Combatant Command (CCMD) Trauma Systems (CTS)*, Procedural Instruction No. 6064.06 (Washington, DC: Department of Defense [DoD], September 8, 2020), https://www.health.mil/; and Derek Licina and Jackson Taylor, "International Trauma Capacity Building Programs: Modernizing Capabilities, Enhancing Lethality, Supporting Alliances, Building Partnerships, and Implementing Reform," *Military Medicine* 187, no. 7–8 (February 1, 2022), https://doi.org/.

9. Office of the Under Secretary of Defense for Policy, *Global Health Engagement (GHE) Activities*, DoD Instruction (DoDI) 2000.30 (Washington, DC: DoD, July 12, 2017), https://www.esd.whs.mil/.

10. DoDI 2000.30; and "Global Health Engagement," Health.mil, last updated August 4, 2023, https://www.health.mil/.

framework for a DoD global trauma system to strengthen Indo-Pacific security albeit with global applications.

A Transforming Geostrategic Security Environment

The geostrategic environment over the past two decades was almost singularly focused on rooting out terrorism within the USCENTCOM area of responsibility—a military landscape primarily involving operations in Afghanistan and Iraq. During these periods of intense counterinsurgency fighting, US military and GWOT coalition nation casualties were offered some of the highest levels of medical care ever seen in modern combat.

Data suggests the case fatality rate fell from 55 percent during World War II to 12 percent during the conflicts in Afghanistan and Iraq, while other studies assess the recent rate of survivability was around 98 percent for those who reached surgically capable facilities.[11] Other data from the DoD Trauma Registry suggested a 99.1 percent survival rate amongst casualties from January 2003 to May 2019. Furthermore, unit-specific studies found a Died of Wounds rate as low as 1.7 percent among US Army Rangers in the 75th Ranger Regiment.[12]

This success was dependent upon a variety of factors, including modified clinical practice guidelines such as the increased use of tourniquets and early blood transfusions, as well as decreased medical evacuation transport times to definitive surgical care within the secretary-of-defense-directed 60-minute "golden hour" window.[13] Additionally, air superiority throughout Afghanistan and Iraq allowed for relatively uninhibited intra- and inter-theater evacuation and medical resupply. The focus on two established and resourced theaters of operation within the same geographical combatant command minimized the complexity of the trauma system and the demand for it.

Looking at the future dispersed operating and geostrategic environment in the Indo-Pacific, these advantages may not be present as the United States shifts away from counterinsurgency operations. With an increased focus on integrated deterrence, great

---

11. Jeremy W. Cannon et al., "Comprehensive Analysis of Combat Casualty Outcomes in US Service Members from the Beginning of World War II to the End of Operation Enduring Freedom," *Journal of Trauma and Acute Care Surgery* 89, no. 2S, suppl. 2 (August 1, 2020), https://doi.org/; Robert L. Mabry and Robert DeLorenzo, "Challenges to Improving Combat Casualty Survival on the Battlefield," *Military Medicine* 179, no. 5 (May 2014), https://doi.org/; and Brian J. Eastridge et al., "Death on the Battlefield (2001–2011): Implications for the Future of Combat Casualty Care," *Journal of Trauma and Acute Care Surgery* 73, no. 6, suppl. 5 (2012), https://doi.org/.

12. Steven G. Schauer et al., "16 Years of Role 1 Trauma Care: A Descriptive Analysis of Casualties within the Prehospital Trauma Registry," *Medical Journal*, US Army Medical Center of Excellence, no. 44–49 (2021), https://pubmed.ncbi.nlm.nih.gov/; and Russ S. Kotwal, "Eliminating Preventable Death on the Battlefield," *Archives of Surgery* 146, no. 12 (December 1, 2011): 1350, https://doi.org/.

13. Jeffrey T. Howard et al., "Use of Combat Casualty Care Data to Assess the US Military Trauma System during the Afghanistan and Iraq Conflicts, 2001–2017," *JAMA Surgery* 154, no. 7 (July 1, 2019), https://doi.org/; and Russ S. Kotwal et al., "The Effect of a Golden Hour Policy on the Morbidity and Mortality of Combat Casualties," *JAMA Surgery* 151, no. 1 (January 1, 2016): 15, https://doi.org/.

power competition, and irregular warfare, this emerging operating environment may feature LSCO with anti-access/area-denial technology and multidomain warfare across multiple theaters.

Conflict with nations in the Indo-Pacific such as China may feature other unique challenges: The United States and its Allies and partners will encounter obstacles brought on by China's gray-zone tactics, including its creation of artificial islands for purportedly economic purposes that actually serve to increase its military's access, presence, and control over the region.[14] Because of this, ship-based naval medicine within distributed maritime operations will see a heightened role in comparison with the land-based conflicts of the Global War on Terror, while integrated deterrence and irregular warfare will demand novel medical planning solutions.

Furthermore, rapid advances in the cyber, electromagnetic, and information domains will threaten US communications globally, which could critically disrupt casualty care. This includes medical evacuation, resupply, hospital operations, health data security, and telemedicine.[15] These multidomain threats will challenge not just US personnel, but also Allies and partners in the Indo-Pacific region. It is paramount that the United States invest in regional partnerships to expand capacity, integrate plans, and strengthen alliances to adapt to this new geostrategic environment.

Obstacles to Trauma Care

Potential conflicts against peer adversaries, such as the PRC, resulting in large-scale combat operations and distributed maritime operations highlight challenges in providing trauma care in the Indo-Pacific. These obstacles are described below through the lens of the casualty care continuum (fig. 1).

14. Ryan M. Leone et al., "Disguised among the Sea: The Implications of Artificial Islands on Casualty Care in the Indo-Pacific," *Military Medicine*, January 1, 2024, https://doi.org/; and Bonny Lin et al., *A New Framework for Understanding and Countering China's Gray Zone Tactics* (Santa Monica, CA: RAND Corporation, March 30, 2022), https://doi.org/.

15. "Electromagnetic Spectrum Operations: DOD Needs to Address Governance and Oversight Issues to Help Ensure Superiority," US Government Accountability Office (GAO), December 10, 2020, https://www.gao.gov/; and "Challenges Facing DOD in Strategic Competition with China," *GAO National Security Snapshot* (Washington, DC: GAO, February 2022), https://www.gao.gov/.

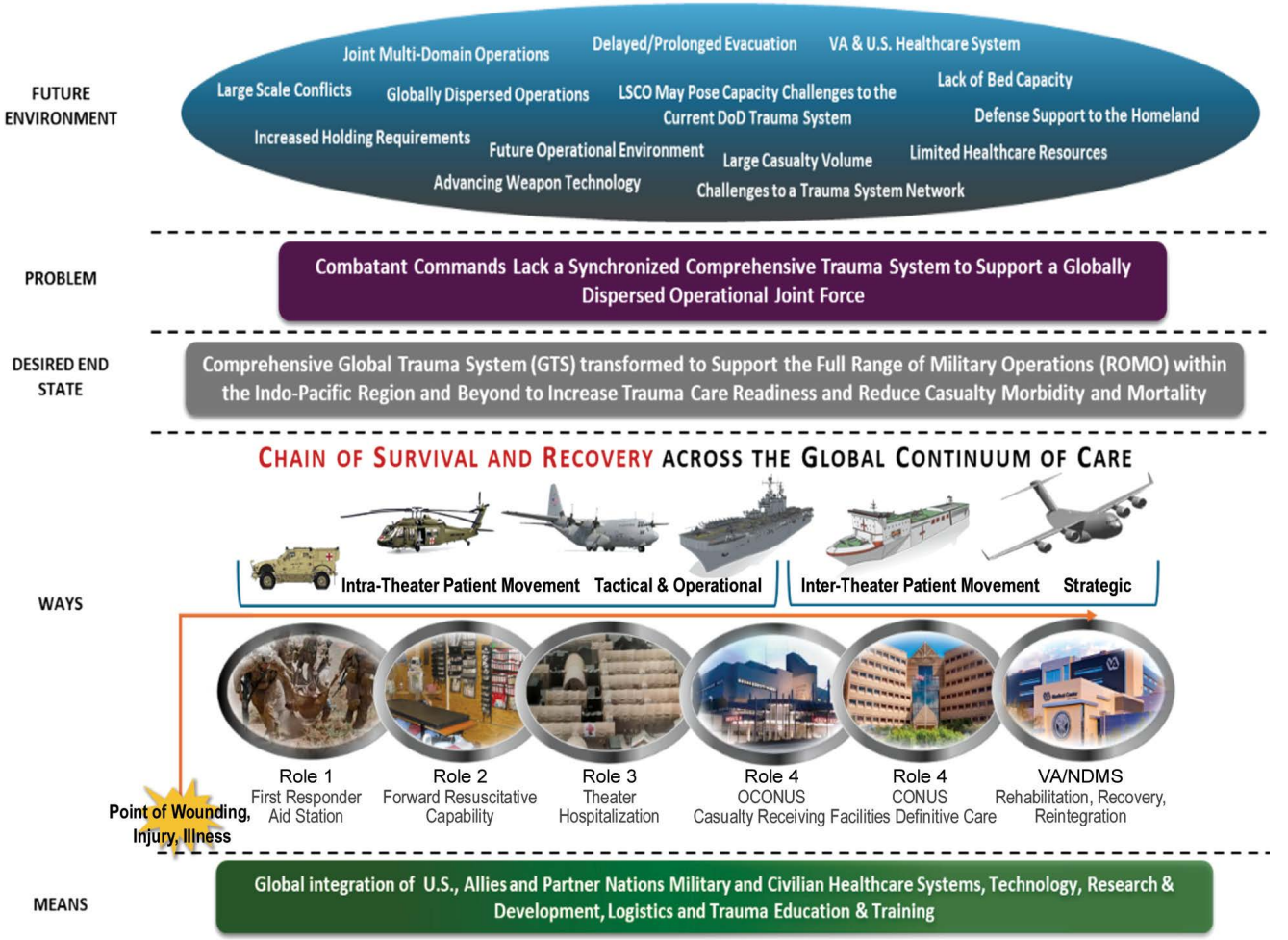

Figure 1. The casualty care continuum

Beginning with point-of-injury care and Role 1 (unit-level medical care) operations, limited evacuation capabilities may force prehospital providers—for example, medics and corpsmen—to provide care for upwards of hours to days before casualties can be offered even limited surgical care in austere settings in close proximity to the front line. As a result, prehospital providers must be thoroughly trained to support prolonged casualty care to ensure the highest survivability in resource-limited environments. In addition, they must also be equipped with the appropriate supplies to meet this new extended scope of practice, be physically prepared to carry more extensive medical supplies without limiting tactical mobility, and be virtually connected to higher-level providers through reach-back communications platforms such as the Advanced Virtual Support for Operational Forces program.[16]

Even with augmented support to address the challenges in this shift in trauma care, prehospital providers will still be under-resourced in providing casualty care. With this limitation in capabilities, additional focus will need to be on evacuation to far-forward surgical care with evacuation as soon as feasible while providing en-route care. With the elongated period between the point of injury and evacuation, these patients may enter physiological states akin to those of patients traditionally cared for in intensive care units, but with no availability of a wide array of tools, providers, and resources in the field.

This provision of en-route care, whether it be from the point of injury to Role 2 far-forward surgical support—forward resuscitative capability—or from the latter to Role 3 and 4 military treatment facilities (MTFs)—in this case, theater hospitalization and continental United States casualty receiving facilities, respectively—will similarly require trained, equipped, and remotely supported providers to offer care at an expanded scope of practice to casualties in complex physiological states.

These en-route providers will likely need to offer this high-level care in substandard environments. Operating on low-flying rotary-wing aircraft may be possible, but providing care during clandestine casualty evacuation on land or sea employing local partner-nation capability may need to be considered. This is especially true given that air evacuation will be significantly limited in the weapon engagement zone—where adversarial weapon systems can target Allied platforms—and that surface connectors in the evacuation chain will move at a far slower rate.

Once intra-theater transportation to Role 2 facilities augmented by far-forward, surgical teams is completed, surgeons operating on patients with complex wounds, infections, and physiologies in low-resource settings will encounter similar obstacles. The limited bed space of Role 2 facilities can quickly become bottlenecked. Limitations on evacuation to Role 3 MTFs will further stress these resources, potentially creating a bottleneck of the already limited Role 2 MTFs.

16. Robert D. McLeroy et al., "Advanced Virtual Support for Operational Forces: A 3-Year Summary," *Military Medicine* 187, no. 5–6 (October 22, 2021), https://doi.org/.

These extraordinary circumstances could pose the unique challenge of forcing emergency physicians and surgeons to utilize situational triage guidelines, putting medical decisions within the commander's intent in scenarios with limited resupply and evacuation, intensive need for resources, and balanced survival outcomes.[17] Military physicians should not only be equipped to operate in low-resource environments but also receive training in ethical decision-making, especially in the context of mass-casualty scenarios. The potential Indo-Pacific conflict highlights educational needs beyond medical care, stretching into Joint, interagency, and multinational operational planning of both evacuation and treatment authorities and priority.

The unpredictability of evacuation to Role 3 MTFs means Role 2 teams must keep certain patients in a constant state of preparedness for movement, even when patient stability is in question. When evacuation to Role 3 MTFs can be executed, similar demands will be seen with en-route casualty care and the subsequent treatment of complex casualties. Larger distances, terrain that restricts maneuver, and expansive bodies of water will separate Role 2 and Role 3 facilities, while a lack of air superiority, with well-positioned adversarial surface-to-air and air-to-air missiles or potential electromagnetic weapons to use against friendly vehicles, may further complicate the journey. This may result in a requirement for transport to occur between different Role 2 facilities, or even from Role 2 to less-capable platforms, before arrival at a Role 3 site.

Transportation via fixed-wing aircraft from Role 3 to overseas and continental Role 4 MTFs, whether they are US- or partner-owned facilities, will also be complicated by long distances and potential threats to evacuation platforms. Finally, once these casualties can be transferred stateside, the lengthy rehabilitation process and large number of casualties will force the activation of the National Disaster Medical System in civilian hospitals once DoD and Veterans Affairs hospitals have reached capacity, ensuring that a network of providers and supplies are in place to offer them care.[18]

Overall, the current US approach to warfare is centered on casualty aversion. Yet the reality of LSCO and multidomain operations conflict is that casualties may be significant and accumulate rapidly. Medical plans must account for the logistics of such intensive holding, en-route care, evacuation, and rehabilitation needs.[19]

17. Brian Beldowicz et al., "Situational Triage: Redefining Medical Decision Making for Large-Scale Combat Operations," *Military Review*, July–August 2022, https://www.armyupress.army.mil/.

18. Clark J. Lee et al., "The National Disaster Medical System and Military Combat Readiness: A Scoping Review," *Journal of Trauma and Acute Care Surgery* 93, no. 2 (August 1, 2022), https://doi.org/.

19. Jennifer Wilson, "Casualty Aversion, the Challenge in Medical Planning for LSCO," Small Wars Journal, June 8, 2018, https://smallwarsjournal.com/.

A Global Trauma System for the Department of Defense

To overcome global casualty care challenges generated by the future strategic and military operational environment, the Department of Defense should establish a global trauma system. In the United States, formally organized civilian trauma systems have been shown to decrease the mortality of severely injured patients by 15 to 20 percent.[20] As mentioned, military medical leaders during the Global War on Terror followed this model and created a system to care for injured service members on the battlefield that eventually became the DoD Joint Trauma System.

Standardizing the way the military performs trauma care, the JTS enables the collection and analysis of injury and treatment data to fall under a single system across the continuum of care led by a single organization. Real-time modifications of clinical practice guidelines, casualty evacuation command implementation, and subject-matter expert guidance to combatant commanders were associated with a 44 percent reduction in mortality from the outset of the conflict.[21]

Centralizing the trauma care system was one of the leading reasons for the reduction of preventable deaths and increased combat casualty survival on the battlefield during the GWOT. Using the features of this optimized trauma care system in LSCO and multidomain operations conflicts will be vital in maximizing US, Ally, and partner-nation casualty survival and maintaining combat force lethality.

A global trauma system will require transforming combat trauma systems across all geographic combatant commands, including integrating with Ally and partner-nation operational medicine and fixed-facility trauma capability. The combatant command trauma system serves as a crucial asset for these commands and the Department of Defense more broadly by ensuring rapid and effective medical care for injured service members within their respective operational theaters. By providing dedicated assets, this system enhances the geographic combatant commands' ability to sustain military operations and support mission success across the range of trauma system tasks, functions, and responsibilities.

Yet, despite its effectiveness at the individual command level, focusing primarily on the needs of US military personnel through US military treatment facilities, the combatant command trauma system lacks integration at an international level and with Allies and partners. Collaboration and integration with international trauma systems could offer significant benefits, including enhanced interoperability, resource sharing, and collective response capabilities in multinational operations. Integrating Allies and partners into the command-level and broader DoD global trauma system would also facilitate the exchange of best practices, promote standardization of trauma care protocols and collaborative trauma research and development, and ultimately strengthen overall medical readiness and resilience in Joint and combined military operations.

---

20. Ellen J. MacKenzie et al., "A National Evaluation of the Effect of Trauma-Center Care on Mortality," *New England Journal of Medicine* 354, no. 4 (January 26, 2006), https://doi.org/.

21. Howard et al., "Combat Casualty Care Data."

This is especially true within and around the First Island Chain, a Pacific geographical area essential to military operations that features limited US trauma system capability. As the closest island chain to the PRC, it can be theorized that initial LSCO would be conducted within this region, and the Second Island Chain, which includes Guam, might serve as a buffer zone bordering the theater. A system that creates an interconnected lattice of trauma centers within Ally and partner nations—such as Australia, Indonesia, Japan, Malaysia, Papua New Guinea, the Philippines, South Korea, Vietnam, and Taiwan—will be essential for delivering far-forward care for US, Ally, and partner-nation personnel (fig. 2).

The Defense Department has worked with each of these countries in the past through a range of global health engagement efforts, some including casualty and trauma care.[22] This could and should include military and civilian personnel supporting or affected by the range of military operations. Building on these existing DoD global health engagement efforts with enhanced medical capabilities becomes even more important when considering the possibilities for delayed evacuation, extended evacuation routes over the Pacific, and the previously mentioned potential for Role 2 MTF bottlenecks.

22. Joshua Michaud et al., "Militaries and Global Health: Peace, Conflict, and Disaster Response," *Lancet* 393, no. 10168 (January 2019), https://doi.org/; Terry M. Rauch et al., "US Department of Defense Global Health Engagement: Supporting Global Health Security, Readiness and Interoperability," *BMJ Military Health*, December 22, 2023, https://doi.org/; Derek Licina, "The Military Sector's Role in Global Health: Historical Context and Future Direction," *Global Health Governance* 6, no. 1 (2012); and Thomas Cullison, Charles Beadling, and Elizabeth Erickson, "Global Health Engagement: A Military Medicine Core Competency," *Joint Force Quarterly* 80 (January 1, 2016), https://ndupress.ndu.edu/.

Figure 2. Conceptual member states of a globally integrated trauma system

During a potential conflict in the US Indo-Pacific Command, the proportion of estimated casualties coming from ground forces and naval forces will vary. The ratio will fluctuate based on the timing and breadth of operations by forward-assigned assets compared with that of amphibious assaults or other littoral operations. Nevertheless, hospital ships may prove valuable in augmenting the casualty treatment and evacuation system. The Navy's humanitarian efforts with the USNS *Comfort* and USNS *Mercy* have already proved fruitful in providing care while strengthening partnerships globally.[23]

Furthermore, the United States has announced the creation of three new expeditionary medical ships to more than double its current medical ship fleet, signaling its investment in supporting ship-based trauma care and evacuation.[24] This expanded utilization of hospital ships is likely the first sign of increased preparations to ready trauma personnel and operations for possible Indo-Pacific conflict. With hundreds of hospital beds and a dozen operating rooms, each ship could serve to facilitate operations at various points on the trauma lattice, similar to the way hospital ships were used during World War II. These hospital ships may also serve as large, mobile resupply vessels for Class VIII (medical) materials, including blood.

Yet despite the capability provided by a growing number of hospital ship platforms, shortfalls remain in closing anticipated trauma system gaps during large-scale combat operations and associated distributed maritime operations. The proposed DoD global trauma system would maximize limited trauma care resources and mitigate the risk posed by the anticipated casualty volume and rate.

Moreover, such a system would promote the JTS concept of expeditious medical performance optimization. This concept involves the collection of injury and treatment data, analysis of the quality of care delivered, development of evidence-based clinical practice guidelines, and the utilization of these outcomes to modify education and training for the future.[25] Such an automated, system-wide data-collection process would maximize trauma care performance, with appropriate consideration given to ensuring such collection aligns with information privacy and data limitations of Ally and partner nations.

Data centralization and inherent adaptability were essential components of the strategy that improved mortality in the GWOT by increasing US, Ally, and partner-nation

23. Alicia G. Sykes et al., "Trends in Surgical Case Volume during Pacific Partnership Missions Onboard USNS Mercy," *Military Medicine* 188, no. 7–8 (December 15, 2021), https://doi.org/; Shane Jensen et al., "Integration of Surgical Residency Training with US Military Humanitarian Missions," *Journal of Surgical Education* 72, no. 5 (September 2015), https://doi.org/; "USNS Mercy Delivering Medical Care, Humanitarian Assistance to Pacific Islands," Indo-Pacific Defense Forum, November 6, 2023, https://ipdefenseforum.com/; and Alex Wilson, "Navy Hospital Ship Wraps Up Annual Humanitarian Mission in the Pacific," *Stars and Stripes*, January 25, 2024, https://www.stripes.com/.

24. Heather Mongilio, "SECNAV Del Toro Names Next-Generation Hospital Ship Bethesda," *USNI News*, January 9, 2024, https://news.usni.org/.

25. Jennifer Gurney et al., "The 'Survival Chain': Medical Support to Military Operations on the Future Battlefield," *Joint Force Quarterly* 112 (February 16, 2024), https://ndupress.ndu.edu/.

combat casualty survival and return to duty.[26] The execution of care optimization is however limited by the ability to coordinate and communicate with points in the lattice, reinforcing the importance of pre-conflict multination partnerships.

Operationally, a DoD GTS structure could enable the quick maneuvering of far-forward surgical assets to the medical decisive point, the swift movement of casualty evacuation platforms to collect injured service members during breaks in fighting, and the prompt medical situational awareness for onward patient movement. A modified five-pronged approach originally proposed by one study is necessary to ensure the development of a global trauma system for the Department of Defense, and in collaboration with Allies and partners.[27]

(1) Optimize Global Health Engagement

- Optimize ongoing global health engagement, security cooperation, and formal development efforts conducted across the various geographic combatant commands by the total force—active-duty, guard, and reserve—and the interagency in support of a DoD GTS.

(2) Increase Trauma Care Readiness

- Leverage Ally and partner-nation trauma resources, capabilities, and capacities to support combined military operations.
- Enhance partner-nation medical infrastructure, contingency planning processes, prehospital care guidance, and advanced evacuation assets.
- Share novel trauma care research, guidelines, and best practices to provide measurable benefits to all stakeholders.

(3) Enable Interoperability

- Enable effective and efficient allocation of US, Ally, and partner-nation trauma care resources, casualty evacuation platforms, and personnel.
- Standardize system-wide trauma care doctrine and associated tactics, techniques, and procedures used for the execution of successful treatment and evacuation collaboration.
- Establish trust and build rapport among US, Ally, and partner-nation military medical personnel.

---

26. Donald H. Jenkins and Jeffrey A. Bailey, "Origins and Importance of the Joint Trauma System," *Journal of Trauma and Acute Care Surgery* 81, no. 5 (2016).

27. Kyle Remick and Eric Elster, "Trauma Care in Support of Global Military Operations," *Joint Force Quarterly* 86 (January 26, 2016), https://ndupress.ndu.edu/.

(4) Enhance Interagency Partnerships

- Build long-term trauma care relationships with Ally and partner nations to enhance trauma care efforts between the Defense Department, Department of State, US Agency for International Development (USAID), and nongovernmental organizations.
- Maintain robust military-to-military, military-to-civilian, and civilian-to-civilian trauma care partnerships involving the Defense Department, State Department, USAID, academic universities, and hospital institutions.

(5) Support Integrated Deterrence

- Integrate trauma systems across military domains and nonmilitary domains, such as health.
- Integrate across all geographic combatant commands and link back to the homeland through the National Disaster Medical System.
- Integrate across the spectrum of conflict with primary efforts in shaping operations.
- Integrate with diplomacy and development efforts to take a government "3D approach," that is, addressing defense, diplomacy, and development.
- Integrate with Allies and partners through mutual investment and risk mitigation.[28]

Engagement Framework

Strengthening casualty care capacity in the Indo-Pacific region and beyond involves creating a framework for trauma system efforts. First, the United States, in conjunction with Allies and partners, must determine the trauma system requirements to collectively support large-scale combat operations, current capabilities, gaps, and solutions to mitigate the current trauma system risks. A holistic analysis of expected needs, based on casualty estimates, will create a standard to which current capabilities can be compared. Identified gaps in capacity and capability can then be addressed.

Second, a strategic transformation concept of operation should be developed to transform the geographic combatant command trauma system into a DoD GTS that can support the identified requirements. This would include establishing the legal framework for internal (Defense Department), interagency (for example, State Department and USAID), multilateral (World Health Organization [WHO]), and nongovernmental organizations to provide trauma care to US, Ally, and partner-nation military and civilian personnel even when it extends beyond their traditional scope of coverage.

28. Robbert Gabriëlse, "A 3D Approach to Security and Development," *Connections* 6, no. 2 (2007).

Importantly, this framework and combined efforts could expand to support the WHO Global Emergency and Trauma Care Initiative, which addresses injuries that killed 4.4 million people around the world and constituted 8 percent of all deaths in 2019.[29] Nearly 90 percent of injury deaths take place in low- and middle-income countries. The DoD GTS efforts could assist partner nations in closing this gap.[30]

Across the interagency, DoD civilian employees are traditionally only covered for space-available care under TRICARE, and State Department providers are only authorized to provide care to chief-of-mission personnel whose host agencies have contributed financially to gain coverage. In each of these situations, department policies or congressional legislation should be proactively updated and/or developed to offer streamlined protocols that eliminate any financial or administrative obstacles that could prevent patients from receiving care from interagency partners.

Furthermore, the rules that allow DoD providers to offer trauma care to foreign nationals during conflict or humanitarian settings should be extended to Department of State providers at international embassies and consulates. This would allow providers to apply their expertise in the local community and hospitals to strengthen relationships rather than just serving chief-of-mission personnel. Removing logistical and administrative barriers to care will enable the Joint Trauma System and the DoD GTS to incorporate interagency resources into their strategy and associated plans for not just DoD casualties, but all US, Ally, and partner-nation casualties that need definitive care within and outside the theater of operations.

These efforts should extend across all phases of operations including, but not limited to, defense support to civil authorities, integrated deterrence, conflict, and stabilizing activities that rebuild countries after conflicts end.[31] Doing so would increase the scope of the Department's global health engagement activities supporting US Allies and partners employing the total force as well as interagency partners to support global health security.

Increased interagency and multilateral collaboration would facilitate information-sharing regarding the current state of US, Ally, and partner-nation trauma system capabilities through completed assessments. This should minimize the intrusiveness of assessments on potential partners, reduce the cost of conducting repeated assessments, and maximize efficiency by ensuring that all collaborators with a need to know are informed for their respective planning purposes.

Third, it is important to ensure that global health engagement, development, and diplomacy efforts established through the DoD GTS are intended to primarily serve US, Ally, and partner nations' regional security and defense strategies, including their domestic health security needs for trauma care. Global stakeholders should understand that system-wide

29. "Global Emergency and Trauma Care Initiative," World Health Organization (WHO), 2024, https://www.who.int/; and "Injuries and Violence," WHO, March 19, 2021, https://www.who.int/.

30. "Global Emergency."

31. *Joint Campaigns and Operations*, Joint Publication 3-0 (Washington, DC: Chairman of the Joint Chiefs of Staff, June 18, 2022), https://www.dau.edu/.

agreements will target locations, capacities, and capabilities pertinent to shared military and global health security objectives between the United States and its partners.

Global health engagement should focus on mutual benefit, address systemic issues, and enhance security cooperation—in short, it should serve as a a form of soft power.[32] These efforts may include enhancing highly capable trauma centers in existing Ally and partner nations. They may also include establishing trauma centers in low- and middle-income countries with capabilities that could both improve local care and accept American casualties en route to Role 4 facilities during contingency operations. The selection of a trauma system site should align with established combatant command campaign plans and the existing geographic combatant command trauma system. Geographic diversity, surge capacity, and strength of preexisting relationships through treaties and defense cooperative agreements should also factor into site selection processes.

Last, Ally and partner nations selected as part of the DoD global trauma system should undergo an assessment and capability development process. While many of the potential nations in the area of responsibility have been assessed by various agencies, often these reports lack standardization, verification, and collaboration. Consequently, increased interagency collaboration should include information-sharing about foreign capabilities to maximize efficiency, save costs, and reduce the burden on partner nations.

As discussed, enhancing Ally or partner-nation trauma systems will be crucial in supporting military operations in regions where US military resources are limited or not readily available. This may be due in part to the dispersion and demands of LSCO in the Indo-Pacific and the resulting diminished capability of the United States to provide immediate trauma care to service members. To integrate the medical capabilities of such partner nations to create a global network for casualty care, a formal method that focuses on both evaluation and enhancement of existing trauma systems is critical.

The Global Trauma System Evaluation Tool (G-TSET), developed by an international team of military and civilian health care providers and other experts and piloted in South Sudan, is one such proposed tool. This capability enables trauma systems assessments in a variety of low-resource settings and serves as a framework for "nation-centered development" based on identified gaps.[33] Findings using this tool form the basis of a system gap analysis in trauma and emergency care that, with the input and support of Allied or partner-nation military and medical leadership, can be targeted for the creation of a short- and long-term strategy. This specific tool identified critical components of a trauma system for evaluation, including leadership and organization, prevention of injuries, access to care, initial injury care and resuscitation, acute injury care, rehabilitation, and education, research, and quality improvement.

32. Aizen Marrogi and Saadoun Al-Dulaimi, "Medical Diplomacy in Achieving U. S. Global Strategic Objectives," *Joint Force Quarterly* 74 (July 1, 2014), https://ndupress.ndu.edu/.

33. Kyle N. Remick et al., "Development of a Novel Global Trauma System Evaluation Tool and Initial Results of Implementation in the Republic of South Sudan," *Injury* 45, no. 11 (November 2014), https://doi.org/.

The use of an assessment such as the G-TSET or another approach developed in concert with the JTS, the American College of Surgeons, Joint Commission International, or WHO could ensure trauma system readiness, identify and prioritize deficiencies, and implement necessary changes unique to an Ally or partner-nation medical care facility. This would ultimately allow for a more integrated military and civilian trauma system while also bolstering the capacity of partner nations to care for their civilian trauma patients outside of regional conflicts.

Expanding beyond military-to-military relationships, the DoD global trauma system should consider whole-of-government treaties and agreements to support a military-civilian trauma system—in partnership with the Department of State, Health and Human Services, and USAID. This could include updating and expanding existing global health engagement efforts and health care resource-sharing agreements with Ally and partner nations to set the conditions necessary to generate and share bed capacity in time of need.[34] Given notice, Ally and partner nations per bilateral agreements could clear beds—for instance, cancel elective procedures—to provide capacity for DoD, Ally, and partner-nation casualties in support of an LSCO event. Through these agreements, Ally and partner nations could be reimbursed by the Department of Defense for the treatment of DoD military casualties and other beneficiaries. This concept is modeled after the approach used by the US government with private-sector medical facilities in the National Disaster Medical System, though in this case it would extend across international borders.

Conclusion

Although this article focuses on the establishment of a trauma system to augment casualty care and alliances in the Indo-Pacific region, a DoD global trauma system would truly be global in nature and application. Despite regional differences in terrain and adversaries, the broader obstacles in a multidomain, large-scale combat operations environment, plus the strategies that the United States should follow to address them, remain the same. This includes Ally and partner-nation capabilities at every level of care, the complete interoperability of trauma care across US agencies and with US Allies and partners, and the enhancement of Ally and partner-nation health systems to address their own domestic needs.

These efforts serve as an integrated system for the United States and its Allies and partners to draw from across the range of military operations in each region of the globe, with particular emphasis on the Indo-Pacific, where the most pressing threat exists.

To move a DoD global trauma system concept from proposal into practice, congressional support to authorize a pilot program through the National Defense Authorization Act (NDAA) would assist the Defense Department in addressing a potential national security threat of limited trauma system capability and capacity in support of integrated

34. Derek Licina et al., "Expanding Global Health Engagement through Multilateral Security Organizations," *Military Medicine*, December 11, 2023, https://doi.org/; and Lee et al., "National Disaster Medical System."

deterrence and LSCO. The Department of Defense and the interagency could undertake a pilot program to develop and test ways to strengthen international military-military and military-civilian interoperable trauma systems to care for the nation's casualties and support international partners in doing the same. The DoD GTS would directly support the DoD Unified Command Plan, theater campaign plans, the State Department, USAID Development Joint Strategic Plan Fiscal Year 2022–26, and select partner country US Ambassador Integrated Country Plans.[35]

The DoD GTS pilot would seek to mitigate injury risk to military forces and civilians from the United States, its Allies, and partners, while eliminating preventable deaths and disability through prevention and evidence-based care. This program would be designed to increase medical surge capabilities and capacity by strengthening interoperable partnerships with key Allies and partners across regional combatant commands to care for the nation's combat casualties while supporting these Allies and partners in doing the same. The United States, its Allies, and partners that are working together to support global security, peace, and health deserve nothing less. ✈

35. *Joint Strategic Plan, FY 2022–2026* (Washington, DC: US Department of State [DoS] and US Agency for International Development, March 2022), https://www.usaid.gov/; and *Integrated Country Strategy: Philippines* (Washington, DC: DoS, March 21, 2022), https://www.state.gov.